JERRY BARTELS: Welcome to our session. We're glad you made it. We're glad you made it out to AU. We always appreciate the opportunity to come out here and present and share a little bit about what we know and the things that we've been working on with some folks that are equally excited about technology and learning about how to use the tools.

We're Jerry and Jeff Bartels. For the most part, we're interchangeable. I'm the better looking of the two, arguably. We're actually 2/3 of a set of triplets. So and for those people that are watching the recording at some point in the future, we've been told we look just like Brad Pitt, all right? So we'll paint the visual before we get started.

Jeff and I have worked in a number of different areas of the infrastructure industry. Between the two of us, it's almost 50 years. Got started in the late '80s when we were about 16 or 15 years old, and then worked our way forward. We've been involved in actual production, and then got into some education. We've both been involved in consulting. We've been at Autodesk now for a while.

We've done some creative stuff as well. I was the mayor in the community where I live. And Jeff has been involved in some things with Lynda.com and doing recordings. So we've got a lot of experience with a lot of tools, both from creating things using the tools, receiving some things that were created as a result of other people using the tools.

So what we want to do is share a little bit of that experience in a session today, where we're going to talk about the AEC Collection and how we can use that on a land development project. What we've found is a lot of folks maybe gravitate to Civil 3D as being the primary thing that they're accustomed to, maybe a little bit of InfraWorks, and then wonder, well, what else can I use some of these other tools for? So we're going to walk through a little bit of that process today.

Did you have anything you wanted to throw out--

JEFF BARTELS: No.

JERRY BARTELS: --before we going? OK.

JEFF BARTELS: That pretty much covered it.

JERRY BARTELS: We run a blog, that we do Civil 3D tips and tricks. We also get into other things that are infrastructure-related. Has anybody been to the blog? Outstanding. OK. It's being recorded, everybody. Fantastic.

JEFF BARTELS: Yeah, Civil Immersion. If you just look for civilimmersion.typepad.com. And we'll have the link up there.

JERRY BARTELS: We post things throughout the year on a weekly basis.

So anyway, our intention, we'll be going through our overview. These are the learning objectives that we had set for the session.

We're pretty much a PowerPoint-free zone. We like to avoid PowerPoint. We like to avoid videos. We like to go in and do everything live. Adds a certain element of risk and danger that makes it exciting for everybody involved.

We heard that the group that was in here last was having some serious projector issues, so we're just assuming that was a fluke. We heard one of them had a Mac. Maybe that had something to do with it.

Everything seems to be working all right for us now. If we do run into a hiccup or so along the way, bear with us, and we'll try and resolve that as we go.

The scenario that we're going to be working with, so that instead of it just being like feature by feature that we'll be covering is we're looking at it from the perspective of a civil engineering firm that's going to work on a land development project. Maybe the project was brought to them by an owner.

And this firm is right now maybe most comfortable using Civil 3D. They've heard about the [? Collection, ?] maybe know a little bit about the packages in there, but would like to see how the package could assist them in getting the project completed.

The project itself that we'll be looking at is just a small site plan. We'll be putting together a commercial-type building in a commercially zoned property. So I think it's maybe an acre or two, maybe a little bit larger than that. We've already gone in and pulled some information from the city that we can see that it's zoned correctly.

And the type of building that we're putting up is a fictitious Chicken & Waffles restaurant. And a

lot of folks would say, Jeff, Jerry, your obvious commitment to physical fitness, why would you go with fast food? We thought we would go with that, be more inclusive of all people that are involved.

So the important thing to remember is this is not a real project. I have done some things before where I've had people in the audience who actually turned out to live in the same area where we were showing this, and right away were picking up the phone, hey, we got to stop this, because I don't want this by my house, and other challenges with land development. So anyway, it is a completely fictitious project, as is the restaurant.

So we will be walking through various packages of the solutions within the suite. And we're going to try in the time that we've got allotted to touch on maybe as many as 10, if not more, of the tools that are in the Collection.

As we go through, if you have any questions at all, please let us know along the way. We'll take those as we go through. If it turns out that we're starting to get a long on time, we may push those out to the end.

So time to get out of the PowerPoint, and we're going to hop into the application here. So we're going to start with Google Earth, just so I can give you a little perspective of the site itself.

So the story that we're going with or the scenario that we're using is the entrepreneur, the developer, if you will, would like to develop this property as this type of a restaurant. Knowing this, there are going to be some challenges that we'll come up with along the way, both its close proximity to a car wash that's next door. You've obviously got some residential back here that could be a challenge going through the approval process. We've even got a church and some other occupied houses and that that aren't necessarily commercially developed property as well.

Just to get one more perspective on the site itself, since we can't take a tour out there. If we look at the site, this is what it looks like. This building was built not long ago. We can see the terrain is such that it's roughly the same elevation as that, but it tapers off a little bit.

We can also see that there's a ridge out in this area, a swale. Well, swale would be a wrong term, maybe a berm. And if we come back and look at it from the top view, there's a bit of a detention area that's back there, another mound of stockpile that still remains from when this

was under construction. That will be the basis of the project we'll be using moving forward.

So knowing that, assuming that we were just using Civil 3D, our ability to move forward would be limited, because we've got tools that we can go in and immediately start doing some detailed design.

But to start drawing some things together quickly, as an example from our perspective, we're going to be going into it from a concept stage first. We want to build the concept to get sign-off by the owner or the proposed developer. We also want to go into the city, and maybe have them take a look at it, and tell us whether or not they're vehemently opposed to a project like this before we invest a lot of money and move forward.

So to have a tool that's going to allow us to do that, we're going to explore InfraWorks. So I'm going to go ahead and-- well, you know what? Before I open that guy up, how many people have used InfraWorks or use InfraWorks now? Couple folks. All right. Few folks.

What we would typically do is if I want to get a model to get started with, I would go into Model Builder. I'd type in the area that I'm interested in. We'll take and find that. And then this is the area that is our project site. I'd window that. It would build a model for me, and it would pull together freely available data with roads, buildings, imagery, and we would go with that.

Now, I've already done that, which is the model that I'm currently in. So we can take a look at that model. This is what would have been produced. And as I look at it, I can see that detail. There's our a little bit of a berm. Obvious ground raised up a little bit here, maybe another stockpile or remnants of an old one back there.

I want to start making some decisions or get some idea of what we're working with here. I'd also like to know the quality of information that maybe I got from Model Builder. If I'm going to be putting together a concept, I don't want it to be way off before I get started, because my results would be way off or my decisions would be.

So what I'm going to do is I'm just going to quickly create what's called a parcel object within this environment. And we'll will window off the area that we're thinking about. And the reason I'm doing that is because I can start to perform a little bit of analysis on this in that if we go over to the parcel, I can take a look at some contours. So we go with 1-foot contours. I can kind of see what we wound up with.

So I'm going to flip over to a view to make that a little bit easier to see. And you see the

contours moving across the site. Well, I got that from Model Builder And obviously, if I got a berm and some other things, it's not reflecting that in what I have.

Now, I could have somebody go out and survey it. But if I do that, then the city tells me they're not interested, I just spent a lot of money that I didn't need. But I'd really like to have something more accurate than this.

So we're going to explore another tool. Let's flip back to Conceptual. I'd like to explore another tool. Has anybody been in a session so far around UAV or drones, some of the technology that's available in that? We actually went out on October 31, and we flew this, just to see how that would be. And this tool-- obviously, we don't do surveying software or we don't do surveying equipment, things like that, but we leverage the data that comes out of that. But just to see what that would look like.

I'm going to minimize this guy for a moment. I'm going to share my screen here on my Galaxy tablet. And I'm going to fire up an application here. We'll go to Home. And this is the tool that I used to capture it.

It's called Pix4D. If I'm going to leverage the technology to where ReCap 360 Pro is where we're going to build this representation from the photographs, I need to take photographs that have overlap of 80% to 85%. So I need to take those pictures to be able to do it. So I need some software that's going to assist me, otherwise I'm going to be flying this drone around just clicking the button, taking pictures, and I don't know if I'm getting enough overlap to do that.

A lot of companies that are out there that do it. 3DR's got a solution. I believe they're in the exhibit hall. Pix4D's got a solution called Pix4Dcapture. For That's what I used with this.

Just to show it to you here real quick. We can come out-- this is the project site. So what it did is it creates like a lawnmower path. You send the drone up in the air. It's got GPS on it. It goes back and forth. It takes and snaps the photos for us.

