RAQUEL RECIO: OK, good afternoon, everyone. Do you hear me?

AUDIENCE: Yes.

RAQUEL RECIO: Cool, thank you. Thank you very much for coming. I really appreciate it the last day in the afternoon, last class, you will be tired after yesterday's party and everything, so thank you very much. And welcome to the Secret to Landscape Modeling with Revit. My name Raquel Bascones Recio. I work as a landscape architect at Populous, but I'm also an architect. Here is my tutor. You can follow me.

So I think if you sign up for this class you already read that. My main objective in this class is to convince you that it is possible to model landscape with Revit. You heard a lot of things, but it is possible, and let me show you. So, of course, it's not something easy. It's something challenging, and you have to be creative. And I will try to so you some work arounds, and how to deal with hard landscape, and soft landscape elements, as well as how to work with topography kind of.

We have a lot of things to cover today, so we'll started with a bit of introduction and why to use BIM for landscape. And then I will go through the elements. We will have a question and answer at the end. I prefer to go through all the presentation and then answer everything at the end, OK.

So let's get started. So, as I said, I work at Populous as a landscape architect. We are a global design and architectural firm that creates places where people love to be together like the Yankee stadiums, or the London Olympics, or Super Bowl. We have 17 offices across the world with three regional centers in Kansas City, London, and Brisbane. We offer services from architectural to interior design with funding, branding, planning, and, of course, landscape architecture.

Populous landscape is quite unique because we create places that work with the venues to create this special environment where one day we host thousands of fans, and the next day, we have the community. So it's really challenging. Here is the first project we have done full in Revit. It is the new Tottenham Hotspur stadium in north London. It's a 61,000 stadium, and it's currently under construction. And I can say that Revit helped us a lot to coordinate with the architects, with the structural engineers, with the MEP engineers. Here's another example. It

will be finished by 2019. It's the Bristol arena, also fully done in Revit. Sorry, I forgot to put the timer, but it's fine. It will be finished by 2019. It's fully done in Revit. It's a [? leum ?] certificate and level two BIM.

So after this class, when you come home tomorrow or on Monday, and then you go to the office and you tell your colleagues, your directors, your managers, you know what, we can go do landscape with Revit. Yeah, you're sure? And I'm going to give you three main reasons to do landscape with Revit.

So the first one is that the most architects and engineers are working in BIM environments at the moment. And we rarely work alone. We work in multi-disciplinary environment, so it's time for us to transition to BIM as well and to work in this collaborative environment.

Secondly, clients are requesting BIM. Clients are realizing the benefits of working with BIM for managing the projects, managing construction, and also for reducing cost. And the third-- and this also applies for UK for now-- is it's mandatory. Since April 2016, so this year, it is mandatory for all centrally procured projects in the UK-- so government projects to be level two BIM. And they're already working for the next deadline, which is level three BIM. So in the UK, if you're a landscape architect, you need to speed up and work in Revit if you want to work for a public sector.

So I'm talking about BIM. How many of you work already with Revit or BIM environments? Cool, OK. So you probably know that, but I just want to say that OK, this is a method and what BIM stands for. BIM stands for Building Information Modeling, so we are trying to do something for landscape that is called building information modeling, OK.

But I'm going to say that, as you may know, the B is not the most important thing about BIM. The most important thing about BIM is the information and modeling. So what we want to do, we want to create 3D models of our products. You will say, OK, we can do that with other softwares or other methods.

Yes, but we are going to create 3D models that host a lot of information. And we are going to collaborate with other consultants, and we are going to give them the information. That's the key about using BIM for landscape. So if you want, we can change the name. We can say that we are going to do LIM, Landscape Information Modeling, SIM, Site Information Modeling, whatever. But, in the end, the essence is the same.

Two years ago, when we decided that we wanted to go for BIM we had this deadline, 2016. We had already some projects where clients were requesting to be BIM. So we thought, OK, there are many softwares that we can use, and we choose Revit. And in any of the systems in life, you have to balance like, pros and cons, and, in this case, benefits and what are called challenges.

So on the good side, we had already like a team with a background in Revit. We had our architectural team. We had BIM managers, BIM coordinators that have been working with Revit for a long time, so we could use their experience to build our transition. Also, our team also working with AutoCAD, so it was kind of mindful to use the same software providers-- some similarities there.

It's used by most architects and engineers we work with. I say most, not all. It allows parametric design. It's really good. And then, its a server that unifies everything. You have your views, you have your sheets, you have your 3Ds, you have your schedules, you have everything there. And finally, you can render and visualize from the same file.

But, of course, we have a down side. We have some challenges. It's not a software design for landscape, so there's no landscape specific building tools or workflows. I said most of engineers work with Revit, but the engineers we work more often with are civil engineers. And they were with AutoCAD Civil 3D. And, for the moment, there is not good interoperability between the two softwares, but I know they are working on that. Topography again-- ah, that element-- yes, difficult. And then, of course, there are many consultants that are not still working on BIM, and they are really far behind like irrigation consultants or water feature specialists.

