PRESENTER: I'm Jeff Lyons I'm. The VP Of Sales Marketing and a partner of a company called AC solutions. We are mostly a development company that decided we want to do something in the cloud around cost estimating and bid preparation. For the last 20 years I've been doing Civil 3D programming, implementation, InfraWorks model building, pretty much everything infrastructure related. So this product is really a connection between what the contract administrators would do and what the design group does. So this really is what I've been thinking about for the last 10 years, at least, and now, finally, we've got a product that does it

OK, so these are the learning objectives. This is why you signed up. So I will keep it-- the training aspect is definitely there, but we do have a lot of content to cover, because we're looking at three different pieces of software all integrated. The first bit will be looking at InfraWorks 360. It's use in conceptual proposal building is amazing. For the first 20 minutes you'll see some of that. The next 20 minutes will we'll look at the AEC Tender product. And then we'll tie it off with looking at Civil 3D QTO in a way that you've probably never seen before.

OK, so like I said, it's a three part session. We're going to build, in the next 20 minutes, an Infraworks concept model. And I didn't show the second one, but you get the idea. I didn't want to do another 20 minutes showing the second model. But the first set of videos tells it all.

Part two, we're going to look at AEC Tender product. This is what does all the cost estimating from both objects and pay items. So you'll see that on the fly, working here. The Civil 3D QTO, it's something that even I myself, in the past over last 10 years, haven't really adopted all that fully. Mostly because the pay item management was tough to do if you didn't have a standard. So this video should show you how easy it can be to implement QTO with all three of these products.

OK, so like I said, our primary objective is to create two different proposals. I picked a rapid bus way because that's what I've been focused on in the last year or so on my own projects, etc. And the other thing I noticed is a lot of design engineers do in-field road rehabilitation, site planning, all the stuff that we do every day. And this is where InfraWorks can help out. So this isn't a beautiful highway through the mountain passes, or a highway over green fields. This is the bread and butter of what everybody probably works on, which is two or three kilometers of road rehabilitation or expansion, pipe-- sewer movements and utility relocations. So that's why

I picked these jobs it's. More typical of what we would do every day.

When you think about InfraWorks, it's just not about the big projects, right? What I'm showing here in these videos can be done by you guys. If you're all into Civil 3-D you can probably do this very quickly with little training. Even these videos will help. Even showing a graph like that, better than Google Earth, right? Basically, we're going to look at two different routes, and option A is a red bypass of the downtown and option B is a downtown route. I mean, this is just a fictitious project, by the way. It's nothing I actually designed or built.

All right, so if you use InfraWorks 360, you probably know all about model builder. Model builder is probably, I think, it's been around maybe over a year at least. But it's the one thing that if you don't have InfraWorks 360, if you just have the regular InfraWorks, this thing really pays for itself. I mean, if you're doing a concept design, you can go from a picked area to a base model in 15 minutes. And that's subject to how fast the servers are producing it for you at Autodesk. So it's quite amazing. This model, I had some city data sets on hand so I imported the buildings and trees, signage. If you're interested, you can put your point clouds in there. I just recently did a job that was 10 kilometers of point cloud. And InfraWorks and Recap just cut through, it no problem. It was amazing. If you have point clouds with mobile truck mounted systems, you can put them in into InfraWorks, no problem.

AUDIENCE: Do you think that you [INAUDIBLE] your trees' location, or do you add trees to the model?

PRESENTER: Yeah, so what happened is, in this particular model, I had buildings from the city-- the city of Oakville. So I had the trees, the wooded areas are really just polygons. So you can define the wooded area and throw in a density. If you really want to get fancy with wooded areas, you can put in the wooded area twice and put it with different trees and really mix it up. In this particular model I had the trees, but I only put in one area because I didn't want to worry about all the detail, basically, for this demo. And I'll explain that in a little while, during our InfraWorks object counting. You'll see that in a second. You're going to see something nobody has in the world today. You're going to see that in the next hour.

OK, so like I said, I do have embedded videos here. I am going to post them online. And if you e-mail me I will-- I'm sure it's are available through AU online as well. So this is model builder, if you haven't seen it. I mean, if you can type an address you're 90% there. I know that doesn't seem like much of a training video, but basically that's it. You can pick an area that's up to 200 square kilometers and it will query the public databases for anything. I'm Canadian, so ortho-

photography on a rough DEM is kind of the best we can get. Some of the buildings do come in, but I know in The States you get a lot more data. You'll get everything from water courses, lakes, all of the stuff that's available on the USGS, I think, is probably coming out of there as well.

So once you've picked your area, you can name the site and submit it to the Cloud for processing. Within 15 minutes you're downloading and loading this. So if you've got a meeting at noon, and your boss needs a quick and dirty visualization, this is as good as it gets, right? You can start building your models very quickly. So in this case I've dragged and dropped the shape file and randomized the buildings. Here's the data sources tool pallet, here.

I also brought in a Civil 3-D surface, the actual survey surface, and overlaid it in the model. Some of the model builder stuff in Canada is out quite a bit. It's probably only within 2 meters, vertical. It's not great at all, so when you bring in the DEM it's survey quality. You can also bring in SketchUp models to show the existing bus terminal, and so the whole point of this demo was to show you that you really can build something pretty quickly. If you've got meetings with the owner, or if you just want to get your design into a system quickly for videos and images.

So option A, was the 2.5 kilometer stretch and the concept was to put the rapid way right down the middle of the project. It's going to have the double traffic on either side, stationing, landscaping, a lot of street-scaping. In the next couple videos will show how easy it is to design the roads for that. The second option was a 3 1/2 kilometer stretch, and this one would have sort of a street-scape on the main street and then more of a rapid way on the other tail end of it. So this the kind of thinking I had when I do this work. I want to be able to do something that's representative.