If I open that, it's pretty intuitive in that I can make it bigger or smaller. And you see it'll automatically increase the number of passes that are required. I can also set the elevation at which the drone is going to fly, and it automatically determines for us the minimum amount of photographs that are required to get the overlap that we need.

So this is the tool that I leveraged. Like I said, I just wanted to show you that. Because from a

practical aspect, going out and doing the collection is a bit of a mystery. Like all right, well, how do you make sure that you take the pictures in the right spots that you're going to get a good result? Yes, sir.

AUDIENCE: Is it Autodesk software [INAUDIBLE]?

JERRY BARTELS: That's a great question. This is not Autodesk software. This would be something that you would leverage if you had the drone.

AUDIENCE: If you had [INAUDIBLE].

JERRY BARTELS: Well, that's a great question. The Pix4Dcapture application is free, so it'll go through and allow you to do that. And then what I did is took those images and then ran them through ReCap photo, Recap 3D-- 360 Pro to do that. Pix4D has another solution that they do it with as well.

So yeah, this isn't part of the collection. Just wanted to show you how I was able to get information into that.

So let's drop this guy down, and drop out of that. And we'll look at a folder here. So if we take a look at this folder here real quick, we have large icons. These are the photos that were captured.

So as I take and step through these, this is what the drone went through and collected for us back and forth on the site. I took and moved that information up into ReCap 360 Pro, which is part of the Collection

So I'm going to bring that up. I built a photo project. So we're going to open that up on the screen here. And I'll be able to select that, and we'll see the results of it. So my AU 2016R. We'll go ahead and just open the model.

So I used the photographs. We see those over on the side. The model itself, once that was stitched together, I used the photographs in addition to a couple of points I used on the ground to provide some control and scale. And that's what it produced.

So it's, yeah, not incredibly obvious, but you can see it's done a little bit better job now with the terrain than what I got out of Model Builder. And if I hover over one of these photographs-- oops-- I can back up here. And within this environment as well, we can kind of move around these guys, and you can see which one's in which position.

Once that was captured-- drop out of that-- I came back to InfraWorks 360, and I brought it in. Just for the sake of time here, I'll go to a Model Explorer, and I'm going to go ahead and turn on my Point Cloud. We see the Point Cloud appear. There's the new data that's been incorporated into that, that I went out and flew it. So that looks a little bit better.

And then I can extract from this immediately my Point Cloud terrain. So I'm just going to go ahead and just use the defaults. We'll start processing on that. We'll let it read the Point Cloud, and it'll automatically build a surface to represent the terrain. That terrain then will be much closer to what the existing is.

Now once again, is it survey grade? Absolutely not. I mean, I just flew it with a drone, did pictometry to stitch the images together, but at least I have something that's a lot more representative of what's actually happening out in the field. Yes, sir.

AUDIENCE: [INAUDIBLE]

JERRY BARTELS: Correct. When the pictures were stitched together, one of the ways that we can export it out of ReCap 360 Pro is a Point Cloud. We can export it as a 3D object or a mesh. I just brought it out as a Point Cloud. Yep.

So as I look at this now, let's go back and look at it from the view here with the contours, and I get something that's a lot more representative of what's actually out there.

So we've used InfraWorks. We've used ReCap 360 Pro.

The next thing that I want to do, I'm going to come back to my engineering view here. And what I'd like to do is start to lay out my conceptual area of what the restaurant itself is going to look like. I'd like to have some idea of where the parcel lines are. I'd also like to lay out some of the parking lot.

I've got tools that I can do that in InfraWorks 360, but they're a little crude in that I'm kind of just making rectangles for parking lots or buildings. Instead I'm going to leverage Map, which is also in the Collection, to help assist me in that.

So we'll come down here. I'm going to launch Map. And in Map, I've got the ability that I can bring in geospatial information. And at the same time, I can also leverage the tools from AutoCAD in that to start to rough out my parking lot design.

So we're going to go ahead and open a file here. I've got a concept drawing that we'll start with, and use the online Map data. So when this comes up, I should have an aerial image already in here of the area that's in question.

Now, I have shape file information of the parcel data that exists. The cool thing about that is I can immediately incorporate that into this file, and start to get some idea of the parcel lines. So we'll navigate out to my folder here. We'll come out to concept phase. We're going to do my parcels.

And a fantastic thing with a lot of the Autodesk solutions is that a lot of things are drag and drop. So I'm just going to grab the parcel shape file, drop it in here, it automatically takes itself to where it's supposed to go. So it's like what command do I need to load it and things like that. If it can live in there, most cases, we can drag and drop it.

Once the parcels go in-- I'm just going to quickly make that a little bit easier to see. I can double-click on these. Let's maybe make the outlines of the parcels, we'll go yellow. The fill, I'll maybe make that a light blue. I'll add a little transparency to that. And I get my parcel effect. So there's the parcel I'm interested in.

If that GIS information has attributes associated with it, I'm going to do Show the Data Table, and I can drill down and get access to all of the information about that parcel. So should extra information exist, I have the ability that I can start to harvest that as well. If not, the line work was what was most important to me anyway.

Because I want to use it as line work, I'm going to go ahead and check that out. And I'm going to explode that, just so that I can leverage that geometry. We'll turn these parcels off.

So that's the property line. Now, is it a surveyed property line? Absolutely not. It's GIS information. If you're a surveyor, GIS means get it surveyed. I've heard that 100 times. But anyway, it gives us some proximity of what we're working with respect to size.

The other thing I'm going to do is I'm going to turn some layers on here that show the parking. We'll turn on some layers here. This is the parking lot that I'm going to go with. I'm going to experiment with a couple of entrances. One in, one out, and wrapping around the building.

So I've spent some time laying out more accurate geometry, get the curves in there the way that I like it. And then what I would do is I would export these back out as shape, shape data, geospatial information, to bring it back into InfraWorks.

The way I'm going to do that-- we'll just do it for one of them-- I'm going to type in the command map export. It actually exists in the menu. But like I said before, I started using the software in the late '80s, so I'm still a bit of a typist. And I find if you type, the interface never changes. You just type it in, and you're ready to go.

So map export will export a shape. We'll say Project Site. It exists. We'll overwrite that. It is a polygon shape. I'm going to select that manually. We'll grab that. We'll come down, no data. The only options that I'll change is I'm going to treat close polylines as polygons, and say OK.

I've exported the outline of the parcel. I would do the same thing with my parking lot and the island, maybe the area for the building. From there.

AUDIENCE: [INAUDIBLE] SDF files work better than shape files?

JERRY BARTELS: Great question. The question was around SDF files. Would I use that over shape? Absolutely. SDF files work fine. Yep. Yep. And then the SDF, I could have put them all out in one file as well. You know, shape, point, line polygon, SDF. Yep. So that works fine.

So not necessarily going to save changes to that guy. We'll come back to InfraWorks. And then like I said before, I can drag and drop all this stuff.

So we're going to go ahead and come out to my desktop here. We're going to go to my shape information. We're going to grab the island. We're going to grab the parking lot. We're going to grab the project site. I'm going to click and hold, drag those in and drop them. Now,

Once they come in, they've not been configured yet. So because they've not been configured, I can't see them. So I'll configure them individually. We see them up here at the top.

Let's start with the project site. I'm going to double-click on that. I want that to be represented as a coverage area. And I'd like that to look like, we'll say, Terrain. And we'll use Grass 2 as far as my material. We'll Close and Refresh.

Now, my yellow line, I'm going to get rid of that, because that was just a rough area I was looking at. So we'll highlight him, and we'll delete him

So this is my project site area that we're looking at. Let's take a look at the parking lot. We'll double-pick on that. It, too, will be a coverage area. I'm going to come down. That is going to be roadway. And we'll do a Surface Dark Asphalt. Close and Refresh.

I have that in there. It's underneath my grass. We'll fix that in a moment.

Last one we'll do is map the island. So we'll say, it, too, is a coverage area, and we'll apply a material to that. Now, like I mentioned before, we could go through and I could have built these things within InfraWorks, but the tools are a little more crude. And since I've got the Collection, I can go through and leverage some of the other tools to make the process of creating the outlines exactly like I want them.

So all of those are in. Let's restack them, so we can see them. I'm going to come over to my surface layers. We'll take the project site. I'll drop that to the bottom. I'll move the island up over the top of that. So we've got the site, the parking lot, and the island. We'll say OK. That's the area that I'm looking at.