So we are going to deal with 2D information as well as 3D and BIM information. But again, I think these four points, they can be overcome using our creativity and some tools like Dynamo for some.

So before I start I like setting out and getting specific with the elements. I would like to let you know some warnings. First one, I work in the metrics. Sorry, United Kingdom. Second one, I'm doing live demonstration. I'm really scared of something going wrong, so I did some videos. And the third one, this is not a fixed method. This is something that worked for us, and as you saw before, we have really specific projects.

OK, so what I want to do is to show you our method and inspire you to create your own based

on your own projects. OK, so, setting out your landscape Revit model. So you have decided, OK, we are going for BIM. We are going to use Revit. You have trained yourself. You have trained your team. You are all convinced. You opened the Revit because you are starting your first landscape model with Revit.

So you go to the big R, develop a project, and the first thing it asks you, where is the template you want to use? There's no landscape template. Of course, you will need to create your own landscape template. It's endless. So, as a matter of really basics, depending on your project, you will need some views, of course. So for starters, for your plan views for each level, you will need some general arrangement, grading and levels, hard landscape and furniture, soft landscape, and, of course, some sections and detail sections.

And what about worksets? Because I'm sure you will want to explore the collaboration features on Revit because that's why you're transitioning to BIM. So, us, what we do, we create these three groups of worksets. In the first one, we have the site worksets with the component typography, the existing and propose, the existing planting, entourage, and masses. Then we have our hard landscape, paving, stairs, ramps, and railings, some walls, fences, furniture, and finally, our soft landscape.

Of course, all the coding will depend on your office standards. And you will need to add more worksets, or maybe you don't use some of these. OK, that's really open. This is basic. So let's start with the hard landscape elements.

So what's the most common hard landscape element? Anyone?

AUDIENCE: [INAUDIBLE]?

RAQUEL RECIO: Paving, that's it, paving! Come on, every landscape project has paving on it. OK, you have already your project open. You have created your own template. And you go to your ribbon, and you say OK, let's find paving. OK, no, I don't see it. OK, first work around of the afternoon.

So the most similar elements to paving are roof and floor. We use floors, but you can use both. I am going to argue why we use floors. So firstly, in the floor versus roof, level alignment. When you create the floor the top face of your floor will match the level of creation while, in working with roofs, the bottom face of your roof will match the level of creation. So you will need to adjust offset, and that's extra work. We don't want to work extra.

Second, family hosting. You can host many, many, many, families to floors but not to roofs, and you want to host things through your paving. Editing shape, because our paving is not going to be flat. In this case, it's a tie, both do the same. And finally, and not the least important, is for coordination.

If you work with architects, and they have floor inside for their horizontal surfaces, it makes kind of sense to use the same type of element for our outdoor surfaces. So you can use the same floors by changing some structure. So, for me, it makes more sense to use floors rather than roofs.

So say that how you make your paving. So, as you know, it's a system family, so you will need to duplicate an existing paving floor and rename. First thing to do, change the function to exterior, easy. And then you can edit the structure. You can put as many layers as you need, the thickness you need. In this case, we have a natural stone paving, thickness to 65 mill. We have a bedding, and we have surveys. You can have whatever. You can have as many layers as you need to express your paving.

A couple more examples. We have natural stone paving, and we can see that it sits top face matching our level of creation, and we have our three layers-- so in different patterns. Self binding gravel, the same, we have three layers, different materials, OK. So we can do it. We can do paving in Revit.

I want to talk about one special paving. It's warning, hazard, tactile paving. Different places, they call it different. All [? parallel ?] projects need to have that type of paving. And you can say, OK, Raquel. We can do another floor for our paving. Yes, we can. But we're working in 3D environments.

So we want to show our texture. We want to show the blister paving or the corduroy paving. And also, really, there are really small areas for this paving, so we don't want to start like creating paving over paving and then have to modify. So what we do, we create genetic model face based families. Why face based instead of floor based? Because if you use a floor base you will be flat. But if you use a face based, you will follow your paving if you edit the same.

So in the handle you have all details step by step how to model this family. What I do is to model like, single units, standard units. In the UK it's 400 mill square units. And then I place it in my projects. So let's see. Sorry, I need to click here. So we have a paving, our natural stone and bound paving, and you can see the area, 13.5 square meters.

So we go to Component and place, on face, the family we created. We copy the things we need-- all ready copied here. And you can see that my main paving is in still the same area because if I go closer, I have both our classing. So what I'm going to do is do our vertical opening, my main paving that matches my tactile paving, and I'm going to log this sketch.

And when I click OK, it will warn me. Like, oh, you have a face based element, and there's no host below. I know, it's fine. So now, if I click my paving, you can see that now I have less area. So for my schedule, the area will be correct, and if I move it, it moves all together nicely. Of course, you can change the shape or whatever meets your needs.

So yes, you can delegate, Raquel, we have one of these in 3D, but we need to share this information with other consultants, with the contractor. And we need to represent our paving in plants, in drawings. What we used to do with 2D was to use? What do we use? Hatches. Yes. We use hatches and a legend to represent our hard landscape paving. And we are going to do something similar with Revit.

