MATT BROWN: All right, well it looks like it's 1 o'clock. So I can get things started here now. Thanks, everybody, for coming out. Good turnout for the class today. Just a little bit of background on myself. My name is Matt Brown. I've been with RISA for eight years now. And in that time, basically from day one, I've been the sort of lead on the RISA-Revit Link. So I don't do any of the actual programming for it, we have separate developers who do that, but I guide them on how to do the programming and tell them what features to put in and test it and everything else. In the earlier years, especially if you ever have any tech support stuff with it, you probably have talked to me on the phone before, or emailed with me back and forth. I don't do that as much any more, just because I've been doing more development management around there, including the strategic management for our RISAConnection link, which I'll be showing you guys today.

And then in addition to that, too, I also have my own engineering consulting business, where I work as a practicing engineer. And so it helps me a lot to sort of get things from the other perspective as well in terms of how do you actually use this stuff in real life. Because certainly, when you do these presentations, you draw a nice little rectangular building with flat roofs everywhere, and then you go, look at this, it's so easy. It round trips back and forth, no problems. But as we all know, that's not how real life works, and so I've hit a lot of these snags in projects that I've designed and stamped myself, where I've then had to go back and say, look, I need to change the way the software operates so that it's easier. But I haven't certainly caught everything. So I would encourage you guys as well to please get in touch with us whenever you run into any issues with the Link, or if you have ideas or suggestions for it.

Because the one thing that I found with the research link is that I can test this thing eight hours a day, five days a week, and never hit problems that other people do, just because in a certain way, I'm conditioned to build these models the way that I do. And maybe I draw all the beams left to right, and you draw them all right to left. And so I never catch that, oh, there's a bug if you draw the beam right to left. So stuff like that does happen. And I would definitely encourage, if you run into problems, please contact us. We get the fixes out. Nowadays we're patching the Revit Link about four times a year. So if there's a bug that I can't give you a workaround for, at least I can give you a timely patch for it as well.

So anyway, without further ado, today's presentation is going to be really all about some

advanced topics and troubleshooting. So I'm assuming you may know something about round tripping with Revit already with RISA. If you don't, there's a lot of good videos up on our web site, including last year's presentation that I gave that was all about the roundtrip workflow and about how to bring rebar and foundations back and forth. With this class, though, I wanted to touch on a number of specific subjects where it's problems that I see people run into again and again. And I sort of wanted to address this whole frequently asked questions, almost.

So what I've done is I've put together a slide show that can also sort of act as an FAQ. And I was going to print it out and hand it out to everybody, but in my experience, when I've taught classes like that before, everybody just sits and reads the handout all day and doesn't look up at the screen. So in lieu of that, what I'm going to do is make this available to you guys as a PDF. So after the class is over, if you want to drop ovv your business card or pick up one of mine up at this table here, and shoot me an email or if you leave me your business card I'll email it over to you. And that way you'll be able to get a copy of this, so that you can use as a reference. And then also, I've got a direct channel with you so that we can talk back and forth if you run into problems using the link or anything else. So I'm available any time to discuss anything with the RISA-Revit Link. My goal is just to promote it for as many of you guys to use it for as much stuff as possible.

All right. So this is a slide that I am mandated to just have in here, but I don't expect anybody to read it. This was just the class summary. And learning objectives. We're going to skip right on by that. And before I begin, I just want to give you guys a little bit of an update on where things stand. We released our final link for Revit 2016 back in-- I think it was May or June, probably. That's done now. Revit 2016 development is finished. So if you're still stuck on 2016, you can use that Link. But you're not getting the new features that are coming forward. Currently all of our development's occurring on the Revit 2017 platform. We've got an update coming to it that's going to be out next month. It's actually just been delayed because I've been out here doing all this stuff, and I still have to finish testing it. And that is just sort of a pick up of bug fixes that people found over the summer that we've gotten in there. So when that's available, I would definitely recommend updating it.

We're working on this RISAConnection Link right now that I'm going to show at the end of the day today. That's going to be rolled out as part of our final Revit 2017 Link that's going to come out at the same time as our first Revit 2018 Link. So basically whenever Autodesk comes out with a new version of Revit, we halt all development on the previous version,

release a link with whatever we've done up to that point, and then move forward on the new platform. Because it's just too time consuming to develop simultaneously in multiple Revit platforms at the same time. So you can expect in the Spring, when Revit 2018-- or whatever they call it-- comes out, that you'll see two new Revit Links, one for 2017, one for 2018. They'll be functionally identical, but they will also have that connection link in there.

All right. So these are some of the common topics that I've run into with just tech support and other issues. So as you can see up here, I'm not going to bother reading them off, because we're going to be going through these on slides one by one. But these are important for how you go back and forth between RISA and Revit. And here's just a few more of them that I've got up here. And then lastly, of course, the steel connections, as well, which is a new feature.

So let's start off and talk about coordinate systems for a minute. And what I'm going to do is I'm going to run through the slide show first, then I'm going to pull up a model, and we're going to sort of live fix some of these issues so you can see how it's done. There's a lot of confusion over coordinate systems with Revit because Revit has two different coordinate systems. They have a survey base point in a project base point. And depending on who sets up your Revit model, especially if you're dealing with an architect, they may be working off of one coordinate system versus another.

Now, the survey base point is intended to be some sort of actual location as determined by a survey. So as you can see here, for example, I could have my base level at 1,078 feet. And while it doesn't matter in general, you'll find that if you bring a model into RISA with this coordinate system, your numbers are all huge. And so it can make it a little bit difficult to work with some times, versus dealing with a project base point, where we're talking about zero. I mean, a great example of this is my node coordinates in RISA, for example. Do I want my node coordinates of this floor to be 1090.618746255? No. I just want it to be 12.0000. So that way if I need to add in new members, I can easily drop in a node there. So I would definitely recommend paying attention to what coordinate systems you have in your Revit model. And when possible, work off of the project base point. Because that's the whole point of the project base point, is that we can give ourselves a convenient 000 in the model to work with.

Now-- yes?

AUDIENCE: Just a quick question on that. So if we're using [INAUDIBLE] to [INAUDIBLE]

MATT BROWN: Well, you can pick-- the Revit model always has a shared coordinate system, whether you

want it or not. So they're both present. And what you can do is you can pick, when you export to RISA, which coordinate system you want to go with. So I always lean towards project, but I'll always pay attention to project. And we'll see in the model here, too, how we can view these things both ways.