Now, we notice one thing, the parking lot is draped over the top of the terrain. Probably not the way my parking lot's going to be grade. If I'm going to go in and grade it out, I'm going to want a concept that's a little bit closer to reality.

So I'm going to highlight this. And if I right-click and say Edit, I'll get a option here. I've got something else selected. I'll highlight that guy. We'll say, Shape Terrain. And if I grab the arrow, notice how it levels it out, and I can start to move that up and down into the terrain, and it'll automatically grade it for me.

So I'm going to drop it down a little bit, keep it level. It'll grade into the rest of the terrain around the outside. So I've got a nicer grading for my lot.

Last thing that I want to do is I could use a-- let's turn the clouds on. It's always happier when you have the clouds on in the background.

I want to bring in the representation of the building. It'll make a lot more sense if I can see the building. This building was created in AutoCAD.

So I'm going to come up, 2016 Project. We'll say, Concept Phase, my concept building. This is the Chicken & Waffles concept. It's an FBX file. It can live in InfraWorks, which means we can drag and drop it.

When it comes in, we'll tell it that it should be displayed as city furniture. And then I'm going to tell it interactive placing. And I can come in, and I can kind of eyeball that, and double-pick to

drop it on the site.

So now I've got something that's a little bit more representative. I could continue to enhance this, but I'm going down the path that I can take this to the owner and say, well, what do you think about this with the proximity to the building? What do you think about the entrances?

We can go down to the city, and like I said, we wouldn't necessarily get a full approval, but we could maybe get a thumbs up or a thumbs down that, hey, we like where you're going, we're not morally opposed to it, before it moves into the preliminary engineering stage.

Any questions on that at all? All right. Well then, I'm going to shift gears. Jeff's going to hit the button there. He'll take us into the preliminary.

JEFF BARTELS: Perfect. OK, you can see my screen. I'm currently using Civil 3D. So we're in the preliminary engineering stage.

I'm showing the same shape file property lines that Jerry used before from the GIS data. Now, let's say that we've been told that these property lines have moved in the recent years. So we went to the county to get a recent or a current plat, and they gave us that as a TIFF image.

So I'm going to use Raster Design, which is another tool in the Collection. Let's go ahead, and we'll insert that TIFF file that they gave us. And I'm going to-- let's just step through here. And I'll drag this out and place it in the drawing.

So there's my image. The nice thing about having this plat is not only am I getting more accurate geometry, but I'm also able to see any easements. I've got a utility easement here. I've got some building setbacks. I can also see that they've called out future [? write-in ?] only access. And so now we can determine based on-- I mean, we've already kind of laid out our parking lot there. We can find out where we stand with respect to the current plat.

So I'm going to use Raster Design to align this. I'm just going to pick a couple points here for right now. We'll align this to my geometry here, keeping in mind that the GIS data is not 100% accurate. So there we go. We can see, reasonably close. We can see that some of the lot lines there have changed.

Let me do this. I'm going to type xref, and I'll bring up our proposed conditions. Let me reload this. And when I do, I can see, you know what? Our entrance, we've got one of them here very close to where they want the right-in only access. So this tells us we are going to have to have

a meeting with somebody and talk about the feasibility of getting away with the lot configuration or the parking configuration we currently have.

Looks like we're not-- I mean, our utility easement's not under the building, thank goodness. And we're not encroaching on the setback at all. So with respect to the current plat, that's not too bad. Now, we will get our own surveyor to go out and do a survey of this.

When we create exhibits for meetings, it would be helpful to have some of this text. Here we have the legal description for the lot. And since this is a TIFF, it would be painful to go through and retype this.

Fortunately, we don't have to. With Raster, I can extract this text. First, I'm going to clean it up. Let me go to Clean Up here first. And I'll choose Invert. We'll invert the image.

And then I'll choose Process. And I'll say Change Color Depth. And we'll change it to bitonal. So now it's either all black or all white. And since I inverted it, it makes the black stand out.

Now that I've done that, I can do a little cleanup here. I can say Clean Up, Despeckle, and then I can pick the speckle of my choice. I'll grab-- whoops, I apologize. Let me go Despeckle, and I'll pick my area I want to Despeckle first. There we go. We'll get this much. Then I will zoom in and pick a representative speckle.

So now that I've cleaned up that area, I'm going to go through and do an optical character recognition on this. I can just define the angle that the text was written. And then I can pull this down and select the paragraph. It'll go through and extract that text. And then as I drag this down, it'll highlight things that it didn't understand. If I click on this, it'll show me the image as well. So I can go through and make evaluations on this. And I can make corrections if necessary.

I could export this as an RTF file if I wanted to move it into Word or some other word processing application. Likewise, if I just click OK here, this will convert the text into MTEXT. So this is now fully editable text that I could go through if I had to make additional adjustments. I didn't have to type it myself. So using Raster Design, I was able to do that.

Let me jump out of this drawing, and I'm going to open another one here. This one represents-- now we're working on our preliminary design. I've got the parking lot in here.

I'd like to lay out some stalls. I can use Vehicle Tracking for that. That's also in the Collection.

Let me come up here. I'll choose Vehicle Tracking. And like I said, I've got my boundary of the parking lot. I'm going to go ahead and create some parking stalls here. Let me take and drag this out to here. And I want the stalls to the inside. We'll go ahead and get this as well. And then I'll get the last one.

Anyone have to create parking lots for a living? Creating the stripes can be a really tedious process if you're doing it the old-fashioned way.

AUDIENCE: But are you able to edit [INAUDIBLE]?

JEFF BARTELS: Yes. The question was, can you edit the-- like, the parking standards meet your jurisdictional requirements? Absolutely. The way these parking stalls appear is based on a standards file. And there are just a ton of settings that you can go through. In fact, I did the same thing. I treat the standards that came in the software as a starting point, and then I went through and dialed these up to match the requirements that I needed when I used to do parking lots.

So now that I've got this in here, we'll edit a couple of these just for time here. I've got my drive aisle. It's two-way. It's 24 feet, which is going to be too much for my drive-through there. So I can take and pull this, and say it's going to be one-way, which shows me, OK, I can get away with a one-way aisle here. So since I'm going one way, I can adjust the angle of the stalls. We can go ahead and do that.

Let me do a quick edit here. I can say, let's get rid of the [? start ?] island. I really don't need that.

And then in the interest of full disclosure, my parking lot here is drawn perfectly width. So one thing, let me show you this, when I eliminated that starred island, since that is perfect width there, that last stall, it's like off by 100th, was enough to hide that last line. So I want to make sure I'm getting credit for that last stall on the end.

Now, you may be wondering, who's going to paint that? Nobody's going to paint a stripe on the curb there. There is a setting in here now-- it's actually new in the last couple releases-- where you can say do not draw the side line. So I can take that out. And I could go through, and I could tweak the stalls going around the rest of the lot that way.

The nice thing is I can quickly throw my stalls in, and then I can come up and run a report to find out how many stalls I have. In this case, I've got 45. I'd have to do a couple other

adjustments there, but just for the sake of time here, we'll just stick with this side.

I'd like to add some handicapped stalls. We can do that as well. I'm going to say Edit. And we'll edit this bay. We've got several bay styles. I'm going to choose Disabled. Now that I've got one, I can select it. And I can say Copy To. And I can say copy one here, and maybe copy another one there.

As fast as I make edits to this, I can come back and hit my report and find out where I'm at.

So very quickly, we can go through and take and lay out our parking configuration for the parking lot, and make sure that we have enough space, or if we have to resize the lot to accommodate more cars.

Another thing I can do, we're going to have to have a semi-trailer come and make deliveries. So I want to make sure that we can get a WB-40 vehicle in here. So we're going to do a quick swept path analysis. That's another thing we can do with Vehicle Tracking. I'm just going to choose AutoDrive Arc here. And then I've got a WB-40 semi. Let me go ahead, and we'll drop him out in the road here. There we go. Proceed. And I'm going to turn off my running object snaps here for a second.

We'll go ahead and drive up here. Now, this parking lot is based on a real world parking lot where I live. And I was fortunate when we were out there taking some pictures to create this data set. Actually, the guy doing the delivery was actually there with the truck, which was nice. I got to see how he pulled in. So I'm going to be pulling in the same way, and actually, pulling in the exit.

Let me come in here. I'd like to pull the vehicle in parallel to the geometry. So we'll take and pull in there.