Common to both is the concept of water, sewer, utilities. So no matter what you do, you're going to be getting data, 2D or 3D, from existing sources. You'll get it from your own designers if they have past projects, they want to give you the pipe networks. InfraWorks allows you to put these existing utilities into the model, for the future. Right? So you can start seeing things like clash detection and visual clash detection.

So this is kind of like the ultimate visualization, here. We're not going to see that in my 20 minute video, it takes a little longer. But everything you're seeing is directly from AutoCAD. So if you think about AutoCAD, they all have objects and every one of those objects is a potential

pay item.

So we're kind of circling back to the concept of, everything you're seeing including, here-- even these trees here came from the landscape architect, right? All of the hydro poles, the electrical consultant provided the lighting here. And they were all blocks in AutoCAD. They weren't Civil 3D or 3D models or any of this business, right? These are just typical drawings you get that are blocks, they could be circles, just anything that has an xy location, and then using Civil 3D you can export it to SDF in the right coordinate system.

Building up models like that is great. And now we're going to take it to the next level by attaching it to pay item information. The painted line work coming, again, from the traffic plan, that's all poly-lines, it uses coverages. Again, you can quantify everything you're seeing now. Before, it was just a visualization. Now it's got some real value. Right, so this is what I did. It's a little less than the other one, but it gets the point across. We're going to look at some video showing how to create these objects very quickly using InfraWorks.

OK, so one of the powerful things about InfraWorks 360, is the idea of doing your road design in conceptual, not just horizontal, but vertical design as well. So if you're using InfraWorks 360, you only get to drape the road and stylize it. If you're using the roadway design component, you can actually put the vertical design in and do all the cloud services like profile optimization, sight lines, etc. In this project, we didn't do the profile optimization, because it's a road rehab and we just want to stick close to the current profile. It wasn't really suitable, I guess.

Right, so this video is going to be a step by step. It's going to show me creating what I would call the boulevard or street-scaping highway, from our end point all the way through to the bus terminal. That's kind of the scenario. So just like Civil 3D or using a poly-line, you can create these design roads. It's got automatic curves for horizontal geometry, if you zoom in to the connected points. And as long as they're both what we call design roads, using InfraWorks 360 road design, you can automatically create the intersections.

So see how I'm converting that GIS road that came in from the model builder to a design road. Right away you're getting the intersection designs, including all of the paint. The radii are all set using the type of vehicle. Like I said, if you're looking to do a pretty quick concept in a few hours, we're talking five minutes to do this entire roadway, by the way, you can do a lot of great work in a morning.

So I actually built another style for the rapid way. It has a little different look to it. So you're not

limited by just these styles. In case you're not familiar with InfraWorks 360, I'm kind of going through the basics here. But you can build your own styles and make it look pretty close to what exactly is going to be built. So here I am touching up to the existing bridge. So that one has a much wider swath. In Canada, you're allowed to destroy people's houses if the road's too wide. I don't know if you knew that or not. I think Justin Trudeau said that was OK now. Stephen Harper didn't allow it, though. Anyway, that's a Canadian joke.

Yeah, so you can go ahead and move the horizontal geometry and kill those houses, relocate those people. Sorry, I mean when I did the demo I thought, OK I'm going to run a street down here and I'm like, bad choice. I mean, it's making its point, right? You can absolutely see your clashes and conflicts, at least in the planning stage, right? So we're using, again, the rapid bus alignment to set up the next leg of our road. I'm sorry I'm showing every road, every street, but I brought my surface and I didn't have my original videos to cut, so just bear with the video for a minute.

Again, we will put a road right up to the existing bus station and design our intersection. OK? So if you think about all the times that you are in an urban area, I mean bumping into buildings, bumping into all kinds of structures that can't move, you're going to see that through putting actual styles in-context with the existing environment, right? Like those houses there, right? That's not going to happen.

Anyway, so you're getting the point. Next thing we want to do, is put the vertical design on these roads. The more time you spend here, the closer it gets. Especially if you're doing profile optimization, it's better to really kind of focus in on the profile design, once we get to it. Sorry, I'm still doing a little bit of horizontal alignments, here. Does anybody have any questions, while I'm working away?

AUDIENCE: If you want to add a turn lane, a left turn lane there, how do you do that?

PRESENTER: Well, the left turn lane, basically there is a way to mix the styles. You can join two roads that have different styles, and change the range of each style and it will interplay it in between. There is videos online that show that on the Eric Chapell site, I believe. They're quite good. And the component road system that's in the sandbox, I think it will do some of that as well. So we're not really dealing with it in this video.

So once you have those roads set up, It's basically a lot like editing in the profile view. You can set up your PVIs, adjust your locations and elevations. So you see the existing ground from

our DEM, and just like that you can start editing these profiles. So this isn't really meant to be a design course for InfraWorks 360 road design, but I just wanted to give you the sense that it really isn't just a toy. I mean, you can actually do this stuff and you can do it pretty quickly.

And this is all happening in an environment that is automatically doing the real grading, it's automatically adjusting all of the inner intersections as you're moving them up and down. It's not like a corridor model, where you're moving stuff up and who knows what's happening to your side streets? You know, gutter grating. I mean, that's kind of, I think, where this is probably going, is direct to corridor. So I don't know that for sure, that would be nice. I'm just an outsider, here.

Yeah, so the beautiful part about this is, and you'll see that in a minute, is it goes direct to Civil 3D. So once you do all this heavy lifting here, you can put it back into Civil 3-D to do the details. Right, so that was a long video. Everybody got through it OK. Not too many people walked out, that's good. OK, so the bridge is the exciting piece as well with InfraWorks 360 bridge design. And these are all modules. I don't know how much they cost or what the whole licensing thing is on it. But basically we're extending our design road and then telling it, hey, between point A and point B, we want a bridge, right?