Another factor to that as well is true North versus project North. Once again, when you're coordinating with civil, they're are going to be very concerned about where the true North is for getting all their site stuff done. But when we actually go in and do the design, I don't want to design a skewed building like this, primarily because, when we go in and do things like, say, seismic or wind load generation, I'm generating along two global axes, x and z. And if I generate a horizontal and a vertical load here, none of my moment frames here are orthogonal to that load. So my design's not going to make any sense. So that's why we want to use a project North orientation. But once again, you get to choose which ones you want to export when you go back and forth.

So right here is a screenshot from the RISA-Revit Link, where I'm showing you-- this is the area where you choose which one you're going to go with. So these dropdowns allow you to choose project or survey, project North or true North. So this is something you want to pay close attention to when you're doing your importing and your exporting, as to which system you're using.

All right. The next item relates to RISAFloor. So for those of you who don't know, we have two different analysis and design softwares, RISA3D and RISAFloor. RISAFloor is our building design software, whereas RISA3D is more of a general purpose software. Because RISAFloor does building design specifically, and because Revit is building information modeling, they tend to integrate with each other more tightly than RISA3D and Revit do. Because RISAFloor knows things like slabs and slab openings, and decks and joists and stuff like that. Whereas RISA3D is really just all about members and columns and beams and whatever.

So with RISAFloor, though, it does carry one limitation, which ultimately will be removed from the program, but you can't believe how difficult it is to pull this out. Although it sounds simple. In RISAFloor, you can only slope the topmost level in your structure. Which means that if you have a low roof, like I'm illustrating right here, you can't slope that in the program. And so, what we have to do is we have to basically flatten the low slope roofs when we go back and forth. Now, certainly if this was a high sloped roof, I would take a totally different approach to how I would do this. I would export this separately as what I call RISA3D only members, and

we'll see that a few slides later. But for right now, let's say that this is a quarter inch on 12 just for drainage. Well, in terms of structural analysis, it doesn't make any difference whether that's flat or whether it has that quarter inch on 12 slope. So in order to make it friendly for RISAFloor, I will project those beams to be flat in the analytical model, and keep them sloped for the physical model. So my drawings look correct, but my analysis occurs as though the beams were flat. That gets me around that limitation in RISAFloor.

Now, something else about sloping members. When we're talking about the top most level where you are allowed to do sloped roofs, another important thing that I see people usually aren't aware of is that in RISAFloor, you have to do a positive offset when you slope a floor. Which means that if I have a bottom of roof level and a top of roof level in Revit, I always want to reference all of my roof beams to that bottom of roof level that's down at the eve, and then give them a positive offset as opposed to referencing them all to the top of roof level, and then saying this end is at negative 3 and that end is at negative 2. Because RISAFloor is not going to support that either.

Again, not too difficult to do. And in fact, if you made the mistake right now in this model of calling these all out as part of the top of roof, it's really easy in the revenue model just to change the reference level that you have. So you can see that we have a reference level drop down in Revit for the beam to pick which floor this is part of, and if I just change that from top of roof to bottom of roof, those numbers will automatically upset so that the beams-- or, updates so that the beam stays in the same place. But now they're all positive instead of negative. So small issues, but important things to pay attention to.

Now, if I'm going to do that projection of the analytical model, I do have to choose which model I'm going to export to RISAFloor. And I would want to choose analytical as opposed to physical. So in our example from a couple slides back here-- let me just hop back to this one. There we go. In this example, if I export physical, this will try to come over as sloped. It'll say it doesn't support slope framing at a lower level. It'll automatically flatten it, which won't seem like a bad thing, until I come back into Revit and it will actually flatten those physical members and pull them all up and kill my slope, which then is going to mess up all my drawings. So this is where I want to make sure, when I choose the dropdown of which model to export, that I choose the analytical model instead. So sort of small settings that have a big impact on how you go back and forth in the software.

The next thing is managing levels. Oftentimes, especially when you're coordinating with other

disciplines, they will create all sorts of levels in your Revit model that have nothing to do with the structure, like my type of toilet stalls level here, for example. You see a lot of models come through that are just riddled with all these excess levels that have nothing to do with the structure. And the problem is that when we go over into RISAFloor, the link was built with the notion that each level in Revit is its own floor. So if I export this model as is over into RISAFloor, I'm going to have a whole structural floor system created that's at top of toilet stalls. And all it's going to have is just columns. But the program's then going to try to want to define a diaphragm there, figure out how much seismic force the toilet stalls are getting, all of this other stuff. We don't want to do that.

So what I recommend doing is using the RISA parameters to indicate to RISA that that is not a structural floor. And the way you do that is, in the RISA-Revit Link up on the top toolbar, there is this button called RISA Parameters. And these are basically extra checkboxes in Revit that you can use to set up things that the RISA-Revit Link cares about. So first things first, you're going to want to turn those parameters on, and one of those parameters is called the reesa structural floor. And if that box is checked-- this is a property of the level by the way-- then we will bring it as a floor into RISAFloor. If it's not checked, we will basically ignore that level. And so in this case, it would make sense to uncheck that box for top of toilet stalls but leave it checked for level 3.

Now, RISAFloor aside, we also have RISA-3D, and as I mentioned, RISA3-D is a wide open program. You can do a geodesic dome in RISA-3D. It doesn't care about the concept of floors. It has no concept of floors or levels. So by contrast, one of the issues you can run into when you go back and forth between RISA-3D and Revit is that RISA-3D, when it comes into Revit, it doesn't know what levels are what, so it just creates them wherever it sees fit. And sometimes that won't make sense. So for example, if I export this frame into Revit, it might create all of these levels right in here, because it's just interpreting where the tops and bottoms of certain members are.

So what you can do to get around this is you can set up your levels in Revit ahead of time. So for example, for this frame, I would just set up three levels of ground, eve, and peak. And then when you import into Revit, you have an option of either Create New Levels As Required or Use Only Existing Levels. So if I check the box says Use Only Existing Levels, it won't add or delete any of my Revit levels. It will just basically tie these members to the nearest level that makes sense, and use those in this case.