And then pick alignment. I would like to turn around the back of the lot here, parallel to this. And then we will pick alignment one more time. I'd like to come around parallel to here. And I'm watching the island in the middle there. That'll work for right now.

And then I can turn this off, and we can back up here without jackknifing. We'll take and get that in. That'll do for right now.

So he actually pulled in and blocked that area of the drive-through, but it let the other cars go around where they could place their order. This is the storage unit that he was delivering to.

So now that I've backed up, and of course, now that I've moved that off. Hold on. Let me take and pull that back. There we go. Let's pull this back out again.

And that is unfortunate. The story of my life. Now that we're doing a recording, it's not letting me pull out.

OK, then what this is, this is like *Iron Chef.* I just took the Baked Alaska out of the oven, and I just dropped it on the floor. Now it's covered with cat hair. So rather than watching me pick the cat hair off the Baked Alaska, I'm going to take and open up the other one that I have here, where I did pull out. So you don't have to watch me sweat, and try and fix that in front of your eyes.

So here's my swept path analysis. I've pulled in. I've backed up. And so now I've validated that that vehicle can get in and out, and service the lot.

At this point, I would go through and take care of some of the grading. I would create feature lines from the curb and gutter, and set those to an elevation. I could build a surface from that. That's actually what I have here. If I select this, I can go to my object viewer, and I can tip this up. You can see, there's my parking lot's been graded.

So once I have my rough grading, I can also go through with vehicle tracking. I can ensure that not only can the vehicle get in here from a horizontal perspective, but am I going to have any difficulties from a vertical perspective?

If I select the path here and go to Vehicle Tracking, I can project this path. If I go to Surfaces here, I can project this up to my top surface. I've got a surface in here called composite that represents my proposed. So that's all I've done there.

Now that I've done that, I can select a path, and I can click Animate. And we can actually watch the vehicle drive in 3D. We'll take and speed this up a little bit. And I've got some nice camera controls here, where I can get a good look. But you can see when he pulls in, you can see the vehicle is actually driving on the surface. That's one of the nice things about Vehicle Tracking is it is incorporated into Civil 3D, so it does recognize the Civil 3D objects.

Let's get above this, so we can see the vehicle coming around. And you can save these videos, so that if you did have to go to a public meeting, you can show any type of vehicle that's got to get in there and service it, not only can we give you a printed exhibit, but I can

give you an animation, too, that shows you that it works.

So let's bump this up even a little faster. We're backing up. A little faster. Breaking the law now. Now he's pulling back out into the main traffic.

So using Vehicle Tracking, I was able to create my stalls and my swept path analysis, both horizontal and vertical.

And just real quick. Now, we don't have a lot of issues with the grading here as far as steep grades or anything. But if I do select the path, I can come up and have it generate sections where it'll look and identify places where I'm getting close to the ground. Let's see if we can see a measurement here. Like I said, 1.29 feet.

I know that I don't have any issues, because it would actually create colorized lines showing me the green, yellow, orange, magenta, red, depending on if I'm approaching the ground or penetrating the ground.

Let's do one more thing. If I select the vehicle, I can bring up a quick profile here. So this is the profile for that vehicle. And you can see the minimum ground clearance is 1.334 feet. So I got within 1.2 feet. So I did approach the ground a little bit, but nowhere close to where it was going to be a problem.

AUDIENCE: How do you turn off [INAUDIBLE]?

JEFF BARTELS: Oh, question was, yeah, how do you take and turn off the number one nodes? We have to adjust the-- it's called a-- let me select this, and I'll go to the-- it's called a Report Wizard. Probably not the best name for it. It should be called Style Wizard. That's what controls the appearance of what these things look like. And when that comes up, you got to step through. There's a control for everything.

And one of these is going to have to do with construction, construction lines, construction objects, all the little accouterments. But that's where you'd go through and whichever one it happens to be.

And another thing. We'll give our email addresses at the end of the session. I've done a ton of recordings that go through and explain just that, how to go through and create your own parking standards-- somebody asked about that-- and how to create your own styles for the driving paths. So I'm more than willing to share those.

So got the preliminary. At this point, we're getting ready to move things back over to InfraWorks. We'd be creating shape files from the surface boundary and the parking lot boundary to move that over.

I want to do one more thing. When we get the stuff over to InfraWorks, one of the best ways to add realism to a model is to add all of the little accouterments, building-- I'm sorry-- trees and people and cars.

And if you have a fast food restaurant, you're going to have things that are specific to that, menu boards, the sign out in front, things like that. You may think, well, if I've got to create something like that, maybe I've got to get SketchUp or some other application. You can actually do it in AutoCAD. It's very easy. AutoCAD's part of the collection. AutoCAD's incorporated into several of these tools as well.

But let me show you real quick. I'm going to build a menu board here for the restaurant. I'm just going to pull up AutoCAD. And the board that I'm going to create is going to be the weekly specials. So it's not going to be the whole board. It's going to be the board that you see while you're sitting waiting for the next guy to finish ordering. It's going to be a small board.

So let me open this up quick. I've just got some geometry here. Let me click my Southeast hot spot to go to a 3D view on this. I'm also going to go through and click the gear in the corner, and I'll make sure that I'm viewing the 3D Modeling workspace.

So I've got a couple rectangles. These are going to represent the base, the menu board. So I'm going to move-- let's move this inner rectangle. I'll just pick a point. And I'll lock my Ortho. And you can see from the 3D perspective, I can actually pull that straight up along the z-axis. I want to move that up a foot and a half. So that represents my base.

Then I want to create a solid out of that. I'll open the menu, and I'll choose Loft. I'll grab those two cross sections, if you will, and I'll hit Enter twice, and it creates a nice solid between those two shapes. I could have more than two if I want to, but these are the two that I grabbed.

Let's go to a conceptual view. And we can see, there's the base of the menu board. This geometry is just a closed polyline. This is going to represent the top. I'm going to use the Extrude command for that. I'll just click that. We'll pull this straight up. This is going to be 5 and 1/2 feet tall. So I'll just type 5.5.

Now I'd like to put the menu board on top of the base. I'm going to change my visual style. Again, I like using X-ray. I can see through my geometry. Allows me to grab my object snaps a little easier.

I'm going to say move, and we'll grab this. And I want to pick it up from the mid between two points. We'll pick it up from the midpoint between the center and the center, and we'll move it to the mid between two points, the endpoint and the endpoint. So now that's sitting right on top of the base.

One more thing I want to do is create a little recessed area where the menu's are to be placed. So I'd like to put a UCS on the front of this object. So I'll come up to the UCS menu here, and I'll just say the origin is going to be that lower left corner. The endpoint, the point that represents the x-axis will be this lower left endpoint, and then this upper one will be the y-axis. So you can see, I have defined the UCS on the front of that object.

Let me create a couple quick lines here. We'll just take and trace the top edge there. And I will trace the bottom edge. I would like to have about a quarter of a foot margin around the menu board, so I'm going to offset. Let's offset 0.25. I will offset this top line down.

And I have my selections cycling on here, so it makes it easy to grab that line. We'll just offset that down. And then I will take this line, and I'll offset that up.

Then I can use press/pull. I can move my cursor inside that closed shape, and now I can just push that in 0.05. I'm just making up dimensions. Nobody's going to be measuring it in InfraWorks, OK? We just want to get something that we can quickly use.

So there's my board.

Last thing I want to do is create some kind of image that I can take and map to the front of this. What I did-- let me go here. We'll open this with Paint. Tried to be a bit of an overachiever there.

So this is my menu board. I defined an image. Basically, what I did was I measured that rectangle in AutoCAD. How big is that space that I made? It's 2.1 feet by 5 feet. So I created an image that has the same proportions, 2.1 inches by 5 inches. That way I know this is going to fit perfectly in that spot. So that's the image I'm going to be using here.

Let's add some materials. We'll go to the Visualize tab here, and I'll say Materials Browser.

This brings up the library where I can grab materials.

To make this show up, we'll say we're going to use, like, yellow paint. So I'll just type yellow as my text string there, And it'll search through the library here for yellow objects. It kind of stopped on plastic. We'll use smooth yellow plastic. That'll be good for now.

To apply the material, I'll just drag it over and drop it. Just drag and drop to add the material to the object.

Let me flip this now to Realistic, so we can see the material. One more. I want to create the material for the menu board. So let me open the little icon down here to create a new material. We'll make a new generic one. And I am going to call this Menu Board.