So doing, again, the visualizations of something like this manually, if you had to model that in SketchUp or even Revit, I mean you wouldn't be able to do it that fast, for sure. So just like that, we've got the bridge with the piers. And in this particular case the length of the bridge is cutting off just short of the creek, but in the real condition, there's a little bit of reality in this video. I'm actually going to be extending the bridge point back as far as I can, because there's a road that goes underneath the existing bridge right now. So you can modify that and dynamically it resets all of your piers and concrete.

So that's kind of what we're getting at, is if we can make this is realistic possible conceptually, we should be able to do more than just a visualization. We should be able to do quantities and drill down to a close number of what that might cost. Right? The grading's off a bit there, I see. So if you want to move these over, again, you just select everything. InfraWorks 360 makes it easy. Very little training, really, to get in here and do a lot of-- it's kind like the 80-20 rule here. You can do a ton of work in a short amount of time. And as you're moving these objects around, it's recalculating the bridge. You probably guessed I'm not a bridge person, so I'm just, kind of more of a land development/ subdivision guy, but the bridge thing is absolutely

amazing.

So in this demo, if you haven't, again, got much experience editing styles, the bridge has to accommodate the rapid way. And we show a small snippet of how the styles are modified for this bridge. So what we'll do, is edit the style for the bridge and add that median down the middle. When I put the videos together, I really don't know what the level of the user was. So I kind of started from first principles. So it wouldn't have been fair just to drag and drop a whole bunch of prefab styles. I thought I would have at least given you a little snippet of how it's done.

So the roadways down the middle get expanded. Everything from the paint lines to the Jersey barrier is considered a track. This is kind of some funny business, and I fixed it in the ultimate model, but I forgot to videotape it. So basically we're putting in the- if you got matching paint lines, they will match and merge quite nicely. And so as you can see, we're adding the decorations to each track here.

Doing OK, half hour. I gave myself half an hour to design this rapidway. I mean, you could produce something like this in a few hours. And with video with images everybody thinks you worked weeks on it, right? So make sure you don't tell the truth on your time sheet.

AUDIENCE: In your styles, If you put trees in your medians, or whatever, do you get to count those as well?

PRESENTER: Yeah, so we'll talk about that during the next session. so the cool thing about bridges, you can perform the quantity take off directly from the model. It's giving you numbers of concrete and steel, and I'll just pause that. I don't know, we couldn't figure out a way to export that, but you can write it on a napkin if you want. I don't know. There must be a way. But I don't know it yet. We're getting the numbers for the masses. And that's it for the bridge. OK?

Adding the intersections and details, so these are the things that we can really count quite easily through the model. These are the street furnitures, the coverages, barriers. And so the more detail you add, keep in mind if we can count it later then we've got some real numbers. And a lot of the stuff you would necessarily do in CAD even. Like, especially if it's concept, you know? Like landscape design, you're going to hire a landscape architect, they're going to do it. But, from a civil engineering point of view, you could do a pretty extensive landscape design maybe a dozen types of tree types. And some ability to count them at the end is what we're shooting for, right?

OK, same thing with all these signals and signs. Everything you're seeing costs money. So it's not just a pretty picture if we can count this and export it to a system that can estimate it. And of course, this isn't CAD, so everything we're doing is very conceptual. You could do three or four different types of proposals and if you can do them in a few days you can just pick the one you want for detailed design when you're done.

So I'm painstakingly going through and putting some traffic in there. Almost done. So a lot of these models I'm using came from 3D Warehouse. Some of them are internal, like the stop signs, but really going to 3dwarehouse.com or the Trimble site is the way to go. Here we are, putting in the landscape barriers, like a barrier curb. And so I sped up the video a little bit, and we'll throw in some detail.

Using the cut-paste in InfraWorks does wonders. You can add all the detail you want and copy it, copy it, copy it. So for something like this, it's very cookie cutter. You can put in, once you build the first station, you can put in 10 more, right? Just like AutoCAD. Just make a copy. So any landscape architects here? Oh really, OK. I'd better keep my mouth shut then, eh? I don't know what kind of plant that is. It's a greenus shrubbus. So using the properties here, we're changing the barrier curb height, and there you go. So I said, you would select all of that, make copy and edit. So once you've created the one, you're off and running. Any questions? Because we're right perfectly timed on the half hour. Any brief questions, or anything about InfraWorks you're curious about? No? OK.

AUDIENCE: If you wanted to put down a radius on that curb, [INAUDIBLE] How would you do that?

PRESENTER: On the curbs? How would I do it? Well, if I was doing it, I would probably-- I don't know if you can put a radius on a barrier. First of all, I haven't tried it, I don't think you can. Maybe John would know Yeah, so if I was doing it, if this was a legitimate job, I would just put in two barrier curbs and I'd build a 3D model of a butt end and put it in and count it. So it visually looks good, right? But you have to use either-- like I like using AutoCAD for my 3D, just because I've been doing that for years. So I'm not a SketchUp person, but honestly, you can put in SketchUp models. And for these little extras, you definitely have to model something and make a block of it and pop it in there, put a part of your library.

OK so we'll spend a little bit of time going through this product. You've probably never seen it before. It's becoming popular in Canada for cost estimating and bid preparation. It's something that I built with my partner, because we wanted to extend the building information modeling

concept beyond design. I was getting sick of working in CAD management and design, and building all these wonderful bid models, or information models, and that would be it. In other words, when the thing got designed and approved the models would be put on the hard drive and nobody would ever see the light of day again. Right?

So I wanted something that would expand Civil 3D, all the great work we're doing in Civil 3D, even InfraWorks past in the contract administration. So contract administration, at least where I've worked, is the field inspection, bid preparation, and cost estimating mobile field inspection. So these are the guys who, they might know some AutoCAD for quantity takeoffs, but 3D modeling and building information modeling, is just like so far off the radar they wouldn't even know what you were talking about. Right?