All right. Now, RISAFloor has a special license, RISAFloor ES, which is for elevated two-way concrete slab design. And with RISAFloor ES, you can do the design of elevated two-way concrete slabs. However, coming back to the parameter issue, the program needs to know whether your floor is supposed to be a beam supported floor or a two-way slab floor. Because we really can't tell. Especially when you have concrete beams and slabs, we can't figure out-- do you just mean to basically have this be a one-way floor, where it's just sitting on these concrete beams? Or is this all cast in place. There's no way for the program to ever figure that out. So you as the engineer need to specify it. And you can do it, once again, with the RISA parameters. So each level, in addition to having a structural floor check box, has an elevated slab check box. If you check that box, then when you bring it over, we will do a two-way FEA analysis of the floor, like it's a concrete two-way slab. If it's unchecked, then we're just going to treat that as a deck, basically, whether it's a precast concrete or metal deck, or composite deck or something else, sitting on top of beams. So we need to know this ahead of time. That's another important parameter to check. And then whenever you're exporting elevated slabs, you need to make sure to check the box in here for elevated slabs to get those to go out to RISAFloor.

Another big issue that you run into a lot is miscellaneous elements. This is a lot of [? facia ?] steel, little miscellaneous steel, [? davits, ?] all these other weird little things that really have nothing to do with the larger structural design of the building, but they get included in the Revit model, because you're trying to make the Revit model complete for the drawings. And certainly, if I have this little single angles here that are supporting a sign or a break or something like that, I want those present in the Revit model, but I don't want to have these little single angles considered in my lateral analysis and design of the building. I mean, they're totally irrelevant. But they will get in the way. And in a lot of cases, too, with the way these are modeled, they'll just be floating in the Revit model, because they're where they need to be. But then when you go into RISA-3D, for example, you'll get instability because you've got these members floating there that have nothing to do with anything.

So what you want to do with those elements is the same thing that you want to do with small wall openings that are basically insignificant. So if I had two pipes coming through here that are a six inch diameter pipe, I'm designing this as a shear wall. I don't want the shear wall to have to consider the subtraction of this area in the meshing and the design and the rebar. I mean, these are really small openings, but they need to be there for multi-discipline coordination. So I also-- similar to the miscellaneous steel-- want to shut those off. What I can

do is, Revit has this checkbox called Enable Analytical Model on all the elements in there. And if you uncheck that box, it shuts off the analytical model for that element. And what that means is that the RISA-Revit Link will ignore that element. So we won't send it back and forth. So with these angles and with those small wall openings, if I uncheck the Enable Analytical, then I don't get the little frames, and I don't get the little holes in there. So what you see on the screen here is what RISA will see, but it will preserve those openings and those little single angles in the Revit model, even when you do round trips back and forth, so that your drawings don't get messed up.

Another important thing to bring up is model backups. Because no matter how hard you try to get everything right on your first try or your 10th try, inevitably you will miss something, and something may go wrong. So what we introduced in the Revit Link last year was that now, immediately prior to doing any import or export operation with the RISA-Revit Link, it does a complete backup of your project. So it takes a snapshot of your Revit model, your RISA model, all of the exchange files, the solution files, basically any file on your computer that's related to either of these two. And it copies them all into a folder called import backup or export backup, depending on which way you're going.

And so what that allows you to do is basically take it complete step back from where you were just by copying those files in. So here you'll see that on my computer, it created this import backup folder. And it put both my model, .rfl's, the floor file, the exchange file, the solution and results is the _sr, I don't even know what the temp file's for, but I'm sure it's important, and the .rvt file. So if I did an import into Revit, and all of sudden I'm like, oh, crap, it just blew away all my beams. Like, this is really bad. Instead of freaking out about it, I'm simply going to close the model, and go into this import backup folder, and just drag all these files out to the main folder, overriding the files that were just created during that import. And that's basically stepped the whole project back to five minutes ago before I blew away all my beams. So that allows me to experiment and do things without worrying about losing all of my data. So that import backup and export backup folders, I've found to be very useful.

They're also great for tech support, too. So if you ever run into an issue where you can't figure out what's going on, obviously I need to be able to recreate it on my own computer back at the RISA office in order to figure out what the issue is. So what I'll ask is that you basically zip up all the files in your import or export backup folder, and just email me that zip file. And then on my computer, I have your exact project in the state it was before you hit Import, and so then I

can hit Import on my computer and get the same whatever thing happened occurring on mine, so I can recreate it.

Yeah?

AUDIENCE: Does that just keep one iteration?

MATT BROWN: Yes, by default it keeps one iteration. But if you want to, you can manually go in and basically create zip files each time you do that, and then save those zip files somewhere else. So that would actually allow you to keep snapshots of your project throughout as it goes along, in case you ever needed to go back several iterations.

All right. Another big topic is RISA-3D only members. This relates to RISAFloor. So basically with RISAFloor, there's certain complex structures that can't be done. trusses, for example, can't be done directly in RISAFloor. But RISAFloor has a RISA-3D model embedded underneath it that can do all of the complicated geometry. So what I would do in this case is I would model the top cord of that truss as a beam in RISAFloor. when I solve it in RISAFloor it's going to say it fails, but then when I go into RISA-3D underneath RISAFloor, I can model the bottom cord and all the webs in there and get a full FEA on that.

The trick to that is that I need to call out all the members that I want to be RISA-3D only members as horizontal bracings. You see there's a structural usage parameter on those members. And if you call it as horizontal bracing, RISAFloor will ignore it and it will pass right through to the RISA-3D model underneath RISAFloor. The same is true for braces as well. So if I model an element as a brace, it'll pass right through and just appear in RISA-3D under RISAFloor. And so you can see right here, in this case, the pink and red members, and then the other pink braces here, those came over as RISA-3D only members. But you won't see those in RISAFloor when you go to the full model view, there.

Custom families as are another common thing that I see people using. A lot of times, maybe the default wide flange family that Revit ships with is missing parameters that you need for this, that, or the other thing. We absolutely support the use of doing custom families. But what you need to do for that-- there's a checkbox in the program to set, but also the folder structure is critical. So if you take a look at the default rivet libraries, if you go to, say, the US imperial library, which is a default in there, there's a subfolder called structural framing, and a subfolder underneath that called steel. So when you import a steel beam in to Revit, we need to know where to go find that family. So we just take a look in the structural framing subfolder, and the

steel subfolder underneath that.

So if I'm going to build out my whole parallel library, I need to make sure that it follows this exact folder structure from Revit. And the other thing, too, is you can't do a subfolder. So I can't do Structural Framing backslash Steel backslash Matt's Steel Shapes, because it won't look underneath that. That was sort of a time thing with the Link, because in theory, if we supported subfolders, we would have to run down all the subfolders that were underneath there, looking around. And there could be conflicts. So for right now, we just sort of make you stick with that format.