There are two ways to do it. The first way is using the material surface pattern, and the second way is using filled region. Both are valid. The first one, when you create the paving, as we saw before, you have to choose your material, and you can select any surface pattern, any color. And you can, of course, override these after in the visibility and graphics. This is a model element, so you go see it in any view.

In the opposite, we have filled region Filled region is really similar to hatches in CAD. So you can find it on the Annotate tab region. And the problem with this is our view specific element. So if you want to have them in several views, you will need to copy across, and they will not update if you are updating one view. So, for me, material surface pattern is the most used for representing the paving in my hard landscape plan. But sometimes, for some details, I use, also, filled region.

And then, of course, as I said, we have created these floors in these levels, but they're flat. And we all know that external floors, external paving, it's not going to be flat. We need to get the water away, right? So there are some tools to change the levels of our paving.

So when you create a paving, and you selected a floor, and you selected-- Modify menu will open in the ribbon. It has several options. Edit Boundary will get you to the sketch mode again. And then let's see the rest of options.

So Modify Sub Elements. So Modify Sub Elements. So we have our paving, our natural stone paving. Modify Sub Elements allows you to change the elevation of the elements that create the boundary of your paving. You can change the elevation of the points and the sides, but remember that it's relative to the floor not to the level, OK. You can change it in the top, below the Ribbon, or you can change it directly in each element. And the paving will adjust.

So if we go now to spin. It's difficult to see in 3D without me changing the corners. So if we got to a plan view we create a section called section. And we can see that all our layers are following the slope. This can be changed, OK. If you change the materials to be viable in your floor type, it will change, but usually you want all your layers to have the same thickness for your paving.

OK, that was the first one, but usually I not only work with my boundaries to get the water away. And I need to add low and high points for drainage, so that's why we have Add Point tool. Add Point tool allows us to put extra points in a floor. So again, to open the modify floor, we select it, and we can check that it is not just mapping to anything.

So first thing, before adding points, is to go to plan view and to sketch where we want to put our points. So with detail lines we can, in this case, we're going to do an offset from our boundary and place the points in the intersections. Now, we can select again our paving, and you will see that now it just snaps to our detail lines. We can place these points to our low or high points.

So, now in 3D, you can see that those are in the same level of the paving, and we can adjust the relative elevation. And this is really cool. What Revit does is to automatically create ridges and valleys to accommodate those changes in elevation. This allows you to match like system levels or building levels in your projects. Cool.

The third tool we have is Split Line. I didn't record a video for this because, in the end, it's just two points, and it will create a valley or a ridge in your paving. Again, it won't snap to geometry, so you will need to sketch before placing your split line. Pick Supports is not something that we really use because we don't place supports, so we cannot pick supports. And then finally, Reset Shape will reset your floor to be flat, so discarding all the changes that you had done.

OK, so we have created this floor that is graded, that is sloping to get the water away, and we

need to collect this water. So that's why we need drainage. This is a really tricky element to model because it's always like, who does what? Like, civil engineers or landscape architects, so it will depend on your BIM execution plan. You will need to decide, discuss, but usually what happens is that the landscape architect models the surface drainage while the civil engineers model the underground drainage.

So again, you go to your Ribbon. There's nothing similar to drainage at all, so what tool should we use? Family Component. But really there are two ways that I model drainage in my projects. The first one is for gullies or spot rain, so we can use generic model face based families. What happens when I have, like, drainage that is following my grading-- like a slow drain, regrading-- and it's something that is called model in-place. So let's see this in an example.

So we have this paving with a ridge line in the middle, and, of course, we want to get the water to that line and convey it somewhere else. So we are going to go to architectural component model in-place. And it will prompt us for a category. There is no category for drainage, so you will need to decide where to put it like 5/15s, 5. I usually put it in specialty equipment because it's a really open category that nobody knows exactly what it is. And it will prompt you for a name, a slot drain, for example.

And what we are going to create is a sweep that follows our paving. So we're going to pick the path. Remember to pick 3D edges on, and we can sketch the profile or we can have one loaded. I loaded one for this example. We need to check that it's currently positioned, and now we can see the magic. We have a flood drain following our paving, and then we need just to finish our model to exit the model in-place environment. And here it is, our slot drain.

Kerbs, both the spelling, British and American, so no one gets confused. So again, nothing in the Ribbon we are not liking. So what are we going to do with kerbs? There are several workflows to work with kerbs. And it will firstly depend on the type of element that you are using for your paving. So if you are using floors, you can use a slab edge to create your curves. If you are using roofs, you can use fascia or gutter there. And I'm going to explain that because you can find it in any general Revit training. But there's a third way, that is valid for both options, that is really similar to drainage, which is model in place of family.