So AEC Tender was a result of, OK, fine. You don't know anything about 3D, that's good. You don't need to. So let's build a system that can suck data in. You don't need to know how it's being done , but if your design group does it a certain way then this is possible. That's basically the message, right? So a dream for me would be, if you're working on a design and somebody from contract admin came over and says, how's your pipe networks coming? Or something, right? That would just never happen until you have a product like this.

Like, building spreadsheets is one thing, but building the entire bid, that's definitely something else. So this product really is integrated with what they normally do with Excel, currently, and Word.

AUDIENCE: Is this product from Autodesk?

PRESENTER: No. No, so our company is AEC Solutions, we're booth number three downstairs at the little kiosk. If you come by we can show you some more detail. And it's fairly new, so we attended last year at AU and it was basically very new. It's really been 12 months, so it's been a blur for Chris and I building this thing.

But we're really happy with it, because the contract administration groups, when we have meetings about information modeling and stuff like that, they're like, oh yeah. We don't trust our CAD guys, or something. I'm like well, a block-- it's 2015-- a block and a poly-line is like 50% of your work. So if you can get them to put in a block without exploding it and draw a ploy-line without exploding it, that's about half your quantities right there. So AEC Tender is built for people who can do the bare minimum of AutoCAD. If you don't even have AutoCAD,

you can just type it in manually from a library.

It's been quite a process, but we're there now and we're ready. This is the result. This is kind of the schedule unit pricing. I don't know what they call it the United States, but this is what we give to our bidders. This is what the engineers provide. And see how organized that is? Grouped and sorted and wonderful. That comes from AutoCAD, that comes from Civil 3D. Somebody didn't type that in.

So when you look at this, when you look at this text right here, somebody didn't type that text in. You're all Civil 3D experts, probably, so that's what I am. I like Civil 3D I love styles. So we've created a system that sucks the data in, and you can program your own long description, we call it. Which is basically the item description. So you're getting something that looks like somebody typed it by hand, in any style you want in that description column. You're grouping and sorting based on actual pipe parameters, versus I don't know how you're doing it.

Then, of course the bidder only gets to type into the yellow fields. It's all password protected. So they only see this. They think, oh wow, so this company produced a nice looking spreadsheet this time instead of a Word document. That's what they're seeing, but the power of that is crazy. Because we get to suck it back in immediately. And that means your very first tender, your very first bid, if you send it out to six companies you'll have six prices coming back, all going into the system on your first project. If you did it for a full year, you'd have a whole year's worth of pricing.

The whole concept here is, we need to standardize. That's the number one. Just like a pay item table. Without standardization, without good standards, just like a Civil 3D template. So it creates the cost sheets fast and easy. In other words, the spreadsheets are the deliverable for here. And you can import from CAD. When the bids come back, you can analyze them, of course. You're not going to do it in Excel. And then the real time cost estimates is the one that's been basically making this product. In other words, we've got all this great data, I've got 35 project managers. Well, now any one of them can go in and get a price for anything.

This is the interface of the drag and drops. This looks just like your pay item tables right now. This just looks like your items. So from a Civil 3D QTO perspective, it's looking awfully familiar, right? And of course, we're not typing in text over here, we're typing in just, like, Excel properties, right? And that gets formatted into a nice cost sheet. Importing from CAD, doing

some analysis, right? High bids, low bids, section by section.

This is the one, again, number five. So this means your project managers can go to a single web page. They can hunt through what looks like a tender section tree, here. And then they can put in the properties of the pay item over here and get the results for a cost estimate on a sample of two years worth of data. This has been an action, by the way. This isn't a bunch of people typing in stuff to a system that only does cost estimating. This will do the whole thing.

Again, I think we're still good for time. This is the site. This is very simple. If you want to create a tender or a bid-- if you call it that in the United States, I still don't know what you call it down here-- you can pick your project. This is your starting point. The tender type is active, which is a full blown tender. You can just have a cost estimate if you just want a quick and dirty number for pipe network or something.

So when you do the template, when you do this, there's a couple things. One is, when you create the master it's as if you had a spreadsheet full of all your items. So some of you cost estimators or cost administrators are like, oh I got a system. I got a spreadsheet I've been using for 20 years, has every single item I've ever built. And all I do is delete what I don't need, versus add to it. We put in this thing called Create Master so it'll populate the entire catalog into a tender and you can delete what you don't want. If you want to do. That

Closing dates, the template here. So this isn't just subdivisions or site plans or municipal. This really is anything, any type of project. And of course you build these templates up on the system. when you-- just a second here-- I think I got my slides screwed up there. We just play that. Sorry about that. Sorry, I kind of messed up the thing here. I'm using my phone, by the way, for this thing. OK, there we go. And then I go down here and I just change the video a little bit. OK, well we'll just go through this. So it's important to see some other way the drag and drop happens.

AUDIENCE: What format is the template?

PRESENTER: So the template is, you have a standards catalog and so if you're familiar with pipe catalogs and parts lists, a lot of the design of Autodesk is showing through here. It's really the good way to design it. You have extensive parts list that has common items. It could be very extensive. The template is really a version of it. Like your parts list versus your catalog.

So you're coming up with, say, a subdivisions template, and that's only pieces from the catalog

that you want. And the long description is, of course, custom to that template. So in other words, a subdivision you want manhole from and to with an average depth and a class and all that stuff. A site plan, you just want to know it's a 200 PVC and you got 200 meters of it, right? So the template is what controls the-- There we go, sorry. I should've answered that. So as far as the format of this goes, the site's used to build the templates, and then, in the next video, you'll see how QTO is connected to it, and InfraWorks, for that matter.

AUDIENCE: Sorry, just checking, [INAUDIBLE] all the little bits and pieces of the [INAUDIBLE] If you've converted that into Civil 3D, then you're using AEC Tender [INAUDIBLE]

PRESENTER: Yeah, we don't need to convert to Civil 3D just yet.

AUDIENCE: OK. That comes straight [INAUDIBLE] OK, thank you.