It's going to be based on an image. So I'll click the Image field. And then I'll grab my menu board image. A lot of adjustments here you can make to it. I'm just going to turn the glossiness off.

And then the last thing-- really, that's it. I just have to do one more thing. I have to set the size. So I'll click that Image field again. And I'll come over here under the editor, and I'll uncheck this Proportional Lock. And I'll say, what's the width? It's 2.1 feet. And what's the height? 5 feet.

So because that material is the same size as that face, I can now drag this over, hold my control key, and then drop it. If you hold your Control key, it only applies the material to the one face you were over. I don't want to apply it to the whole thing.

Now, most people would take and close out, and say, that's beautiful, but then as you're walking away, you'd say, you know what? I don't think that was quite right on there. And it's not. It's got to be shifted just a little bit. That's what this button's for, Material Mapping. All I have to do is click Material Mapping, Control-click that face, and hit Enter. And it'll take and scare it into lining up like it's supposed to.

So now I've got my menu board. The one that you'll see in the InfraWorks' model is painted black. I didn't do it black here, because the background's black.

So now that I have this object, though, here's where I would go and export this. I would just say, export to FBX. And I could export this to my hard drive somewhere here. I'll just throw it on the desktop for right now, weeklyspecials.fbx. And I'll click Save.

I want to export Selected Entities. I want to export the objects with the materials, and go ahead and embed the materials. And I'll click OK. That is now an FBX object that I can drag in InfraWorks and place in the model.

So at this point, we're going to jump over, because now we're putting together the preliminary model for approval of the project. So I can flip that back over.

JERRY BARTELS: Before we roll into the next step, any questions on where we're at? All right.

As Jeff mentioned, we finish the preliminary now. The important thing out of that as well is the idea that I can have different people working on different things. We're working towards next the approval process, making it as realistic as possible. People won't approve things that they don't understand.

If anybody's ever been in a public meeting before, I've had the opportunity to preside over those for about 10 years. I used to think sometimes I had the front row seat to the train wreck as they would try and defuse bogeymen that were coming up from all over, because people couldn't visualize what was there.

So the fact that one person could be Civil 3D working on the design, somebody else could be in AutoCAD building components, somebody else could be building stuff in InfraWorks 360.

So we've got a completed model that we'll open up in InfraWorks now. And I'm going to go ahead and use a bookmark. We'll jump up to that [? area ?] to take and show what that looks like.

So the menu board that Jeff just created, we've got on the back of the building here. So that's, basically, the same FBX file we looked at before. Did the same thing with the other drive up and other [? ones. ?]

AUDIENCE: Question. Sorry to interrupt.

JERRY BARTELS: Yep.

JEFF BARTELS: As far as [? estimating ?] the FPX?

JERRY BARTELS: FBX, yes, sir.

AUDIENCE: FDX [INAUDIBLE].

JERRY BARTELS: F, B as in boy, and then X. Yep.

AUDIENCE: Can you do that-- do you have to have InfraWorks installed to do that? Or is [INAUDIBLE]?

JERRY BARTELS: Yeah, the question is about the FBX file format. It's actually like an Autodesk interchange file format. So you don't have to have InfraWorks loaded. You could just go to a machine that has AutoCAD. You'll have the option to export to FBX. You could open up-- Navisworks will have it. Revit will have it.

AUDIENCE: [? Revit. ?]

JERRY BARTELS: Yep. It's a great way to exchange data between applications, makes it more agnostic, and then move it around, keep the materials, things like that. OK?

So obviously, he's done some other things as well to add some of the lights and that around the building. This would be something that we would take to the meeting to kind of show the neighbors as well as the adjacent property owner.

One of the things that we did was-- if you noticed the property line, the parking was pretty close to that. The idea was that this area may expand further. And with this up against the property line, his parking lot could expand, and we could tie the two together. Until such time, there was some grading issues, so Jeff put in a retaining wall, because we kind of have to stay off their property until that would actually take place.

But we can put that stuff into a model, and make that very easy for people to understand, when we go in for the review process, how these things are going to be addressed. A very nice tool in InfraWorks for still frame or rendered images-- animations, I mean. We'll go ahead and create a storyboard. And it's actually pretty easy to deal with.

We'll bring this down here. I'm going to create a new-- we'll say, Add a Camera Path Animation. A new spot right here. Then what I do is we'll move to another point. I will capture another image. We'll move to another spot here, capture another image.

And what it'll do is it'll automatically stitch these things together and create one all-inclusive animation that we can run. All right. We'll slide along the back of the building, take another one, and we can keep working our way around.

Once we've done that, [? is ?] one way. There's multiple ways to do it. I can see the keyframes

that have been created. We'll start at keyframe 1. And I'll set the speed as far as how far I want it to go. And it'll automatically figure out, OK, this is how much time I should take to move from image 1 to image 2. You can fine-tune it. But for right now, we'll just go with something quickly here.

We'll say, I'm going to go at 50 miles an hour. And when I hit that, it bumps up my entire animation to about 18 seconds. And if we move this guy down now, and we hit Play, it'll start from where we were at, and then it will move from image to image, and stitch in between them.

So if I wanted to create something that I could-- and we used to do this when I was at the city-- it would be helpful that, you know what? You want to create something, put it on the website, have people looking at it before they get there, before they've already got preconceived ideas of what you're doing, that helps.

We can also do still frame rendering. That helps too.

The other thing that InfraWorks gives us the ability to do is it gives us the flexibility to address things in the meeting. And anybody who's been in the meeting before, I used to say that people don't show up at a meeting to tell you what a good job you're doing. They're usually there with pitchforks and the torches, and want to know, all right, what's going on? How is this impacting me?

One example that I thought of immediately is when I see the big cartoon chicken on that sign, that folks may not understand how big that sign actually is. And there'll be people that when they see that, oh, that's going to be just like something that's out on the interstate. My god, I'll see that from five miles away. That's going to look terrible.

Well, if you don't have some way to address that other than saying, well, it's going to be 35 foot high, if they can't visualize it, then you run the risk of maybe you having to go to another meeting or finding some other way to do that.

Well, in this environment, if that was a question that came up, I can literally come and position myself down here on the street at street level, and from the street level here, if I was a passing car, that's what that sign is going to look like driving up and down the street. So it doesn't look like the giant McDonald's or Wendy's or something you'd see out on the interstate that people would have to see from real far away.

So the tool gives us the flexibility to be able to address those things right there in the meeting as well.

I'm going to drop out of this for a second, because the other thing that's kind of helpful now-- Jeff's going to go in and we'll take a look at that-- is virtual reality. You guys have seen a little bit of that this morning, maybe if you were at the one of the opening sessions where they talked about it. I know there's a lot of that in the exhibit hall.

But as part of the approval process, being able to invoke some visual reality or virtual reality will certainly be able to help us when it comes to maybe the neighbors who might not necessarily want to embrace having a restaurant that close to their house. So I'm going to flip over. We'll give it back to you.

JEFF BARTELS: All right. So nothing tells the story about the model like being in the model. And I know I was someone that, when somebody said virtual reality, I thought, well, that's got to be hard and it's got to be expensive.

If you have the Collection, you can do virtual reality with your cell phone. And we're going to do it right here.

So I've got my InfraWorks model. So what I'm going to do is export this model as an FBX. Let me come up here, and I'll say Export 3D Model. Say Bounding Box. And basically, I'm defining the amount of my model I want to export to make my virtual reality environment.

So we're going to export this as an FBX. And I had a directory here earlier. But let me come down here. AU2016. You can see, I've got one there called Site Plan. I'll just go ahead, and we'll overwrite that one.

So I'm just going to export with the materials. I'm going to merge the objects with the same texture. And I'll replace that one that I made earlier. So that's going to go ahead and export.

If you would, would you grab-- on the other side of the screen, the [? Aldi ?] bag's got that viewer in it.

OK, so that's step one. Just export it as an FBX. Then I can jump out of InfraWorks, and then I'm going to jump into Navisworks. Navisworks is a tool that we have as part of the Collection. Now, it does a lot of things. One thing it does really well is stereo panorama renderings.

So here in Navisworks, I'm going to go to Open, and I'll grab that site plan FBX file that I just exported. And it'll pop this up on the screen. And then when this comes up, it will always have a wee bit of a tilt to it. There we go.