So we have this, the same, paving with our slot drain in the middle with a ridge, and we want to place a kerb follow in our paving. So we, again, use the same workflow. We go to model in-

place. Now we have more clear category, which is floors. Because, in this case, we are using floors for paving. It will prompt for a name, kerb, with a k. And again we are going to do a sweep, so pick path. Remember always to do 3D edges. We select both sides of our paving.

And now, in this case, I will sketch our kerb. Edit for fun. OK, we go to a reference, and we're going to do a rectangular kerb. As always, in Revit, you draw and then define the dimensions. In this case, 250 millimeters by 150. Remember to place your sketch next to the insertion point, so it seats nicely adjusting to your paving. And we're going to add a fill it to the outer edge, 50 mill radius.

And up set when we are happy with the sketch. Go back and see the magic happening. We have a kerb, good, and it's following our paving. We just need to up set to finish the model, and we are done. We have a kerb, slot drain, and paving. Cool.

The stairs, oh yes, we are super lucky. And we have a tool for stairs. Yes! We don't need to work around for this one. Just two warnings-- first thing, create new types for your stairs, and set them to be exterior. And the second one take the calculation rules because you know that they differ from internal to external. That's it, simple. Something needed to be simple.

Ramps, yes, we are super lucky. We have ramp. The ramp tool has improved over the past few versions of Revit. I didn't use it at the beginning, but now, I tend to use it sometimes. The problem it has now is that you cannot slope in two directions, so it can only one have one direction, sloping. And you know that sometimes we need to slope in two directions for drainage, or to accommodate existing levels. So, in that case, that you cannot use ramp, what I use as a work around is to use floors. So the same that we did for our paving, we can use for ramp, and then work with the Modify Sub Elements tool to get our levels.

Oh, railings, yes, they are there. Railings is one of the most complex elements to get right in Revit. If you work with Revit, you know. There are many, many tutorials and classes. I attended one yesterday, really good, on railings. I just need to highlight something that came with the new Revit 2017 that is really good. Now, we can host railings to walls and floors, and that's really good for us.

So imagine that we have this funky wall, which I have edited, save. Really strange one, but it's just an example so you can see the capabilities. And we want to place a guardrail on top of a wall. So we go to railing in the Architectural tab. And the main thing you can see, OK, I want to place on the host, so place on host. No, wrong. Place on host is only for stairs and ramps. You

need to go to your sketch path railing. Yeah, its a bit confusing. So you got to sketch path, and then you pick your host.

So you can pick, as I said, walls, floors. So you pick your wall. Now, you sketch your path. In this case, we are going to do it in the middle of our wall, centerline. You see in the 3D that it sits down in-- see the magic now. Wow, great, huh? And if you change the profile of this wall, you will see now, it will update. Spoiler. Select, Edit Profile. So if I change it, I accept the changes, and you will see. Boom, done. This is only for Revit 2017, so upgrade.

Walls, yes, you will use walls as a landscape architect for retaining walls or in closing spaces. And we can use the architectural wall, you just need to create your new types. You can change the Build tab. You can change the layers, materials, appearance. That's easy one.

This is not that easy. Fences. So you go again to your Ribbon. You have to do this fence, and there's nothing there. So what's the most similar element that you can use? No, some people use railings. I use walls, but not any wall. I use curtain walls as fences. So traditionally, a curtain wall is glazing and mullions. But really, for Revit, horizontal and vertical mullions can be any type of profile, and they can be any material. And funnels can be any wall type, any basic wall type, and they can even be empty panel. So this is really, really a powerful tool.

So for example, we can create a round post fence. How we do that? First, we create a new family, of course. And we define the curtain panel to be empty panel. Be careful here. It's not known. It's-- see, empty system panel empty. And then we don't have any horizontal mullions, and we have vertical mullions. This is [? wrung ?] at a fixed space-- in this case, 250 millimeters, wherever you want. And, of course, as a curtain wall, you will select the height in the instance, so you can have any height you want.

Let's see another example, a really traditional timber fence. So again, new family, empty panel. We don't have anything in between the mullions. And we have vertical mullions as a fixed distance of 1.2 meters this time, and we have horizontal mullions at a fixed number of two. OK, again, you can select the height in the model.

Oh, I like this one. Wire fence, you use that fence for grounds or playgrounds, so this one is a bit more complex. So we have vertical and horizontal mullions for the frame. And then, what we have done, is to create a new wall type to act as our panel. That wall type has one single layer. It's a new material. It is called wire mesh. And we have changed the appearance of that material with a cut out, so the black is empty and the white is the solid. So in the appearance

and the renderings, we have this mesh like appearance.

But, of course, we want to be able to cross our fences and get the people in and out, so we want to use doors as a gate. So we can replace our panels for doors. We can use traditional curtain walls and change the type. In this case, we changed the glazing materials to be the same material as our panels.

And this is the last hard landscape element that we are checking today, and it's water features. And this is a really wide element because there are many types of water feature, any design you want to do. But the first thing, the most important, is that there's no way to model water in Revit. There's nothing about water in Revit. So we need to be creative and do something a bit not orthodox with water.