And the way you can set that is in the RISA-Revit Link under the Advanced tab. So you'll see there's a shape library options, so in addition to the default Revit shape libraries, if you have your own shape libraries, you can just browse to where that is. You just want to sort of put the parent folder in that area there. And then, during import, it will look in a subfolder for structural framing, or structural columns, or what have you, for the custom shapes that you're using.

Another issue related to coordination is the ability to see your RISA member labels in Revit. So what we had in the past was, RISA would have its own label for the beam, Revit would have its own [? bim ?] ID for the beam, and it was hard to tell. So when you're trying to talk to somebody, one guy's got the RISA model open, the other guy's got the Revit model open. You're on the phone, and you're like, yeah, I don't-- why is M134 doing this? He's going, I don't know, what is M134? Well, we now import the RISA member labels as a parameter in Revit, and you can tag those. So if you use the beam annotations tool in Revit, you'll see there's an option for the RISA label. And so then in my Revit model, you see right here it has the F2 M13 F2 M12. The F2 is the floor level it's at, so puts that prefix in there. But basically now I can map 1 to 1 what those member labels are. So it makes it a lot easier when coordinating with people to go back and forth.

Now, I mentioned earlier about the RISA-3D only members for the trusses. And I mentioned how we could shut off the miscellaneous steel for analysis. But one thing I didn't mention is that you can link multiple models together as well. And so, for example, with those little steel frames that I have, I can actually export those as a totally separate model from RISAFloor, and get a separate design analysis for that. And it is OK for me to do that. So, for example, maybe I want to do the whole building as one big RISAFloor model that has everything, and then I want to do a separate model just of that miscellaneous framing in RISA-3D just so I can do some checks on that one. That's not a problem at all. What we need to use for that one is the

Export Selected Items Only function.

So basically I would, in the case of this building probably, either select everything but these members in Revit, or otherwise shut off the analytical elements for these members, go out to RISAFloor, do everything that I need to do, and then as a totally separate operation, while RISAFloor is doing its thing, just grab only these members, check that Export Selected Items Only, and then send that in to RISA-3D.

Now, the only thing that I have to point out to you is that it's very easy to make mistakes with this workflow. So you need to be careful with what you do. And remember that you have that import backup and export backup folder, which is basically your undo function right there. Because it's possible, if you don't keep track of what items you had for selected only on subsequent roundtrips, you could start to basically get info from one model bleeding into another model, or vice versa. So it's not that it's a problematic feature from the perspective of how it works, it's just that you really need to pay close attention as the operator of the Link to be like, what am I sending out to where? But I want to make you aware that it is possible to do this, that there's no technological limitations to linking multiple RISA models to one Revit model.

Now the only thing that you can't do is, you can't link multiple Revit models to one RISA model. That's not possible. And the link will point that out to you. Because if you ever try to take a given RISA model that was linked to a Revit model and import it to a different Revit model, it's going to warn you. It's going to say that you're about to break the link with the previous Revit model. So I can't have Revit model A, Revit model B, and RISA model going back and forth between each other.

Now, that's the slide show. And as I said, if you guys want to leave your cards afterwards, or grab one of mine, I can send you guys this slideshow that has the screen shots in it. And it should be a handy quick reference. Now at this point, I'd actually like to go in and show you guys live how we can put all this to use in a sample model. So I'm going to leave the slide show now at this point and pop over into Revit. And this building should look familiar to you by. Now this is the sample building for this particular demonstration.

And so let's take a look first off at the coordinate systems that we talked about. So I'm going to pop over to a building elevation. And so what we see in here is, here are all my levels. And we can tell that these are probably at that project coordinate level system. What you can do in

Revit is click on a level, and you have to go up to Edit Type here. It's a little bit unintuitive, as to how you flip this. But if I go into Edit Type, I can choose whether the level's going to show me based off of the project base point or the survey point. So if I flip the survey point, now you'll see it flips to all those. So both coordinate systems are living in the Revit model at any given time. And it doesn't matter which one I have displayed here, because note that when I did that flip there, I could actually have a different view that had a different-- say my North elevation shows project, and my South elevation shows survey. That's possible to happen. So it's all about, when I export here, if I go up to Add Ins, I have my export to RISA button, it's all about which one do I choose here-- project or survey base point?

So for this particular project, it's very clear to me that we would want to work off of the project base point, so we're going to do that. And I'll hit OK on here. The next thing is the true North orientation. So if I pop over into level one. We'll see that here, our plan orientation is to true North. And so when you're in a floor plan, it's this dropdown right here where I flip between these. And I can set that to project North, and it will then orient it correctly for me here. So that's how you can see both of those settings back and forth within Revit.

All right. Now, coming back out here. I see that I have this low sloped roof. And I mentioned that if we want to take this into RISAFloor, analytically we have to flatten it. And you might know that if I look at my analytical model here, some of my elements are already up at that higher level, and some of them aren't. And the reason behind this is what's called auto detect. Basically, if I click on an analytical beam here in Revit, and I come over here to its properties, you'll see this analytical alignment. It just says auto detect. Auto detect is Revit basically trying to make its best guess as to where the analytical model goes. Sometimes it works right, a number of times it goes very wrong, too. So you need to pay close attention to this one. You can never really trust auto detect, and we're going to see an example of this as we go along a little bit further.

But for right now, for some reason, it seems to feel that these beams on the outside here should be up and flat at the floor level, but that these in-fill beams here should all be sloped down to there. We don't want that. So what you want to do in Revit is just highlight all of these beams. I'm going to filter it out so that it's just the beams that we have here. And I'm going to scroll down on the left here. And I'm going to change from auto detect to projection. And projection basically just means that I can put this wherever I want it to go, and this would be the z projection, local z, the lower case z is the vertical in Revit. I say, I want to project these all

to level three. And so if I choose level three, and then apply, it snaps them now all up to level three for me.

Which should be good, except for a funny little quirk that Revit has. If I zoom in, that beam sticks out past the girder. This is-- I don't know if it's a bug in Revit, or what-- but it's something that we've found.