One more thing that I don't know that's 100% necessary, but I always like to say. It makes me feel good. I'm going to right-click to select that. And I'm going to come down to Units and Transform. You can see when it comes out, it comes out at centimeters. I just like working in feet, so I'll set that to feet.

So let's orbit. So you can see, it the retains the materials. It's just one big FBX file.

So what I do here is just position myself where I want to be standing in my virtual reality environment. Right here, we'll say. And then I'm going to go ahead and say Render in Cloud. Part of the Collection is you get the cloud-based rendering.

I'm going to render the current view. I want to render it as a Stereo Panorama. You can see, if you go with the lowest quality, there's no credits necessary. If I wanted to go all out here, I could say I want to do Final, Advanced, with the highest pixels.

And I could say, you know what? Email me when that's complete. And then I can go ahead and click Start Rendering, and it'll render this on the cloud for me, and it'll send me an email when it's done. Now, I've already done that. I'm going to cancel out of this.

So we'll pretend that it sent me the email. Right from Navisworks, I can go to the Render Gallery. Let me click Sign In. And I will log in with my credentials here.

And then when it takes me into the gallery, I can see that I have rendered this model a few times. We're going to take a look at this one. Just want to hover over that, if you look to the bottom, look what the render time is, 15 minutes. That was the highest quality. 15 minutes, then I got an email back. It was done.

When I select that, you can see that it gives me a nice 360 panorama. Depending on the internet connection, it'll take a second for that to give me a nice clear view.

But in addition to this 360 panorama, note it gives me a nice QR code. I can scan that with my phone. Now, you could print that in the newspaper. You don't need any special software or anything loaded. In fact, if you have a QR reader on your phone and you want to try and scan it, go right ahead. And I'm going to--

JERRY BARTELS: We'll flip over to the slide that's got the images?

JEFF BARTELS: Oh yeah, we can do that.

JERRY BARTELS: Flip back to mine. It'll make it a little bit easier if somebody wants to test it.

I'm going to scan this myself here. The whole trick to the scan, the QR code just takes and loads the hyperlink. That's all it does. So all you have to do to get virtual reality is just turn your phone sideways, and it creates the stereo pair. And then you can place this in a Google Cardboard.

Or if you don't want to pay $15 for a Google Cardboard, we found these View-Masters online. Everybody knows how to work a View-Master. Yeah, View-Masters are-- [? so he ?] get past you.

AUDIENCE: [INAUDIBLE]

JERRY BARTELS: What's that?

AUDIENCE: [INAUDIBLE]

JEFF BARTELS: Yeah, View-Master. They've been doing VR for 50 years. Now, it does have a lever on it. Since it is a cell phone in there, you know, your cell phone when it sits for a while, it'll kind of turn dark. You can hit the lever, and it's really high tech, a little rubber finger goes out and touches the screen, so that it stays lit.

But if you want to look in there, you can. You don't need glasses. You can take your glasses off. Phenomenal, phenomenal 3D. You can see the entire site. So we've got a couple View-Masters if we want to take and hand those around. I wish I could say you could take them home with you, but it's got my cell phone in there.

JERRY BARTELS: Yeah and then my wife wouldn't be able to get ahold of me.

JEFF BARTELS: But yeah, if you have a QR reader and you want to try it, you can scan it, you can actually see it on your phone here if you want to try.

So at any rate, we can we can pass those around. But with the Collection, you can do a VR, virtual reality--

JERRY BARTELS: Take a look.

JEFF BARTELS: --simulation--

JERRY BARTELS: Just hit the [? thing-- ?]

JEFF BARTELS: --in just a matter of 15 minutes.

JERRY BARTELS: --every now and again, so the phone doesn't go dead.

JEFF BARTELS: 15 minutes.

Yeah, we've rendered this one a couple of times from the drive-through from the beginning. Another thing that they're handing out, that [? Aldi ?] bag had some-- if you go to the infrastructure booth, or the infrastructure area downstairs, I believe--

JERRY BARTELS: Here, I'll get it.

JEFF BARTELS: --do I have one in here? Yes.

JERRY BARTELS: There you go.

JEFF BARTELS: They've got, like, the Google Cardboard. They're handing these out. I think you may have to sign up for an InfraWorks trial or something to get one. But this is all you need to put your phone in to do that.

AUDIENCE: [INAUDIBLE]

JEFF BARTELS: What's that?

JERRY BARTELS: $17.

JEFF BARTELS: $17 on Amazon.

JERRY BARTELS: Yeah.

AUDIENCE: [INAUDIBLE]

JERRY BARTELS: View-Master VR.

JEFF BARTELS: Yeah. It comes with software, so you can kind of do the old-fashioned View-Master stuff. But

it's beautiful.

JERRY BARTELS: That sweet Batman thing that'll pop up on the desk.

JEFF BARTELS: Yeah, it does a great job viewing the pairs, stereo pairs. And it's a little more substantial than a piece of cardboard with some Velcro and a rubber band.

OK, where are we? What do you think? Do you want to jump back to final engineering?

JERRY BARTELS: Yep.

JEFF BARTELS: OK, let's do that.

AUDIENCE: [INAUDIBLE]

JERRY BARTELS: Sign looks good? There we go. Actually, the weird thing is, if you have glasses, it actually looks better if you take the glasses off, which I don't know the magic that's involved in making that work, but it does. Are you ready to--

JEFF BARTELS: Yep, I'm going to jump over to-- just so I don't forget my phone, do you want to collect those?

JERRY BARTELS: Yeah.

JEFF BARTELS: Oh, you take and give them to [INAUDIBLE].

AUDIENCE: [INAUDIBLE]

JERRY BARTELS: If you have a QR code reader, we'll bring it back up at the end if you want to give it a shot. But it's a QR code reader. Yeah, go to the App Store. Or you got an Android or a Google?

JEFF BARTELS: Likewise, if you do go downstairs and get one of the cardboard devices that they have, if you send me an email-- we'll have our emails up at the end-- if you send me an email, I've got an autoreply that I'm out of the office, I've added the hyperlinks to my autoreply. So if you get the Cardboard, just send me an email. You'll get an autoreply. You can just tap the hyperlink, and it'll go right there on your phone.

JERRY BARTELS: I've [? got ?] his cell phone back on again.

JEFF BARTELS: OK, let me jump out of this. We'll say that we've gotten approval for the project. Now we're going through, and we are in the process of doing some final engineering on this. So we're going to go back to Civil 3D for that.

JERRY BARTELS: Oh, sorry, your phone was in here.

JEFF BARTELS: OK. So we'll go back to Civil 3D for the-- oh, you got to flip screens.

JERRY BARTELS: Oh, yeah, let me flip this over. There we go.

JEFF BARTELS: OK, I'm going to go ahead and open up my final here.

So this is what Civil 3D was made for. So I've gone through, and I've added the utilities at this point. I finalized my surface. And at this point, I could start doing some analysis on it.

I'm going to change the style of my surface for just a second here. I'll change this to contours and triangles, so I can see how it's triangulating. And since I've put in my structures, my storm structures, I want to validate that the water is going to actually go into those structures. So I'll select my surface, and I'll choose Water Drop.

And then I can just run some tests here. I can go ahead and click, and just validate that when the rainwater hits the parking lot, I can see it's all going into the inlets and the structures that I've defined.

Now, I do have a little issue out here. Towards the front, I am running the water out into the street. So I am going to have to accommodate that, or like I like to say, I'm just keeping the road clean. So I'm not capturing all the water, but I'm capturing most of it.

Let me go ahead and get rid of those.

Another nice thing that we can do on the Civil 3D side as far as analysis is concerned, and especially if you're doing parking lots, you go through and lay out all of your triangulation, and you have a pretty good idea everything drains, but you really don't have a good way to visualize the slopes. We're going to a quick slope analysis on this.

I'll grab the surface, and I'll just do a quick [? Surface ?] Properties here. Under Analysis, I'd like to do a Slope Analysis. I would like to do a range. We'll divide it up into three ranges, OK, if I just want to get a visual and find out how I'm doing.

I'll do three ranges. So the lowest range will be from zero to 0.5%. That'll represent areas that are too flat. Anything less than a half a percent, I'm going to want to look at, just to make sure I get the water moving.

Anything from 0.5% up to maybe 4%, we'll say that's going to be our sweet spot. Everything should be in that range. And then we can say anything from 4% up to whatever the maximum is, that's going to show me areas that maybe are too steep, that maybe I need to adjust my grades.