So imagine you have this really simple reflective pool with a sitting wall. That, of course, is a wall with a shape. But what about my water? And here comes the not orthodox Revit. I use floors. Yes, I use floors to model my water. So it's basically, my floor, the information I need from it is the area and the depth, and I can get that from a floor element. So I create this one layer of floor, and I can change the surface pattern to appear in my plans. I can change the cut pattern and the appearance. What about water jets on floors? This simple component, face based, on our paving. OK, that's two examples. You will need to be creative in any design.

And we reached second part, soft landscape elements. So first thing we have to think about is what we want to communicate with our soft landscape elements. So if we go to the Massing and Site tab, we can see that there is site components. So Revit has, in its library, some trees and planting that are, what is called RPC elements. RPC elements are designed for render purposes, so the information they give you is quite limited.

I mean they are not telling you about the root ball size, or the depth of the soil that it needs, or the trunk height, or the crown radius. So there are really three ways to model your trees in this case. So, as I said, with RPC elements-- secondly, with 3D trees, where you can have more information as you like, you can build these families really easily. And then, of course, we need to represent 2D trees in our plans.

What we used to do is to create families that combine these two, 3D trees and 2D trees. You can find in the handout all the information, how to create this family. You can be as detailed as

you need creating parameters like the radius of your root ball, the depth of your root ball, the trunk height, trunk girth, crown shape.

And then, for the family types, what I recommend is to have a family per species, and then each type can be size, for example. Or, if you work with a relatively small amount of species, you can do like one family for conifers, one family for the cedars, and then each type is one species. Up to you, the work flow that works with your projects.

But what about understory planting? Shrubs. So we also have some RPC families built in our Revit library. They look like this. But now think about your 2D landscape projects. Were you placing each and every plant in your master plans? No, not at all. I mean, it would be nuts to place like hundreds and thousands of plants. It would be crazy, and it slow so much your model, that it will be like really difficult to work with it.

So I use two workflows for my low planting. So for specimen shrubs, we use family component as we did for trees, so we can create a family with the same workflow. But for understory planting, I'm going to be non orthodox here too because I'm using floors as well. So yes, I'm using the same element in Revit to model my paving and to model my understory planting, but I'm going to explain why.

So the data I want from my understory planting, it's the height of the planting, the layers that it has, the soil depth, the area. And the element that gives me that information in Revit is a floor. That's what a soft landscape floor looks like. You can add any layer you need. You can be as specific as you need.

In this case, I have planting. You can change the material to have one material per species. The thickness of your floor will be the height of your planting. And then you will have your topsoil, subsoil, your drainage layer, any membrane you need. What you need to be careful is that, I said, that the floors, when you create them, the top face matches the level of creation.

So I want my planting to be above my level, right. So I need to change the offset from level to match my height of the planting. So you can have this, and also, your planting can host your trees. But again, as it happened with paving, we need to represent our planting in plants, in drawings, to send out to our nursery, to send out to a constructor.

So for understorey planting, as I said, there are floors. So we can use the same as we used for paving, materials surface pattern or field region. But now what about my trees and my

shrubs? So really simple example, we have three trees, same species.

What we used to do with cut was two create lines or arcs to link all the trees or shrubs of the same species. We can do the same using detail lines. It's really easy. It can be really tedious, but it can also be automatically done by using Dynamo.

So we have that, but we also need to tag our planting. Well, as I said, Dynamo can help you doing these tedious tags. So we need to create tags for our planting. And we will create one tag or as many tags as you need for the trees and the shrubs. And you can modify your planting tag.

In this case, I put two parameters. One is total plans. This is a parameter I create as a shared parameter, so it will appear in all my projects, and it will appear in all my families if I select them to appear. So total plans is number, and then the type name. As I said, when I'm creating the family, I tried to put the species as a type name, but you can create another parameter to be the scientific name or a common name.

And what about my understory? Well, as I was using floors, what I need to do is a floor tag for my planting. So really similar, total plans, my search parameter that I created, type name with a scientific name, and then the area. The area parameter for tags is only available for Revit 2017, so again, upgrade, because it's really useful.

So then we have our simple example. We can go to the Annotate tab. Annotate tag by category, and we want to tag only one tree, and, with that, tag our floor. The problem is that we don't have the numbers because Revit doesn't know how many trees we have because there's no way to do it. So that's why I created this shared parameter. I select the tree, and I count manually. That's really bad.

And for the planting, the understory planting is the same. I select my floor, and I manually introduce the number of plants. That is something that can be also be automatic by Dynamo, but it's more advanced. But I suggest you to investigate. We don't have to create, like, squares that I was creating. You can go any funky shape, organic shape you need, and tag all your planting.

OK, so we have covered hard and soft elements. What about urban furniture? So many people, when I tell them that I'm working with Revit and lansdcape determine-- oh, but there are not families for landscape. It's true. There are fewer families for urban furniture rather than

interiors.

But the thing is this is like retrofit process, so if landscape architects start working with Revit-- like suppliers, manufacturers, and Autodesk will start creating more families for us. So I encourage you to do it. So we bring the industry to this bin environment.