PRESENTER: That's right. So obviously we will, at some point, go to detailed design with our InfraWorks. And then you get better quantities, but yeah. So this is the like if you didn't have a CAD model. If somebody just says, hey this is my project. So you can see like, for example, bonding has nothing to do with BIM, right? So this isn't just CAD stuff. It's everything, it's your entire cost sheet, schedule unit prices.

So you know site trailers? Well, maybe if you want to have a block that's a site trailer you could count them, or you could just type one in. And as you type in the information, if you go to the cost estimate tab, it's actually, there it is. So you see, as you're doing it it's querying past pricing, right? And so we've got a very powerful processing system that allows you to query, not just the properties of the item, but the project properties as well.

So project scope, like it's a public or private job, it's 50 kilometers from this job. So it's all based on a query that, you know, is important, right? So you don't want a query of pipe Calgary and compare it to something in Toronto. Same as soil type. Could be shale, could be something else.

AUDIENCE: Is your company keeping up-to-date the database?

PRESENTER: Keeping the database?

AUDIENCE: Yeah, so you're saying that the estimates come from a library online instead of coming from AEC solutions?

PRESENTER: You build your own libraries, just like you QTO. It comes with a Getting Started one, just like QTO. You can come by the booth. You'll see how easy it is. I'm not trying to turn this into a commercial. OK, so just like that we're, importing from CAD our structures here. And there they are. When you hit the reset button, so this is from your data. It knows that that manhole at a certain depth is so much money. OK good, made my point.

We'll add some final details and produce the cost sheet. Your bidders aren't aware that you're building an intelligent system. Your CAD people aren't aware that they're improving the overall cost estimating and contract administration system of the company. So your CAD people are doing what they do, contract administrators are using this to speed things up, and the people who are bidding on your jobs, all they see is a spreadsheet.

The query engine's so powerful you could actually estimate how much a certain company would bid. You can put a part of a custom project detail, who the company is. So the spreadsheets, when they get produced , look kind of benign, right? They're all pre-coded, it's all just a regular spreadsheet. As they type in their prices, it's all extended and totalled in the summary. If the enumeration changes in your tender, say you delete an entire contract, it's all auto unenumerated. If you're spending days in Excel , putting together this stuff you can save all that and make money on tenders.

AUDIENCE: How do you normally put all your quantities in the areas?

PRESENTER: Because it all comes, the quantities come from, in this case, the pipe network. So the quantities are fixed to the CAD drawing.

AUDIENCE: Are you clicking the normal quantities that are set?

PRESENTER: That's right. Yeah. So the spreadsheet, in fact, contains everything to do with the project, including the site trailers. Yeah. So your cost estimate for this job, you know, if you were to add all the pay items, is ready to go. So any project manager with access the site can do this with very little-- you know they'd have to have some experience around cost estimating.

Right, so the Ad-Hoc, same idea. This is where your project managers would go . We are releasing the phone app version of this. It will be an actual app, it's not a web page on your phone. So we'll have direct access to cost estimating for project managers, direct to the site. So you'll be able to sit in a meeting and price a site trailer, if you want. If you don't already know what that is. Or a head wall or whatever. This is a very dumbed down interface, but as

you pick each intersection table you get the changes in properties that allow you to do the estimating. I don't have very extensive database there.

The pipes is a little more dramatic. You can type in any of the fields, including average depth plus or minus. Things like the class of the pipe, whatever you're looking to estimate. All the pull-downs and look-ups are all configurable. Everything you're seeing there. We've got two more minutes, and then I've got to move on. OK, so the results for this query, because you're going to have maybe years of data, right? So you're going to be able to see the highs and lows, the mean, percentiles and get a price. So I know I have to save 200 bucks for that. What's that?

AUDIENCE: Does it keep track of the data that [INAUDIBLE] like if it's ten years old. And it might be you can double check to make sure your [INAUDIBLE]

PRESENTER: Yep. So the project definition has the dates in it, and the tender has a date in it. And the other thing is, you can set up an inflation, at least on this system we're plugged into the inflation tables. Or if you want you can override the inflation and put it in, or just limit it to two years of data.

AUDIENCE: And then, all this data in [INAUDIBLE] directs the users to go on to Cloud-based solutions, so if you return the [INAUDIBLE] to a centralized repository of all of the data for one project, [INAUDIBLE]

PRESENTER: Yeah, so we're using Microsoft Azure Cloud for everything you're seeing here. So it's all in the cloud, password, log in protected and all the good stuff that Azure has. So all your projects are in one database. You're querying across all of your projects. If you want to isolate the search, then you just tell it it's part of a subdivisions group only. I only want subdivisions data or municipal. So you can pick and choose, based just on the project properties, how you want to query.

Yeah, like we just sold to a regional municipality, and they want to offer up their catalog, just like a template, and potentially they'll be able to query years of data. The spreadsheets come in to them, they're going to have all kinds of data on municipal projects. And so they could share that with the city or whatever. So it's quite a good system for that.

Right, so this is what we've been working on. We had the QTO thing, figured out the Civil 3D quite some time ago, and we always wanted to do the InfraWorks, the next level. So this is

kind of the alpha, because what you're seeing isn't even really available in the current version. It's only in the sandbox. So we'll be working with Autodesk, at least in the sandbox to get the API up to speed.

And I don't want to bore people the details, but we'll just go quickly here. Very similar to QTO. In other words, the thinking is, this is a 3D version of QTO. So InfraWorks objects are ready for cost estimating. Yes, they are. They can be tagged. There we go, we're linking the objects to the pay items tables using-- it's kind of a loose tag right now, there's no way to connect it direct-- but we are successfully linking what we can.

Mapping the Object Property, so this is where you're asking about the number of street lights, the things on a road style that we can't really grab through the API yet. There's lots of limitations, same as the bridge. We can't really get into the guts of it through the programming, and I'm sure it'll come it's eventually. So what we're doing is saying, if it's a two kilometer stretch of road, and it's got the hardwood maple with a tree every 20 meters, then what we're doing is building in a system just like Civil 3D expressions. So we know the length of the road, and we know that every 20 meters we're going to have a tree, times two. Maybe on the other side.