AUDIENCE: [INAUDIBLE]

MATT BROWN: Oh, yeah, so it's local to the beam. There you go. All right. Thank you. Yeah, see? I wish you would have been there when I first ran into this. What happens with this is, basically you will kick this over into RISA and get an instability. Because it'll say, this beam's not connected to that beam, because it shoots past it by whatever tiny distance. And so that's a problem. The way we get around that is by using the analytical adjustment tools within Revit. Funny, though, that it didn't pull it out away from this beam, either. So there's some level of smarts there, but then a not level of smarts on this end of it.

AUDIENCE: [INAUDIBLE]

MATT BROWN: Oh, Revit. All right. So I'm going to pop over into my floor plan for level three here, and I'm going to shut off the model display, and turn on the analytical display. I"ll shut off the annotation as well. And so that way we can see this clearly here. What I'm going to do to prevent myself from getting these instabilities is I'm going to do an analytical adjust. And this is necessary from time to time to get everything to connect to each other. And so if I hit analytical adjust, I now have access to all the nodes here, and I can just pull those back so that they don't overshoot the beam. So I'm just going to pull that back to the beam here.

So you'll find if you leave Revit and go over to RISA and you get instabilities in RISA, it almost always means that you need to come back into Revit and do analytical cleanup in Revit, because things just aren't connecting quite like they should. So I'll hit finish now that I've dragged those points back, and come back to my analytical model. And now it looks like everything's connecting up well. So we should be fine with that.

Now, another thing that we have to take a look at is the floors as well, to sort of get away from that auto detect that we have going on. So I have these analytical floors as well. This is how RISA's going to interpret the diaphragm or the deck when we go over there. And what I want to do is change the alignment method for those as well to be a projection. So I'm going to

project this floor in to level two. I'll take these two floors here-- this is just a plain metal deck and this is a composite deck here-- and if I go to analytical floors, again, we will project these to be level three on this one. And then another quirk of the way that RISA handles it. With a sloped deck, for reasons, we need to project the deck to be flat. Now it'll still be designed as sloped when we go over into RISAFloor here, but this is how the projection needs to be in order for that deck to come over correctly into RISAFloor, is flat on there.

All right. So now I've got that set up. Another thing that we want to do is get rid of the excess levels and designate which levels in here are going to be for design, and which ones aren't. And which ones are going to be for two-way elevated slab versus not. So if I pop back over to the 3D view for a minute, you'll see I have beams there up on levels three and the roof, but down here this is just a two-way concrete slab that's sitting on these columns. So I want a two-way slab design in this case.

So I will come over into here, and let's start up at the top. As I mentioned, with slope beams we always want to reference the bottom most level and go upwards. So this top of roof level will have nothing to do with us. Under add-ins here, I have my RISA parameters turned on. This is just a toggle. You'll see with it shut off, I don't have that RISA structural floor option there. If I turn it back on, here now that's present. So I want to say the top of roof is not RISA reason structural floor, so I hit Apply. The top of toilet stalls, also not a RISA structural floor. Bottom of roof is, but it's not an elevated slab. Three is, and not an elevated slab. And then level 2 is both a structural floor and an elevated slab.

Now if I want to get that two-way design, one other thing that I have to make sure to do is for this floor system, I have an Analyze As flag here. I want to say that's a two-way floor system. So by calling it out as the elevated and the two-way, we ensure we'll get the correct design when we go over into RISAFloor.

And you'll also note here that miscellaneous steel that I pointed out. That for the drawing purposes for this little channel to come up to the underside of that beam, that looks exactly the way that we would want it. So if I'm producing drawings from this, for construction, we're good to go. But analytically, these are just sort of floating here, and these are just going to tip right over when we go to do an analysis if we bring it over. But as I mentioned, these aren't really critical for the design of the whole building. I can do this as a hand calc separately, or I could export these out to RISA-3D as their own thing.

So I'm going to select these elements here, and I'm going to go up to the filter here. Analytical Beams and Columns. And let's see here. You know what? I have to go to their physical counterparts. That's what I have to do. I can't select the analytical element and tell it it doesn't have an analytical element. So I come to the physical column. I'll uncheck Enable Analytical, I'll come over to the physical beam, again uncheck this Enable Analytical. So now those no longer have analytical components with them. And if I come to the analytical model, they're gone. So the RISA-Revit Link will pretend like those don't even exist at this point.

And then the little circular openings in the wall, you do that through the analytical adjusts. If I click that, you'll see there's this openings plus or minus box in Revit. If I click that, it has a checkbox for every opening on the wall, for me to indicate whether that should be in the analytical model. I'm going to uncheck that, and so then those openings don't exist in the analytical, although they still do exist for the physical model in this case.

All right. So at this point I've got the model cleaned up and I should be able to kick it out to RISAFloor. So let's go ahead and do that. I'm going to save the model here. And under add-ins, I'm going to say export to RISA, and let's just review our options real quick. If I export to RISAFloor, this is going to be a combined floor and 3D model, versus just exporting out to RISA-3D, and RISAFloor has a lot more tools for us to do this, such as that two-way concrete slab design. So I definitely want to go that way. We'll tell it to go ahead and launch the RISA program once I hit OK on here. I want the whole model to come out, so I don't need to say Export Selected Only.

We're going to go off the project base point. We're going to go to a project North. I want to export that analytical model so that I don't get the sloped beams coming down into RISAFloor. I can choose whether I want to have RISAFloor optimize the member sizes, or just check the sizes, in Revit. If you have a design that's dialed in and you've already, say, issued CDs at this point, but you have to go back and do something, strongly recommend doing the second option in here. Because otherwise, RISAFloor may just try to decide to resize all your beams for convenience. All right. So we're going to send out walls. I don't care about foundations in this case, but if I had modeled in a matte foundation or footings of the such, I would check those boxes. Everything else seems to be good here.

And let me just export this out right parallel to where the model exists. So I'm going to hit OK. It'll ask if I want to save the model. I say yes. And what it's done right now is it created that export backup folder. So we now have a snapshot of this model from right before the export

occurred. Now I get a summary of what got exported, and I hit OK. And we go into RISAFloor. Give this a moment to load. Now, one thing that I find right away in here is that RISAFloor has all of the members in there as-- they're going to be exported as gravity members instead of lateral members. And what I want to do is I want to do a full lateral analysis in this case, as opposed to the gravity analysis.

But when I come back in the Revit model, what I can do to adjust that is I can change the properties of these elements. So I've just selected all the analytical elements in Revit now. And I'm going to go up here to Filter. And let's just grab the beams and columns in this case. And you see I have this Analyze flag in here. Gravity versus lateral. I want to flip this to be lateral, in this case. So I'll hit Apply. And then for the walls, I want to take a look at these as well. I want these to be gravity and lateral, and they are going to correctly export that way. Excellent. So now I save this.