So, of course, you have components. There are few. You can build your own. And, as I said-- just a warning. I think you already know-- if you are downloading families from your manufacturers, clean them first. They are really messy.

So schedules, as I said, for me, the most important of all being is the ability to serve information in a model. And schedules is one of these big, big improvements because we have all together, all linked together. We don't need to open an Excel file and update anytime and every time that we update our design.

So if we go to a normal template in Revit, what we see in the schedules is room schedule, [? buildings, ?] door schedule, window schedule. OK, we're not going to use that. We don't have windows or doors. What we have is hard landscape, soft landscape, and furniture schedules. Usually, I combine hard landscape and furniture, but it will depend on your projects.

So let's start with hard landscape schedule. We have used a wide range of elements. We have used floors, stairs, railings, components. And we want all of this to be in the same schedule, right. So we go to our View tab, Schedule, and there are several options.

The thing is the first one, the schedule quantities, we cannot use it because it doesn't allow you to combine all these categories in one. You're going to say OK, you can use Multi-category, but Multi-category doesn't allow you to put system families. And floors and walls are system families. So what we use as a work around is to use Material Takeoff.

So when you press Material Takeoff, it will prompt you for a category-- as I said, Multi-category because we have all these elements-- and a name, and a face. And what's the data that we usually put in these schedules? So, as a basic, materials, size, joints, finishes, colours, quantities, and areas, model, manufacturer, comments, whatever you need. Problem is when you keep doing your schedule in Revit, you can go to the fields, and you see that not all of these fields are available in your list.

So there are two options here. The first one will be to create new parameters using this smaller icon. I prefer to use this first option. The second one will be to pick other parameters

and rename them in your schedule. That will rename them in your schedule, and they will be the same for the rest of the project. OK, so it's valid as well, but I think it's cleaner to create new parameters and have it for all of your projects.

So you press OK, and you have this big list. And as I said, I'm not being really orthodox with Revit because I'm using the same element for many, many things. And you can see here that I have my [INAUDIBLE] along with my ceramic tiles, and my [INAUDIBLE] gravel, my natural stone paving because they are all floors. And I need to tell Revit not to put my water floors or soft landscape floors in this schedule. It's a pity that we are not able to filter by workset. That should be in the wish list for Mr. Autodesk to put it in a new release because it would be really helpful to filter by workset, but we cannot do that.

So we have these three elements that are all modeled with the same element in Revit. So what we need to filter with is a parameter. So when creating these elements, what I do is, under the description, I use either soft water or hard to describe them. Then I can go and filter. So, in this case, the filter by description does not equal soft, and that will remove all my planting floors from the schedule. And then with a bit of formatting and sorting you can create your schedule. Of course, you will need to type a lot of things. Sorry, but I don't have a workaround for that. You will need to do it.

What about our soft landscape elements. So we have these three elements, and we created trees using components, our specimen shrubs using components, and finally, understorey planting using floors. So there are three different model elements. What I tend to use is to use three different planting lists for our trees, shrubs, and planting. And in this case, it's only one category. We can use schedules and quantities. And I'm going to talk about the two first because they are normal schedules, but let's focus on the understory planting.

So understorey planting, apart from all the information that you usually have like common name or scientific name, that's really similar to a normal schedule. But we have three data that we want to put there-- that is the area. Area is an input direct from Revit. So as I created my floors I can have the area of the floors.

What about the spacing? For spacing, I will need to create a new parameter. What I do is create a new set of parameters, so it's available in all my files, in my template. And I will manually, for each family, put a spacing. But what about the quantities? Because the quantity will depend on my area and my spacing, right?

So when doing the fields you can create a calculated value just pressing that small f, and you know the formula. So if you have a triangular pattern for your planting, you have area divided by spacing by 0.866, and if you have a square pattern, it will be different.

So I can have, in my schedule, the area as a direct input from Revit for my model-- spacing, the one I want or I need-- and the quantities as a calculated value. And of course, after that you will need to do some formatting in appearance to get it nicely.

And we get topography. This is one of the biggest challenges in Revit, and everyone asked me like, how'd you do it? But it's really a headache to work with topography. The first thing we need to know it's not like the rest of elements in Revit. It's an element different. It's using masses. It's completely different to any other element in Revit, but I'm going to try you to talk about some workarounds that can help you work more efficiently with typography.

But first let's see the challenges we have to overcome. So the first thing is that topography is a single material. So you can change the material in Revit, but it's like a paint. So you change the color, the appearance of your surface, but when you go to a section, you see nothing. You see that everything is the same, and it will stand still infinitively.

Secondly, only a few families can be hosted by a topography, and they're under the Massing and Site tab inside Component. They are mostly entourage families like planting or even people. Thirdly, I cannot open voids. So I cannot do like a bridge with my topography or a hole in my topography.

As I said, there's no way to do water bodies, nothing. I just can paint my topography in blue to make it look like water. No interaction with hard landscape elements. This is really important, and I want you to hold this thought a bit further. So Revit calculates the topography using triangles and not contours, OK. Hold this thought.