So all we're doing is really kind of doing an expression on that object. These are the objects that we can-- some of them we can get to, some of them we're trying to get to. We haven't been able to hit it. The bridges don't show up yet. So there's lots of objects unexposed, but this is the very first alpha version of it. So this is the tagging, it's as simple as typing in the name of the section table in the pay item group called curb, and then the user data defines some of the properties of the item.

So again, pretty weak. If you spell the word curb wrong, you're done. So it's pretty expert mode type stuff. But we're able to-- because we can query that now in the model direct through Microsoft Azure. We don't have to download an IMX and any of that business. So that's what we're looking for, anything that can be tagged back to the template. So this is our template here, there's our curb, and it takes care of the rest. We know that it's a barrier curb and it's half a meter high or something. So those are properties of the curb.

I put this in this morning, because my InfraWorks, something happened on my little surface here and I couldn't do a nice graphic. But it's something I wanted to talk about, because putting in all these trees, oh my god. If you had to take them all one at a time, forget it, right?

So this is important to note-- that in InfraWorks you can create selection sets of objects just using model explorer.

So when you right click and create a subset, you can use a filter to get the data. The simplest, lowest common denominator is the name of the object. So like the style for it. So if it's a tree, you could type in, OK it's a filter of manual style called tree. And once you select all, en mass, you can change the properties and say this is a deciduous tree and it's so much so thick, or whatever. So it's not that bad. In other words, you're creating selections sets just like you do in AutoCAD.

And that's kind of the interface that of how to program an expression in InfraWorks right there. So it's really just taking something and creating a query. This is, again, a little more complex but this is where we're taking a road and saying, OK that roadway equals this section table, right there, and everything under it. Because it's like you're saying, OK, there is definitely a roadway but we need all of this stuff. And some stuff we can quantify, and other stuff we can't. Maybe it's a lump sum or something. So it's really just a quick way to get the spreadsheet or the tender built with some data.

So as the objects become more exposed we'll be able to do a better job with that. OK, so that will be copied into, and populated with quantity data. So that's the pay item definition. Again, this is under the hood but this is kind of the mapping system. It's basically, you're taking a pay item and you're mapping it to the object. So come by the booth and we can talk about it.

This is me actually doing it. Now, the video is a bit choppy because I think, I don't know what was happening but the InfraWorks online models are a little slow to query, and that's not on us, I don't think. I'm putting that out there to anybody at Autodesk.

So I literally said, we'll see in a second here, I'm going to query the model. So when you log in to Autodesk, right here-- so this is a live. this isn't like a bunch of slides just put together-- you're able to view the models online. And this is through the sandbox program if you're actually using that. You can post models to the online site and only get the test models here.

So when you pick that model you can pick any proposal you want. And what wasn't shown here, see how it's counting super fast, there? It doesn't do that. It takes a while, like 10 minutes. It's like, go for a coffee and come back, kind of stuff. So I think I was just watching TV while it was going on, so the video is a little bit rough. But what's happening is, you're getting each object. And what I didn't show is that each one of those objects is hyperlinked. You click

it, and it gives you all the tagging that's happening behind it.

So we're kind of taking QTO to the next level here with InfraWorks. So that's kind of a result of what we were able to get out of the Rebecca Street model. That's how we're counting everything and building up the tender, and then we have a starting point. That's part C, and I think we're good. I'm right on time, 30 minutes. I hope I haven't bored everybody already.

We're getting into the good stuff now. This is the Civil 3D stuff that you do every day so we've got this great concept now. We've got this tender that's kind of rough but close. Now we're going to extract Civil 3D information. We're going to extract InfraWorks information to Civil 3D, for use in detailed design. So this is one step, you can just grab a part of the model.

If you have InfraWorks 360 roadway design, you can actually export directly through planned production tools to sheets and the whole she-bang. We're defining the IMX file here, and that's now available for Civil 3D import. So it'll grab everything from surfaces, coverages, pipes and alignments and profiles and bridges. It's exporting to the IMX, and we'll just fast forward it here.

This is the new-- I'm not sure it was available in 2015, but definitely 2016-- this is how you get the IMX in the Civil 3D. You spend half a day doing your nice model, you can spend the other half of the day doing detailed design. So keep in mind, anything you produce in Civil 3D can be put back in InfraWorks too. It's not just a one way trip here. So we're not going to go through that. I did that last year in my session.

Anyway, so you can grab the roadway, which we designed. Those are all the alignments that came in from the model. Maybe they're off-set alignments, maybe that roadway had created. I don't know, but roadway is the one we want, so we're going to bring them all in. You can pick and choose what you want to bring in and create a configuration for that. There it is, yep. Say, OK.

So now it's grabbing everything from the IMX file. So this is still filed based. It's doing almost exactly what we were doing online. It's grabbing all the objects available and putting it into CAD. With our AEC system, AEC Tender system, we were querying the objects through a website. Pretty awesome. So I'm going to move Lake Ontario. I guess they thought we needed that for the design. So of course, it comes in with everything and that is super cool. You get the solid 3D modeling for the bridge, right there. Unbelievable, I think. So you're getting all the elements you need to do what you normally do every day.

All the coverages are coming in so I added a nice little landscaped area there. So now that you're seeing poly-lines, you're seeing maybe pipes if we had done some pipes and drainage in InfraWorks, all of those objects can be queried right to QTO, if you think about it. So as you do detailed design, that rough concept tender that we did is really just going to be exactly where we're going to keep updating until the detailed design's totally legitimate.

So the next step is to do the profile design, which if you haven't seen it, just 10 more seconds here. There's a lot of alignments going on there. Just to prove that it's working quite well, you're getting not just the existing and proposed, but you're getting the top, some kind of a top surface of some sort there. I'm going to delete it, because I don't really know what it means.