Now. What happened in revit was, all of a sudden all of my analytical elements just went wonky on me. Now this is a Revit thing, this is not a RISA thing. What happens is, when I have elements that are set to auto detect-- as I mentioned, auto detect works well when it works well and it does not work well when it doesn't work well-- changing the property of this column from gravity to lateral caused the auto detect to reset. And suddenly, that column is no longer connected to these beams. This floor is no longer connected to this floor system. So you have to get a look at that as well when you change things in Revit when you're using that auto detect. So before we go back out to RISAFloor, so that I don't have these elements all goofing up on me, I want to come in and correct how they're done.

So I'm going to come in Analytical Adjust. And let me just pull my beam back to where it needs to go. Pull my column back to where it needs to go. On both ends of this sloped roof system. And we'll pull the column up there. And I'm just going to pull this in over here on the deck as well. So that it plays nicely with everything else. All right. Excellent. So now I've fixed those analytical problems that we had on the Revit end this case. So I'll hit finish.

AUDIENCE: [INAUDIBLE]

MATT BROWN: This can occur anywhere in Revit, I've found. Yeah, basically with that, whenever something's set to auto detect, it can and will just change things around. One safe bet that you have is to just use that projection all over the place. If you set projection for all your analytical elements, they will stay where they're supposed to go.

All right. Yep? Go ahead.

AUDIENCE: [INAUDIBLE]

MATT BROWN: Yes, exactly. What I'm indicating is that I want all these members to participate as part of the lateral force resisting system in the building. So I can pick and choose which members I want to be part of the gravity system here. But for this particular example, I actually wanted all of these to go out as part of the lateral force resisting system. And the reason for that is primarily related to the roof. When I have a sloped roof, whether I like it or not, due to the way that wind load acts on slope roofs, all of those roof purlins will be taking wind loads, which is a lateral force.

All right. So-- oh boy. All right. So I've got a problem over there on the RISAFloor end, but that really doesn't matter, because what we're dealing with in this case is the Revit model. So now I have everything all cleaned up in the Revit model, it's all good to go in that regard. Something else that I can also do in here as well is I can define those 3D only members that I mentioned. And so I could actually come in here in this case on this bottom of roof situation and put in members that will only export themselves out to RISA-3D.

So if I go to the bottom of roof level, I could come along right here and add additional beams in, say, this angle, for example. And the structural usage for that I would set as horizontal bracing. And so then when I draw that across here in Revit, then that element will just export out to there instead. And let me go back out to the 3D model so we can see that more clearly. So here, this would then be considered a RISA-3D only element that would allow me to build out that truss in this case.

All right. So that is how we would send all this information out into RISAFloor for analysis. Let's take a look now, as I mentioned, to the steel connections, and how we can roundtrip that. That's a brand new feature that goes in the RISA-Revit Link. So I'm going to close out of this Revit model right here, and I'm going to open up another one that I have called Connection Frame. And in the connection frame model, what what I've got here, so you can see. It's just very straight forward. I just built a little four-beam four-column model to illustrate this. In this case, I want to export this out into RISA-3D so that we can get analysis of it, come back from RISA-3D, and then get designs for the connections on these members and have those connections actually in the Revit model.

So to start with, let's take a look at the analytical model here real quick. I want to set these beams to be pinned ends. I'm going to select all the beams in the Revit model. And you'll see here that we have the end releases. There's fixed, pinned, and bending moment. Bending moment means that the torsion is fixed but the strong axis and weak accents are pinned. I'd strongly recommend using that over the full pinned, because if you release torsion on both ends of a member, you'll almost always get a torsional instability when you go in to RISA-3D. So this bending moment is a better choice. Now, also, you may not know this, but you can actually add your boundary conditions directly in Revit. If I go to the Analyze tab and say Boundary Conditions, I can come in here and say Fixed, and I can drop these analytical boundary conditions at the bottom of each column, so that when I go in to RISA-3D, I don't have to bother doing that either.

So with that set, I can now save and export. We'll export out into RISA-3D in this case. And I'm going to say, go ahead and bring the boundary conditions over, and hit okay. And so now, this should create the RISA-3D model for me. With just four beams and four columns. There's my RISA-3D model. Pinned, fixed, so on and so forth. And let me just set up a couple of load cases here real quick. And so if I come up here under-- oh, looks like I exported over the previous one that I already had. Oh, great. So we don't even have to set them up. I overwrote the previous model I had. So here you can see I have a self weight set up. I have a superimposed dead load of-- looks like 80 pounds a square foot, and a superimposed live load of 100 pounds a square foot on this model. Under load combinations here, I've set up two load combinations-- dead only and total load. I'm going to solve here. And it looks like I need to do a model merge in this case, because I've probably got something doubled up in this case. Ah, it's under the boundary conditions. Perfect. So let's get rid of the duplicate entry that I've got here that was created just because I exported over the previous one. There we go.

So now after I solve, I can take a look at suggested design. And the program may recommend that I upsize or downsize some of these members. In this case, I'd never set my unbraced lengths, so I want to come in here and make sure that my unbraced lengths are set to one foot for those beams, so we're saying that it's fully braced. And I want to tell the columns that those are going to be part of the WF10 design list, so that way it's only going to pick out nominal 10 inches. So in this case, it's recommending that I downsize some of these columns and upsize some of these beams.

So I hit solve again using suggested shapes. And again. And what I've done here now in RISA-

3D is I've optimized these members for the load that's applied to them. So if I click on one of these beams, for example, we can come in here and take a look at the envelope detail report. That will show me the maximum, minimum, and reaction. So you see I have a 52 kip end reaction, and that's using ASD in this case. So now I just hit Save in the RISA model. Save my results. Now keep in mind that these forces we see here-- 52 and 50 on each end of that beam-- as our envelopes shear reaction.

I'm now going to export my exchange file for this one. And then in Revit, it I'm going to import from that RISA model right here. And so I want to make sure that I import boundary conditions, most importantly beam end reactions. And I'll hit OK. This is notifying me, by the way, it's never a good idea to leave your RISA model open in the background. So it tells you ahead of time, hey, are you sure you want to do this? Whenever I get this warning that says the RISA model's currently open, I'll just step over to RISA and exit real quick. And the reason for that is that sometimes the Link has to-- even though we're going into Revit-- it has to write some info back out to the RISA file. And if the RISA file's open, we can't write the info to it, because Windows treats it as a read-only file in that case.