So I can go through. And I like to go with the other more pastel colors, so they're not quite so aggressive. Let's do the sweet spot here is a light green. And then maybe we can do the area that's too steep, we'll grab a kind of a purple color for that. Let me click OK.

Now, we don't see the change yet, because I'm not using a style that shows slopes. So let me select my surface, and I will change this to show my slopes. And you can see, here I'm flat here on the island. I'm doing pretty good in this area, but I do have some spots that are kind of steep.

Here's where I could go through, and actually select the surface, and I could say add labels, and I could take and click. Let's add a slope label, a one-point label. That's a little steep there, that triangle. But this is how I can go through and find out little places where I may need to make some adjustments.

Let's do one more thing. We'll take these out. And I am going to flip [? this ?] surface back. We'll just show contours. So I'll just flip the style back to [? Proposed ?] 1 and 5.

Another thing I'd like to do is maybe some earthwork. I'd like to identify if I have too much cut, maybe too much fill. I want to find out where I'm at as far as grading this. So to do a quick earthwork calculation, let's go to the Analyze tab here, and I'm going to create a quick volume surface. So I'll just call it Earthwork.

And for style, I'm going to use my Earthwork style. This shows the elevation analysis. And then I'll do my comparison. My base surface is going to be my survey. My comparison surface is going to be my proposed lot. I'll go ahead and click OK.

And how many Civil 3D users do we have here? We've got a couple. OK. I used to think that I had to take and drag all the way down to find out the net graph here. Really, you can just click this button, and it's huge. 2,535 cubic yards a cut. So my site is long. I am going to have some excess material in its current state here.

One more thing I always like to do is, now that I've done my earthwork, I want to have a rough

idea where my cut and fill is. So let me select this. Because the colorization right now doesn't really mean anything.

Let's go to Surface Properties, and I'll do a quick elevational analysis. We'll do two ranges. So there's my deepest cut. So let's say, everything from 5.5 feet of cut up to a half a foot of cut. And then we'll do a half a foot of fill up to the maximum fill. So colorize those areas, but don't colorize the stuff from 6 inches down, 6 inches up. It's essentially the same. Don't colorize that.

And then I can choose my color scheme again here. We'll just make these a little less aggressive. We'll do the traditional red for cut, green for fill. And then I can push these to the back. And that shows me where my cut is. And the nice thing, you know, if I hover, it'll show me. I got 4.7 feet of cut there.

There's other strategies we can use to go through, and actually visualize. We could put grid ticks in and label these if we want to.

So we're working on our final engineering now for the site. At this point, I'm going to hand it back to Jerry. We're going to look at how we can share this data in the field.

JERRY BARTELS: All right. Cool. All right. So we're back to me. [? For ?] the final engineering, we're going have to collaborate with some folks that may be outside the office. We've got a lot of different mobile applications that are available to us [? in ?] the Autodesk side. One of those mobile applications is actually included within the AEC Collection That's the AutoCAD 360 Pro. Gives us the ability to open those files, and be able to view, and maybe take measurements.

I've got the drawing that Jeff was working with here. Perhaps we've got somebody that's out in the field that we want to give them access to it, so they can review it before we finish and start doing the construction documents.

So embedded within Civil 3D or Map or any of the other AutoCAD-based tools, there is an option save the drawing in the cloud. So I'm going to put it out here to Project CW, which is our Chicken & Waffles. So we'll put it out here to-- we'll just call it for review. And I'll save that guy. So it will go out. We'll close this.

And then what I'm going to do is we'll see if we can get out and see that very quickly. With the way the internet has been with the amount of folks that may be online, we'll see how this works for me. Has anybody used Reflector before? Familiar with that? It allows us to broadcast directly onto the device.

JEFF BARTELS: If you've got an Apple TV, you can take and run your iPad or your iPhone through your TV. The Reflector unit does the same thing for your computer. It allows you to take and run it on your computer screen.

JERRY BARTELS: All right. And I've got a gazillion other people that have AirPlay Mirroring that I think is interfering with that. So I'll maybe have Jeff take a look at that real quick. And we'll open it up, then maybe I can hand it around to show it. Just open up-- yeah, there you go. Just open it up, and then we'll take a look at it from there.

AUDIENCE: [INAUDIBLE]

JERRY BARTELS: Reflector is something that's separate. Yeah.

AUDIENCE: [INAUDIBLE]

JERRY BARTELS: Is it $14? Something like that? But yeah, the other thing that I showed earlier with the Galaxy, that was a free application that Samsung has for theirs. But it's great for training and things like that.

Last application I want to show is around 3ds Max. That's part of the Collection as well. We can use that for higher-end rendering. We can also use it for creating marketing pieces and things like that.

As an example, what I like to do is maybe create something to where I've got some buildings moving around the lot. I do have the ability that I can pull things directly from Civil 3D using the Civil View tool that's embedded within 3ds Max. So we'll fire that up.

I'm going to import what is a VSPD file. And basically, it's something that I would have export it out of Civil 3D. So if I come into Marketing, I'm going to grab this. And when we open it up, it'll look familiar. I've exported an alignment or a corridor, essentially, to show how the vehicles drive up in the parking lot and work their way around the building.

So even though most folks look at it more as a transportation solution, we can use it for land development as well. Really, the only thing I'm interested in is the crown of my proposed corridor, because what I'll do is I'll use the elevation in [? that ?] off my surface to determine that. So we'll go ahead and say OK.

There's my alignment that came in from Civil. It's part of my file. From there, I can start to

attach things to that alignment. Let's open up the [? explorer ?] here. We'll set that off on the side. And we'll add a couple of things here.

Object Placement Style Editor. I'm going to create a new object placement. The parent shape that I'm going to use is my horizontal alignment. The parent surface that I'm going to use is the surface that was done as part of my design. So that's what the vehicles will drive on. I'm just going to say a regular interval. We'll set the vehicles at 50 foot apart.

Animation. I'm going to run them at two miles an hour. And I can put in a offset off the line, whether I want them right on the line, whether I want them left or right, above, whatever. We'll go ahead and say that that's fine.

When I click on Play, it's going to extend-- has anybody worked with Max before? It's going to extend my number of keyframes to accommodate two miles an hour around that particular length. So I'm going to go ahead and extend that. It's going to go through. We'll give that a moment just to generate. That's why we shut down some of the materials just to improve the performance on this for a moment.

And when that comes up, I left it set to Ambulances I don't know that that sets the right message we want for our proposed restaurant.

JEFF BARTELS: That is the kind of traffic we want on the opening day though.

JERRY BARTELS: Yeah, but maybe not ambulances. So I'm going to highlight that. I'm going to come down to Cars, and then I'm going to set that to Random, so that I'll switch between the Camaro, the Accord. Let's go ahead and apply that. Get some of the ambulances out of the image. All right, yep, quite a bit better.

And then I can work the slider to see the vehicles. If I have some that are too close together, we can always grab those, and we can adjust their position in line, so they're in a different spot. You got a lot of freedom and flexibility to do that.

Now, vehicles and that, that's very cool, the ability to go in and be able to do those.

The other thing I want to do is I'd like to be able to add people. Oops. I need to change my camera here. We'll go to a top view. Because it's a marketing piece, and we want to see that people are mulling around outside the building, waiting to get in in the morning as the queue fills up.

A very cool tool that was added in 3ds Max not long ago was populate. So I'm going to go ahead and select this. I can create a rectangular idle area where folks can kind of mull around. So I'm going to pick my first point here. Oops. I needed to pick and hold. We'll back up off that.

I've got a material that's giving me a hard time. We'll say we want to populate this guy.

And as I drag that open, you see, like, the little ticks appear? Those are people that are being added to that. And as I work that around, I'm looking for one that's going to give me just a couple of folks that aren't in my building here. There we go. We'll do something like that, where I've got about three people mulling around on the outside. I'm going to say that I want to move that.

We'll slide-- oops. I keep touching my material that I don't have that there. Select this guy. We'll move this over a touch.

So I've got a group of three people that are standing here talking. I've got another person that's over on the side. You can go through and tweak this. Males to females. If they're antisocial, no groups, or you can have them all in groups. So you can control a lot of that.

We'll come back after that set. I'm going to set my camera view back to the camera that I've got looking at the front of the building. And we'll go ahead and simulate that for the length of my presentation here. And we'll get some folks up here. We'll give that just a second.