But I'm going to just do what I normally do, some detailed design. And I didn't spend very long the profile, so don't blame me for all that heavy fill there. Go ahead and label it, that's something you do all the time. Good. OK, so in half an hour we built the model. Another half an hour I talked about the tendering system. Five minutes we're ready to go to detailed design. In detailed design, we can quantify all this stuff with stuff that you do, you've been using for years.

So QTO managers Manager is where it all starts. So the QTO Manager, if this doesn't look familiar it's because it's the tender template that we imported into Civil 3D. So it's not like you're building an XML file to match the tender and half the stuff's missing. Essentially, this is where it all started, this idea of InfraWorks about a year ago, is we wanted a quick way to go from QTO. After we're finished with that we were like, why don't we just go right from InfraWorks? So this kind of was our thinking. So that is exactly the tender template that we're using for this project, right there.

If you have a template, if you have QTO, we have, coming up, the conversion of your XML online back to a catalog. So if you've already got 10 years of work put into a QTO template, then we can upload it directly to a catalog. So it'll go but both ways. And we've even got the little Autodesk symbol up here, because we love Autodesk, right? Right there. So when you click the Autodesk symbol, you're getting the zip file. The zip file contains what you need to do Civil 3D QTO, right here.

So if you spent some time building your template, there's your CSV and your XML, you go to the QTO manager and you load it. You know it's all connected, right? All right, so now you're

seeing QTO in action. This is where everybody, if you're not using QTO, we'll show how easy it is to use. If you already use it, then we can get it back in the tendering system quite easy. I think that's it.

OK, so the next step is a lot of video again. We've still got a little time here. So essentially, we're going to start with basic AutoCAD. So this is, if you're a landscape architect or you're somebody doing electrical design. I mean, it could be really anybody who drafts, has blocks and poly- lines. You're kind of, like I said, 90% there. So a landscape architect, I mean, it's a maple tree and it's a block. So you can select similar and then once you've selected in the pay item list, you've got the code. You've got the embedded code now. Right from AEC Tender.

So you can imagine, once we start doing our counting it's going to start updating. So we can go from our web template into the QTO system, and then, of course, pick everything we need manually. The AutoCAD objects is kind of like the low hanging fruit. These are also things that we can count quite easily in InfraWorks, like trees and signs, all these nice little 3D models. So if you're a civil designer, you probably don't have a landscape plan, but you might have a beautiful InfraWorks model that maybe somebody spent some time on for a presentation. Then you can tag it and do pretty much the same thing here in InfraWorks. If you don't have the data in Civil 3D, you can always just do it through the model. That's kind of where we're headed.

Yeah, so these are areas. So all your coverage areas, if you were to actually use the coverages from the import of IMX, you'll be able to attach the code here. If you want to keep it more accurate if you had changes to it, right? Even the painted line work can be quantified, because we have pavement marking in our template. Everything that gets built is in that template. So like, if you think about BIM, the level of resolution is only so far. You know, you're going to model a painted line. You're going to probably get a ruler and measure it, or do it in CAD.

Right, so once you have all the information you can then compute. So compute is really the counting system, and just to bore everybody I did it one layer at a time. You could do it all at once, but I just want to make sure we're all aware that each file represents a pay item table full of information. There it is, right there. We're getting some counts, very sparse information. We're getting just a code, a description and a quantity-- quantity type.

Not actually great for cost estimating, if you think about it. We don't know how big the tree is.

We don't know anything about it really, other than how many we have. So putting it into AEC Tender gives us some ability to actually give it more properties for better cost estimating. So you'd have to type that in manually later. So now we're producing all of these XML files. So XML is really-- I'm taking a look at it here in HTML, but then I'm saving that XML. So you could have your entire drawing queried with one huge XML file.

So now that we have all that in place, the second level of QTO is to do the pipes. So same thing. We're basically going into our parts lists in our template, in our Civil 3D template, and we're attaching it directly to the AEC Tender catalog. And I know there's a bunch of catalogs that QTO comes with like Florida and AASHTO. So we'll probably do a conversion at some point, but honestly we're pretty busy and the level of detail those catalogs isn't 100%. Like at least the AASHTO ones kind of, I don't know I'm not really familiar with that, so it seems like if you have a better system this would be better just use your own QTO directly.

OK, so hint-- if you do this after the fact, then the little bit of data doesn't transfer. And I have learned that the hard way several times, because sometimes you don't have the parts list updated in your template, and therefore you've got to go and reattach all the data afterwards. So it's obviously better to have it done ahead of time in your template. Right? Everybody's got good templates so I don't have to say that. a

As far as doing the pipe take-offs, again, I'm just going isolate the layer and you can compute the quantities. And it'll export both the structures and the pipes in one XML. You don't have to do it twice, Right It's depending on what you want. So you can have a linear export and then you have an items for each export. So you'll see that in a second. So if you export and you don't know where all your structures are, it's because you've got to redo it for the structures. Oh that's just me attaching some data. That obviously takes some upfront time from the CAD manager, but once it's in place it's pretty much ready to go.

There we go. We'll go ahead and compute the quantities now and turn everything on. So the entire network is exposed and isolated, and we can do a detailed report on this one. In other words, we want every single item itemized. We don't want a total for 250, right? Or total for 525. So this is where you've got to split up the XMLs. Oh I guess it's both of them. I'm sorry about that. OK, so you get that.

So if you don't mind doing pipe quantities with just the description and no properties, then no problem. Like it will handle it, right? But if you want better information, you might have to write

your own scripts. I think it's probably in your best interest, if you want to cost estimating, to write your own code to extract pipe data. Then you get all of the real, like the extensive pipe data. You can do average pipe depth, manhole from and to, basically anything, you can. Even northings and eastings, if you want.