All right, excellent. So now I've brought my beams over, and my new beam sizes into the Revit model. You can see everything's color coded yellow, which means that things were modified since my last export. All right. Here's where the cool thing is. So in Revit, starting with Revit 2017, they now have connections directly in the Revit model. So what I can do up here under Structure is I have this Connection option, and if I click on this little arrow to go into my Connection options, what this will let me do is pick out a connection type, like, say, a shear plate, for example. And so if I hit OK on that, I can now assign shear plate connections to multiple members. So if I grab these two members here, what I've done is I get this little symbol here-- it's easier to see when I do it in a wireframe-- it's this little circle with two lines. That indicates there's a connection between those two members. And I can do the same thing between this beam and this column as well.

So now I have two different connections. And these are occurring at the member center lines, which is why they're at different elevations in that case. And if I grab both of those connections, I can actually change those to be shear connections. So I'll choose shear plate in this case. And we'll give it just a second here. The first time you put the connection in, it takes a little while to load them all in.

All right. So those have now been created. And if I switch that over to a fine view, in this case--

there we go. Now I've got it to refresh. Now you see I actually have a shear plate connection directly in my Revit model. Now, it just picked some default values in this case. There's no smarts to this. It's just basically, how many bolts can I fit on here, and that's that. This is where the new feature comes in. This is something that's going to be released in the spring as part of the final Revit 2017 Link, and we're going to be taking this forward from there. Is, if I click on the beam here, let's say we take this big old girder that I've got, and I'd take a look at its analytical element. You remember we imported this from RISA, and we imported the end reactions. I can look at the member forces in here-- and you see the member forces, 52 kips and 50 kips on each end of this. That just came directly from RISA. These forces are now going to be used to do the connection design for the Revit connections.

And so what I do now is, under add-ins, I'm going to go to this export connections-- which doesn't exist yet, but you guys will see it when this finally gets released to the public. And when I click on that, that is going to allow me to send these connections out into RISA Connection, which is our steel connection design software. So here it pops up this dialogue box, and we can choose what we want to do. In this case I'm going to tell it I want it to launch RISA Connection. Asks me what code I want to design these connections to. So in this case, I'll do the 14th edition ASD, but I can do 13th or 14th ASD or LRFD, or the Canadian codes as well, are all options for me. And then I will just point to where I want to create this. Let's just go ahead and create it out on the desktop is fine. And hit OK.

It's going to give me a list of all the connections in the Revit model that it exported out to RISA Connection. And then over here in RISA Connection, you see, it has created it exactly as it was in the Revit model in that case. So now I can solve in RISA Connection. And it solves for those design forces, like we see right here, for example, the design shear load is 52 kips, that came through from 3D through Revit into here. And at this point I can change parameters of this. So for example, maybe I want to go to three bolts, three rows deep on here. Let's just pop into a 2D view. Let's take this out to a 10 inch plate in this case.

So I can try a totally different bolt arrangement and solve. Now in this case, this fails. Maybe we would want to take this up to maybe five bolts per row, or something like that. We're getting closer. Let's try six. All right. That passes. So now I can make a change like this to the bolts on there. Or in this case, this seems to be a bit overkill. I don't need to go to multiple rows. So maybe I can just drop that down to four bolts, or I could even drastically increase the bolt diameter. Let's go to inch and a half bolts in this case. And just put those at a wider spacing,

comically oversized, but we'll just go with this for example.

So I've sent all of my connections from Revit into RISA Connection. In here is where I'm doing all of my actual engineering checks. So I'm getting all my pass fail. This is checking bean block shear, shear yield, geometry restrictions, weld sizes, weld designs, all of it. Everything related to the connection design is all done. Now I just save in RISA Connection and go back in to Revit. And I say Import Connections. I'll exit that connection file, by the way. And just hit OK. And hit OK again. And what that does now is that is going to update all the connection information right in the Revit model.

Now, what's cool about this, aside from the fact that we can see these connections in the Revit model, is that Autodesk has it set up now so that Revit can transfer this information directly into Advanced Steel. And so now you could actually-- as the engineer-- do your own connection designs if you need to. Especially in California, we need to do that. Get those connection designs into your Revit model along with the rest of your design. And this can be sent straight to the detailer and fabricator for them to take it from there. And so that makes the whole shop drawing process a whole lot easier as well, because they have your model. And in fact, they're still flushing it out, and we're still flushing out with Autodesk-- we work very closely with them, how this is going to work-- but they have settings like Approval Status in here as well that we're going to rig up to this. So that way, not only do you put your connections into the model, but then you can actually just right in Revit say, yeah, all these connection designs are approved for fabrication. So, should save a lot of time.

So, that's it for the new features anyway. But as I mentioned, too, feel free to drop off your card or grab one of mine to get a copy of that hand out or for any questions. But I'm in no hurry to get out of here. So if you guys have any questions, I'd be glad to take them at this time.

Oh. Thanks. Oh, please do rate and review me, by the way. I've been trying to get Best Speaker every year, so if I can get it this year, that would be great.

Yep.

AUDIENCE: [INAUDIBLE]

MATT BROWN: No, because we didn't start doing development for Connections until Revit 2017 came out. And so all development on older versions of Revit has halted. So basically, we never go back

and add stuff to the old versions.

AUDIENCE: Awesome, thank you.

MATT BROWN: Yep. Yeah?

AUDIENCE: I was wondering, when I [INAUDIBLE] computation time. And I, in RISA, prefer to work in [INAUDIBLE] element model [INAUDIBLE] And I'm wondering if [INAUDIBLE] because it doesn't analyze wall panels properly, [INAUDIBLE].

MATT BROWN: No, it doesn't.

AUDIENCE: So, is there a way around that?

MATT BROWN: Not currently. The biggest issue is that we don't have a analog between, like, eight node solid elements on the RISA end, and something in Revit that would be similar. So sadly, I basically have nothing for you. I wish I did.

AUDIENCE: Is that going to be anything you guys might be looking at in the future?

MATT BROWN: It's something that we would need-- on Revit's side, they need to come up with something that matches that. Because it's all one-to-one mapping. So if you call it a wall in Revit, it's going to come over as a wall in RISA. If it's a brick in Revit, then I can make a brick in RISA, but there's no brick in Revit yet, so I really can't drive that.