If anybody's used Populate before, the default people come up, a lot of them look like they are wearing *Star Trek* uniforms. And we can tweak some of that as well.

But you see that people are talking. If we were to start to play this, I got the one standing by the door there on the cell phone, saying, my god, you got to get down here. This place is amazing. Pacing back and forth, somebody's got to get that door open, because I need a chicken and waffles burger.

So I can create some realism. I can take and render that. I can create marketing pieces, do some things. A lot of folks look at it like, oh, if I got InfraWorks, that's all I need. There's kind of different levels of rendering that I can use. InfraWorks, maybe on the conceptual side, maybe through the preliminary 3ds Max, would take me more from the preliminary through final, and then into marketing after that.

So we're getting a little long on time. There's a couple other things we wanted to look at. I'm going to drop out of this guy, come back to my PowerPoint.

One thing that we did want to do, as far as the, well, the final rendering that we would have that we would produce would be something like that, where, as an example, we'd see the folks outside the building and that [INAUDIBLE].

What we have is we've got-- actually, one of the View-Masters we wanted to give away. So folks can bring the code back up if you want to scan it. Or if you want to use, I think, the Batman [INAUDIBLE]. That's cool, too. You can do whatever you want to do. But from the VR thing, you could go out and experiment with that.

Instead of having a drawing or something, we believe in the competitive nature of all folks. So has anybody used Kahoot before?

AUDIENCE: Yeah.

JERRY BARTELS: If you have a smartphone, that's, I guess, the only prerequisite. If you just go to the site kahoot.it, will pop up a number, and then there will be a quiz.

JEFF BARTELS: The nice thing about the quiz is, I like to think of it as impossible trivia or very, very obscure trivia. So don't think that--

JERRY BARTELS: It's not about Civil 3D. It's not about Autodesk products. It's just your, I guess, overall well-roundedness of the world around you, that type of a quiz. So if you'd like to participate in that, if you just go to kahoot.it.

JEFF BARTELS: Yep. It'll be up on the screen here in a second.

JERRY BARTELS: Yeah, kahoot.it. You'll put in the number. There you go.

JEFF BARTELS: Yep, kahoot.it. There's the number. And you'll just give the name that you want to use to participate.

JERRY BARTELS: 10 questions.

JEFF BARTELS: Yeah, it's 10 questions. And the way it's scored is the faster you answer, the more points you get. And then there's additional points for getting a streak, getting more than one or two in a row.

JERRY BARTELS: Yes. And please, no wagering.

[INTERPOSING VOICES]

JERRY BARTELS: Yes, sir.

AUDIENCE: Question for you.

JERRY BARTELS: Yep.

AUDIENCE: Are all the Civil 3D commands available in the standard [INAUDIBLE]?

JERRY BARTELS: Civil 3D in itself is the same. Whether you have the Infrastructure Design Suite or you have the Collection, the tool is the exact same. Yep.

All right. Everybody in that wants to give it a stab?

JEFF BARTELS: Fantastic.

JERRY BARTELS: We good? All right.

JEFF BARTELS: Shut your sound off, just in case.

JERRY BARTELS: Yeah. We're good.

JEFF BARTELS: All right. We're good.

JERRY BARTELS: Good luck.

JEFF BARTELS: These are going to be geared towards people of a particular age too. So if you had one of the original-- or I'm sorry, this is a new Rubik's cube, what color would be on the bottom face?

JERRY BARTELS: Seven seconds.

AUDIENCE: [INAUDIBLE]

JEFF BARTELS: All right. The answer's white. Oh, outstanding. We've got eight people on that. Lance--

JERRY BARTELS: Lance is in the lead. How many-- yeah.

JEFF BARTELS: How many calories are in a Krispy Kreme donut? Is that regional? Do they have Krispy Kreme out here? OK.

JERRY BARTELS: So that's easy. None.

JEFF BARTELS: Yeah, many how many calories--

JERRY BARTELS: That is a sugar-free delicacy.

JEFF BARTELS: --in one of those? Six seconds.

JERRY BARTELS: 190. Man.

JEFF BARTELS: Nobody, nobody got that one.

JERRY BARTELS: All right.

JEFF BARTELS: You know [INAUDIBLE].

JERRY BARTELS: You had no idea it was health food. All right. Anybody watch *Speed Racer* as a child? What was activated when he pushed the letter C on the steering wheel? Anybody remember the Mach 5?

They're coming in so fast, I don't know if they're guessing or if everybody knows. We'll find out. Do one--

JEFF BARTELS: Saw blades. Ooh! Even mix on that one.

JERRY BARTELS: Even distribution. Lance is still up, but David E. is--

Evel Knievel. How many bone fractures in his lifetime? Anybody grow up watching *Wide World of Sports?* That poor guy on the skis that would get just massacred every weekend. Three, two. All right, 433.

JEFF BARTELS: Oh, come on.

JERRY BARTELS: Whoa, man. All right. Lance is still up. The original Simon game, musical notes were played when you pushed the button. What note was played when you pressed the red button? Any music majors? No. Eight seconds. Seven seconds.

A. A. Where are we? Oh, we had one. Was it Lance? Vegas Baby. All right. All right. We've got a leaderboard change.

I'm hoping this wasn't a regional show. Anybody watch *Banana Splits* as a child? Fleegle,

Bingo, Drooper, and Snork. Who was the gorilla?

AUDIENCE: [INAUDIBLE]

JERRY BARTELS: Everybody be humming "Tra La La" on the way out. Four seconds.

JEFF BARTELS: Bingo.

JERRY BARTELS: Bingo was the gorilla. Very good. We've got four. Lance making a comeback.

Phobias. If you're afraid of balloons, what's your condition? Eight seconds. Globophobia. All right, two. Lance.

All right, there's two questions left. It's better to be fast than be right. Medical term for the wishbone. Actually, there's two [INAUDIBLE]. Three. Yeah.

10 seconds. I was told there wouldn't be any math.

It's the furcula. All right, we've got three pre-med students in here. Gary taking the lead now.

Anybody play Operation as a child? Which ailment paid the most cash? That's actually the more contemporary Operation game there. Which one paid the most? Bread Basket.

All right. Kevin. Kevin comes from behind. This is going to go down to the wire.

Last question. This is collective nouns. A group of cattle is called a herd. What's a group of frogs called? This is probably for the win.

AUDIENCE: [INAUDIBLE]

JERRY BARTELS: He's tossing up the Hail Mary.

JEFF BARTELS: That's right. If you didn't know it, you'll know it now.

JERRY BARTELS: It is an army.

JEFF BARTELS: And Lance!

JERRY BARTELS: Lance comes [? back at the end. ?]

JEFF BARTELS: Lance pulled it out. Where is Lance? Outstanding. Right there.

JERRY BARTELS: Lance-- flip back to the--

JEFF BARTELS: Make sure that's got the-- goes back to the PowerPoint. OK.

JERRY BARTELS: Well done. Nicely played, sir.

JEFF BARTELS: Yes.

JERRY BARTELS: All right. So in summary, we went through the Collections. We touched on at least 10 things, a little bit of an internet issue with my AutoCAD 360 Pro, but that does work. I think it's just more with the amount of activity that's going on width bandwidth right now.

But we went through InfraWorks. We looked at Civil 3D. We looked at Raster Design. We looked at Navis, AutoCAD Map.

JEFF BARTELS: Vehicle tracking.

JERRY BARTELS: Vehicle tracking. We touched a lot of different pieces in the context of how we could actually use that to do a land development project. Once again, that was our goal was to show that if we're predisposed to civil 3D and, hey, where would I ever use the other things that are in the Collection? Give you some ideas of where those things could be helpful, and actually that was only even just a small subset. There would be areas [? when those ?] applications would expand further and even do much more.

So really appreciate you guys attending. Hope that the information was helpful.

JEFF BARTELS: We should give them the emails too.

JERRY BARTELS: Please let us know how we did. Feedback's important. These sessions are for you guys, so be brutally honest with that. I don't get offended. Jeff gets offended. But I don't get offended with the comments. So we'd ask that you go ahead and fill that out.

And let me move back to the front here. We have our emails. And then also, like I said at the beginning, we put out a blog where every week we post different things regarding the infrastructure industry, whether it be, some weeks, Civil 3D, someone might be Raster Design, but it's all infrastructure focused and is the type of things that we've walked through and shown today. All right? All right. Thank you very much.

JEFF BARTELS: Thank you.