You can extract all of the data versus just a single description with an item code, because that's giving me a price for a 250 diameter pipe with no depth, or any other properties. It's kind of not a great price. Whereas, if you export to something that has some real data, then you can put it into CSV. So if you already have people producing list routines or VBA or whatever, you can just export it to a common delimited file. And it doesn't have to be my little VBA. If you want to give it to you, but basically that's it.

So the next step is the roadway material, and we're almost done, guys. So the roadways, you can attach the pay items to the QTO in the code set style. In this case, because I always use tables for my road volumes. I wanted a good way to just pull in the totals for my tables. In other words, I didn't want any confusion about what QTO is producing, so I'm literally doing the section lines and pulling in the volumes directly from our quantity tables. That's how we normally present all of our quantities, right? Through sectioning. Just a different alternative.

The only problem with this is, it doesn't come with the pay item code number. It's based on material type. But since our system has an extensive cost estimates query system, you can actually say if it's gravel granular A, actually you can query on that. You don't have to have the code. It's assuming that it's a roadway and it's granular A. You're going to get the great quantities. Here I am creating the samples for that corridor that I built. Just ignore the intersections. It's AU, I didn't want to do a super duper intersection there.

Now we can compute the material volumes and produce the dynamic table. This is just a little bit of something I do anyway on a project. So what we want to do is take this data and export it directly to AEC Tender. Just put in one more table. I'm assuming you know corridor modeling. So this is kind of like the way to do it.

It's important that you pick the select material. Then we can get all the material quantities in one shot. That's the beautiful report it does. And one thing I didn't put in the video is, you have to export it to XML and I didn't show that. But you'll get the idea.

So basically, that last bit of number, that's what I want right there. The other stuff is good for the report, but that's really what I want to put in my tender. So when we go to do our cost

estimating direct now, we can open up the same tender that we use for InfraWorks, drill down to exactly the section we want to update with detailed design information. So it's not like we've got to start from scratch or do any of that business. So this tender can travel with you, the entire project. It gets better and better and better as your data gets better.

So all we're doing is clearing off what InfraWorks gave us, and we're uploading direct from QTO the XML files that we've created using AutoCAD. Here are some XML files. So this is, if you're already doing this anyway, you can build these cost sheets as soon as we get the stuff imported. People who do cost estimating can find out immediately, based on the item codes or properties of the item, exactly what it's going to cost. We'll just play that.

So when we do our pipes, for example, you can estimate what pipes are going to cost, but if they're very deep you could be way off. Or if it's in shale or some kind of whacko property. There we go. In this case, we don't have codes. We just have the material type, but luckily we're actually querying on that. So we can do that. And we'll just wait for the pipes thing.

So you see each one, we have to do some manual entry if the data is not good enough. So if you're getting stuff from QTO and you want to enhance the query, you can just put it in there. Now, the pull down lists are all custom. So we're getting a price now of all of those granulars. It's probably a bit off, by the way, because I built this data set in a few hours and who knows?

The pipe network one I like the best, because it's pulling it in directly. You can pull it in from QTO, from the description of the item code. But if you actually use the CSV import, right there-- just give it a second-- this means you can do like an 1800 lot subdivision. You can price it in about five minutes for depth and everything. So here it comes in. That's the AutoCAD version of it, I think. No average depths or anything, so it's a bit weak on info. Be great if we had more, better info from that. So, you know, that doesn't really give us much for estimating.

So what we want, and especially in the tender, we don't want to be retyping the start manhole in there, right? We're just going to clear it off and import the CSV and to get the real deal here. So you can set up several CSV imports , depending on what type of data you're getting. So if you're getting a spreadsheet from a landscape architect or from an electrical guy, you can make a CSV template and then direct. You don't need people coding.

So that's the kind of info you're going to get from Civil 3D if you write a little bit of automation. You even get the street name. That's awesome, because then you can get grouping on street, you can get the grouping on size of the structure and the depth.

AUDIENCE: [INAUDIBLE]

PRESENTER: Yeah, so if you do Excel, we've got an Excel upload right beside that. So if you're just doing a whole bunch of stuff in Excel, you can import direct, no problem. Anything in CSV, even Revvit. I don't know anything about Revvit, but I'm from sure it exports to CSV. I mean, this is for infrastructure. But if you had a building you could do all this. Doesn't really matter.

So that's what we're getting, and so our price is just under a million bucks, I think, for that pipe. So in your office, when somebody says, how much is this pipe network? Calculating for average depth, soil type-- my god, it'd take you a week to do that manually. Just pull in the other AutoCAD stuff here. There we go. This is everything from fencing to barriers. There we go.

OK, so once you're happy, once you've got everything in, that's basically it. You just download the cost sheet. And it's not just the cost sheet, when you create these catalogs you have the ability to upload PDF specs, drawings, all this stuff on the bottom here. And so basically you're getting not just the spreadsheet, but you can download the whole bid package. So all the PDFs that were attached in the catalog, like the standards, they'll get added to it automatically. All the contract drawings can be uploaded.

So the whole idea here is that the bidder will get not just the spreadsheet, but all the associated PDFs. And they probably get the written material as well, obviously. So this is what you want to give your bidder. And when they're typing on all their prices, when they give it back to you, just put a big smile on your face, because you know, deep down, that you're going to be able to use all that pricing for your next project in the future. So it's no longer a mystery. It's no longer the guy with 20 years experience, remembering to do the head wall one time it cost so much money.

So this is the kind of thing that is out of the box. We've done several spreadsheets custom, so we just charge by the hour to do a custom spreadsheet, like a one time fee. So if you have a very specific look and you just got to have it, we would just customize it for you. We don't have an editor. We just have this is a generic type right now. But in most cases, bidders don't really care, do they?

OK, so I think that's it. So if you want, if you have any questions I'm here. We're right on time. Come by the booth if you want to see some stuff with phones and you want to see it live in

action. We're ready to talk to you any time. Thank you very much.