As I said, there's no direct interoperability between Revit and Civil 3D. I know they are working on it. Please work hard, Mr. Autodesk. There is no built in tools for grading or smoothing our surfaces, so we cannot make it nicer.

So let's start like with creation. I'm not going to explain, like the process because that's really standard. I just want to show you, OK, you can create place in points. You could become crazy like placing each and every point. So the most common workflow is to create for an instance. And usually, as we have here, is a cut instance from Civil 3D.

It's hard to see with the black, sorry. But we have our contour lines, and we have our team surface. We have a triangulated surface. So I did the exercise to do the same topography using contours and triangulated surface in Revit. And this is the result.

OK, they're pretty similar. It's a large area. But you can see that here, with the contour, we have some areas that are not really smooth-- why with triangles are really nicer. So the thought I thought you had the whole is that Revit thinks with triangles. So what happens when I click on this topos, and they reveal the points that make them.

Look, this is what happened. It's the same topography. When I use contours, I have these amount of points to create my topo. When I use triangles, look how many points I have. So to improve the efficiency of the model use triangles. Ask your serial 3D expert, your Civil engineer, to send you a thin surface rather than contours. It will really help you to work with topography.

So there are some site tools built in Revit. I'm going to be quick for this. Building path, it will create a platform. Problem with it, is that it only can slope in one direction. So OK, but usually my drainage doesn't go only in one direction. I want to take the water out in some directions, and there's no control on the boundary. It creates vertical walls, vertical cut, or vertical fill.

These two ones are really, really useful. There are two workflows that I'm going to show you. Speed Surface and Merge Surfaces, of course they are the opposite. One thing that you have to have in mind with these two is you can only use split or merge surfaces two at a time, OK.

So the two workflows I want to talk about-- and I think they will save you time. The first one is refine toposurface boundaries, and the second one is create roads, kerbs, and footpaths. So let's see the first one. So we have the topography I showed you before that I created with this CAD file.

And you can see that my topo is not following the same boundary as my cut. So what I can do is to split the surface of my topo to match to my cut. As I said, it's only one cut at a time, so it can be really tedious. But it will help you to clean up your toposurface to match the boundaries of your project.

This happens because Revit, with these points of the triangles, it creates as many triangles as it can. So now I have split my surface in two. I can select this small triangle and just delete it.

And if I go to my [? saved ?] environment, you will see that it's all gone and it's matching the cut. Of course, you will need a bit of work to refine all this perimeter, but it's something.

The second workflow-- you seen us split and merge surfaces to create roads, kerbs, and footpaths. This is really useful when you're creating big, big master plans or if you are designers because you are not going to create floors for your pavings in such a big project. So I only recommend these when you have the toposurface kind of finished, so it's not going to change.

So for this example we have toposurface in 3D, quite simple. And we have done in the floor plan is to, with detail lines, create footpath and route. And what we are going to do is split my toposurface. So we have the earth, and the footpath, the road, and the other footpath. So I quickly did it already.

As I said, I can change the material. Again, it's just like a paint on top of my toposurface. So I created a material called footpath, and it will change the color of the top. And I can change the road to be asphalt or tarmac.

So now if I go to 3D view, you can see that my road and my kerbs are nicely following my topo. But of course, this is not detailed enough because my road is at the same level of my footpath, so let's go a step further. So I'm going to select my road, and you can see that is matching the level.

So if I go to a section, as I said, everything looks the same, but I can still select-- so that's a footpath because I see the material. That's my road because I see the asphalt. And what we are going to do is just drop down, drop down my road. But I distanced the kerb distance, in this case, 150 mill, you see? And it's following the topography but 150 millimeters down.

But you can see that I have like a gap in 3D, so we are going to split again the surfaces to create kerb and gutter. So along this [? speed ?] line, we are going to do an offset-- 300 mill in this case-- all along, both sides, the road side and the footpath side-- same for the road.

Offset. OK, oh, I did the same for both sides, and I applied a material called kerb, so it's different color. So if I go now to my 3D view, yep, I still have that gap. I still have that gap in between my gutter and my kerb, and I don't want to have that gap. I want it to look nice, so I'm going to do another split surface.

This time, in the line in between the kerb and the gutter, I'm going to do really, really tiny

surfaces, both sides. By really tiny, I use this example, 10 millimeters, so really, really tiny all across my kerb. I promise this is the last split surface that you will need to do. It's really annoying that you can only do it one at a time.

So you can say here that I have my bottom and top, really tiny surface, and we are going to merge those surfaces and see the magic. Oh, we have a kerb! We don't have the gap anymore.

We're going to do it for the other side as well. Merge the two surfaces, bottom and top, and we don't have the gap. OK, as I said, this is really helpful when you have really, really large projects.

OK, Subregion will create areas within your toposurfaces that are linked to the toposurface so you won't break it, and the toposurface will remain unique. And you can change the material while it is still the same toposurface. Edit Surface, really, when you have a toposurface, it will open a menu really similar to the one to create the toposurface. This workflow in the handout to describe how you can use, place points, or create from import, to create your toposurface.