AUDIENCE: [INAUDIBLE]

MATT BROWN: We could make that work as a one-way thing, but we could never make that work as a two-way thing, because then, if I bring all these over as plates, and I say this plate-- change the thickness of this one and not that one and then come back over, it just won't work out, unfortunately. So, sorry we can't help you in that regard. Maybe someday something will get figured out, but I've got to be honest. We've got some other items that are higher up on the priority list at the moment. I know, it sucks to be a niche engineer. Yeah, sure. Other? Yeah?

AUDIENCE: I have a question. So my company does a lot of erection engineering, so often we get Revit [INAUDIBLE] and we want to input that into the [INAUDIBLE] don't have a lot of control over how [INAUDIBLE] structural Rivet model. We've had issues in the past of, when we bring it into RISA, all the nodes [INAUDIBLE]

MATT BROWN: It's-- a lot of that Revit, the analytical model, is a mess, probably, in Revit. And so you'll have to spend the time to clean up that Revit analytical model at that point. And that's-- yeah, because that's basically-- I'm sure if you open up the analytical model, you remember how we saw those beams overshooting the girder? Your Revit model's probably riddled with that. And so then you've got to go in and fix it. Yeah, and the analytical adjust tool is really handy. So that's where, instead of trying to figure out through projections how to get it there, you can just grab a node and be like, no, you're here. Stay here.

Yeah?

AUDIENCE: Is there a way to simply export just geometry [INAUDIBLE] nodes, and [INAUDIBLE] member orientation [INAUDIBLE] coordinates, rather than messing with the analytical model? We've tried that with analytical model, what we're doing, messing with analytical model. And if we're designing a 50-story building, that gets pretty ridiculous. So we don't-- that's one of the main limitations of that. So [INAUDIBLE], if we can actually export those nodes straight into [INAUDIBLE], Is there a way, with your tool, to actually just export [INAUDIBLE]?

MATT BROWN: Well it exports the nodes in the members, so you can correct the nodes, basically, once you get over into RISA. And if you choose physical model when you go over into RISA, then it will-- you know, if the elements were physically connected in Revit but not analytically connected, it's that-- and then that dropdown of physical model, they will be connected when you go into RISA. But otherwise, too, RISA, in-- I think it was version 14, like, a more recent one-- we added a bunch of trim and extend tools that have made it so much easier now to clean up bad Revit models. Because I totally understand the situation where you may not be able to control the Revit model. The Revit model may be owned by a different guy in your company, and that's his thing, so you can't just go in there and start messing with the analytical. You just have to live with what he hands you. At that point, then, if you're in RISA, you clean the whole thing up in RISA. And then when it goes back into Revit, it'll automatically fix the analytical model in Revit to match whatever you did in RISA.

Yeah?

AUDIENCE: [INAUDIBLE]

MATT BROWN: When you say analytical model is off, regardless of whether you're exporting physical or analytical, we've interpreted that as ignore this member. So we just will not export it. Because we had to have a flag somewhere in Revit it to be like, I don't want this to be linked with RISA. I

don't want it to go out to RISA, and I don't want it to get messed with when I come in from RISA. And that Enable Analytical checkbox was sort of the most logical thing for us to do.

AUDIENCE: [INAUDIBLE]

MATT BROWN: Yeah, basically. Which one's cleaner, is generally how I look at it. Which one is better? Because I've seen models, too, where the analytical model's great, but the physical model, the drafter'll get lazy and draw the beam to the face of the other beam. But if you actually look at the nodes that define the beam, they're six inches away from each other. So that could be a mess and the analytical could be good. You never know.

Oh, yeah. No, no, go ahead.

AUDIENCE: [INAUDIBLE]

MATT BROWN: You know, I don't think that we do. That's a good idea, though. Yeah.

AUDIENCE: [INAUDIBLE]

MATT BROWN: OK. Yeah, well actually, then, if you wouldn't mind shooting me an email with that, just because I'm sure I'll forget it by the end of today. But then when I get back to the office, I'll put that on the to do list. And that's something that we could get in in our update that's coming in in a few weeks here I'm sure. Yeah, of course.

AUDIENCE: In RISA-3D, I'm trying to export it from Revit to RISA-3D, is there any way to have a point load on basically a slab come through? Because there's no--

MATT BROWN: Oh, no. Because RISA-3D doesn't have a concept of a floating point load in that case. Yeah, so there's--

AUDIENCE: [INAUDIBLE]

MATT BROWN: Yeah, exactly. Yep. Anything else? Yeah.

AUDIENCE: Out of curiosity, we [INAUDIBLE], and we've got a couple new engineers, [INAUDIBLE] Do you guys do any trial where we can bring in a suite of it and try it out for a couple weeks, or--

MATT BROWN: Absolutely.

AUDIENCE: [INAUDIBLE] platform for that area. [INAUDIBLE] training, as well?

MATT BROWN: Well, we have demo versions of all the software that have no time limit on them, and you can use the features, you just can't save anything. So those are definitely useful for the most part. The only catch is that the demo versions won't work with the RISA-Revit Link. But what we can do, if you want to be using it with Revit as well, is I can set it up so that one computer in your office has the full version for 30 days, and you can then use everything on there as though you owned it.

AUDIENCE: OK, I'll reach out to you then and ask you another question I had too is, it seemed like you were doing a lot of modeling in Revit and bringing it into RISA. I would imagine it being the other way around more often, from a workflow perspective. I guess I'm surprised--

MATT BROWN: People do it both ways. The reason why I was doing that in this presentation is that you tend to get more problems-- like, if I do everything in RISA, it's just going to come over to Revit hunky dory. Because it worked in RISA. Revit doesn't care about instabilities and all the other stuff. So a lot of the issues that people run into are of going from Revit to Risa. But it's also not just about where you start, because if you're roundtripping, you're going to be doing just as much importing as exporting.

AUDIENCE: The way that [INAUDIBLE] they hand off sketches or whatever [INAUDIBLE] so that our Revit drafters can then take that and create the Revit model. [INAUDIBLE] from our perspectives, being an engineer working in RISA and doing it that way. It sounds like that could create a lot of issues coming into Revit in terms of slopes and things like that going on. So it's interesting.

MATT BROWN: Exactly. Yeah, yeah thanks for coming out.

[SIDE CONVERSATION]