And then Simplify Surface is something that I have never used because what it does, really, is to delete points of your toposurface. And you can decide how accurate you want to be, but really I always want to be 100% accurate with my toposurface. And if you are using triangles instead of using contours you won't have so many points. So you will be really accurate, and your performance will be good.

And finally, Cut & Fill, it's something that you can do with Revit. Of course, it's not super, super accurate, but it gives you a number. So to get it you need two toposurfaces. The The first one is the existing toposurface that needs to be in the phase, existing. And the second one is your proposed toposurface that needs to be in another phase-- in this case, new construction-- and it also needs to be within the boundaries of the existing topo.

So if you select the new topo and go to the Properties window, at the bottom, you will see the net Cut & Fill, the fill, and the cut. Autodesk says that the approximation is 2% accurate. So, good enough for me.

So after this, I hope you have like an overall view of what you can do with Revit. But there are some add-ins that can help you to model this landscape even better and easier. It's not this one.

Site designer, we tried. We really tried. I read the whole, like, 100 pages tutorial, but it didn't work for us. I'm not saying that you don't try it, but it really like crosses a lot and there are many problems. But I know people that are relatively happy to working with it so give it a try.

Secondly, I want to talk about this really, really small app that you can buy for $2. So it's really affordable, and it's really great. It has only three options, but they are really, really helpful to work with topography.

So the first one is align to element. It will adjust your toposurface to your hard landscape-- the edge of your floor or your floor. That's really good. And the second option is points from lines. As I said, when you have a toposurface you can add points with Create Points or with Create from Import. With this tool you can create points using model lines. So you create a model line, and this tool will create points following that model line. Really useful as well, and, of course, you can reset all the changes.

And of course, the start of the Autodesk University 2016. I'm sure that you have listened a lot of things about Dynamo. We had-- I don't know, Bill, are you here? Hey, we have a really good session this morning about using Dynamo for landscape. And there are many, many workflows that will help you to build your landscape like the Opposite tool to topple a line-- that is hard floors that follow topography-- automatic creation of planting lines, parametric placing of families, maximize planting area, bring in topography from Rhino. That's really good-- many things. So I encourage you to, if you are more advanced users, to get into Dynamo and give it a try.

And finally, I want to talk about the Render & Visualization property of Revit-- just a small example. This is the other start of the Autodesk University 2016, which is the augmented or virtual reality. So early this year we customized some Google cardboard goggles for our populous-- a London office. We use it for marketing purposes for our clients, and it's really easy to use.

You put a smartphone in between these two flaps, and you're using a VR System. You can see here, my colleague using it. So for the first project, I mentioned a new Tottenham Stadium. We created this 360 view for the client. For me, it's not a design tool, but it's really useful for marketing and to help the client get the scale of the spaces. That, I think, is really challenging for us, as landscape architects-- and to see the relation between the open space, and the building, and the facades.

So how we did this. So having our Revit model, we brought that to 3D Studio Max to refine the textures, materials, and the renderization. And then we brought it to Autodesk 360 Cloud Render for rendering, and that will give you LINK. That LINK can be opened in any smartphone, any smartphone. It's just a LINK. You don't have to download anything. Any smartphone. And you put this smartphone in this Google cardboard, and you have that view in that.

So it's really good. As I said, we use it for marketing purposes. That's it. We have 10 minutes for questions. Hi.

AUDIENCE: I'm an architect, so this may sound silly, but why is Civil 3D imported like the proper [INAUDIBLE]? And then [INAUDIBLE] workflow instead of work so hard for it?

RAQUEL RECIO: So he's asking why the Civil 3D is so important for landscape. We work really closely to Civil engineers, and they work with Civil 3D. And they model all the grading of the paving or the topography using Civil 3D. So to get those levels into Revit like straightforward would be really useful.

AUDIENCE: And then will the workflows still work because, you know, that makes Civil 3D impractical, like with all these floors. And would we have to--

RAQUEL RECIO: We will see depending on how this workflow is. We'll see. Let's see Autodesk, what it is they do. Any more questions?

AUDIENCE: I didn't hear the last part of his question. But the question I have is when we get AutoCAD files from our Civil engineer whenever they give us the contour lines. And in one model I brought it in and did the Create [? Cocoa ?] by contour lines, and I started putting the roads in, and the sidewalks, and everything like that. But let's say the contours changed and our grading changes?

RAQUEL RECIO: Oh, that's why I said-- I mean, it's just saying that if you change the topo once you have created the roads and the kerbs, that's the problem. That's why I said that that workflow works well when you have a final topography. Otherwise, you will-- Yeah.

AUDIENCE: With [INAUDIBLE], will it change the floor in [INAUDIBLE]?

RAQUEL RECIO: Yeah, that will automatically--

AUDIENCE: Dynamo script.

RAQUEL RECIO: If you use Dynamo, yes. Any other questions? No? OK, thank you for coming. Please fill in your surveys.