Session 3.3

Transitioning Your Landscape Team from AutoCAD to Revit

Melonie Beskowiney, DIALOG

Class Description

Having recently spent a little over a month with our Landscape Architecture team to help them reach a deadline, I was overwhelmed with the struggle to coordinate and collaborate with their design content using 2D drafting tools, when my background is in 3D tools such as Revit. With four multi-discipline studios across Canada, and our new studio in San Francisco, it became apparent that the Landscape team needed to be able to more effectively collaborate with the other disciplines here at DIALOG. As an Architectural Technologist, I felt that the Landscape team had the potential to transition from traditional 2D tools to a Revit-based project environment. This required a lot of planning, from developing standards and libraries, creating a Revit template, and finally educating the team in Revit. Though this process was specifically used for the Landscape discipline, the general concepts can be applied to any discipline. In this class, I will outline the progression that successfully brought a traditionally 2D-based discipline the 3D world of Revit, including the struggles, solutions, and success stories.

About the Speaker:

With a background as an Architectural Technologist, Melonie has switched her focus to a support role in Design Technology, where she helps manage BIM on projects in Institutional, Commercial Retail, Health Care, and Residential. Her passion for collaboration and education enables her to successfully transition many, including entire discipline teams, from 2D documentation to BIM.
1.0 Introduction

If you are in this session, you are most likely either a Landscape Architect working in a multi-disciplinary firm or owner of a consulting firm, and you would like to learn more about the world of BIM. Perhaps you are from another discipline, such as Architecture, and you want to learn about how to equip your Landscape team so they can be more effective in collaborating and coordinating on your projects. Whichever is your case, Landscape work in the 3D environment of Revit is still a new concept to most firms.

2.0 Industry Changes and Industry Expectations

The building industry constantly goes through changes with the tools we use to arrive at the final deliverable: a set of printable documents to build a project.

With the industry diving deeper and deeper into BIM, some disciplines are scrambling to catch up, and even software developers are struggling to provide the necessary tools for such an environment. For example, single line diagrams in Electrical models are done poorly in Revit, because the program has not developed an easy workflow that utilizes “Information” aspects of a model.

Working with the Landscape team in AutoCAD for that short period was just enough for me to envision a transition from the 2D line work of one program, which had no “live” state or built-in information, to 3D objects and systems in a live collaborative environment where information can be contained and utilized on a much higher level. I knew we could achieve this. I first had to consider all the tools that are used in the Landscape industry and how to incorporate or obtain their functionality in Revit.
2.1 Current Tools

- AutoCAD: 2D Documentation
- SketchUp: 3D Renderings and Massing
- Civil 3D: 3D Civil information and Modelling
- Land F/X: 2D Documentation
- Rhino: 3D Massing

There are more tools but these are the most common. They have a wide range of uses, and it is important to understand where each of them falls in the BIM spectrum. Adding a few more programs, we can see how each of them compares and ranks with the direction the industry is going (BIM), and their collaborative capabilities:

**BIM Spectrum:**

![BIM Spectrum Diagram](image)
The graph indicates that the programs on the bottom left have the least collaborative and BIM abilities. Land F/X shows slightly more to the right on the BIM capabilities than the others in that corner, but it ranks low on collaboration. AutoCAD, Rhino, and Civil 3D rank higher on their BIM abilities, but are still not collaborative. Vectorworks, Revit, and Dynamo rank highest on the BIM side, but greatly differ in their collaborative abilities.

One of the realities that the Landscape and Civil disciplines face is that in order to have the best collaboration with the ASME disciplines, Revit is the leading tool in the industry. Despite Vectorworks having perhaps the most useful Landscape tools in the package called Vectorworks Landmark, there is no compatibility with the Revit-based disciplines to allow for collaboration. At this point, with all the tools out there, there is no single program that can do it all. We can only focus on what can do the most right now for all disciplines.

It will take time for software development to progress to the point where there are more useful targeted tools for Landscape and Civil within Revit, so the challenge is to create exposure to, demand for, and provide feedback to Autodesk. It is important that more and more firms are willing to take the plunge into BIM so that the demands for development are recognized. Currently, Revit has a built-in addin called Site Designer, but this tool is largely under-developed and has been that way for over two years. Reviews of this tool are extremely low, and our team at DIALOG has found it virtually useless at this point.
3.0 Developing Your Strategy for Entering the BIM World

We recognized that there are five key ingredients to successfully integrate your Landscape team into Revit. As with any successful meal, you need to have the proper ingredients, and add them in the proper order for a successful result.

3.1 Gather Information

Logically, you need a place to start. As someone who has very limited knowledge of the Landscape discipline, I needed to gather all the information that our team had available. The first thing we did was establish a shared folder location, using Dropbox. This was useful for accessing files outside of our network. Key information that you will require at the very minimum are:

1. **Planting Schedules**: These provide several useful tools for the team’s transition to Revit. The most obvious use is how to set up in the template so that the team’s schedules populate information automatically. My recommendation is to collect this in a spreadsheet, which allows them to easily edit the information as they require more species for their projects. It can live on a network location for posterity, for it will continue to grow as different projects require different content.

The second (and most involved!) use of a plant schedule is how it drives your parameters, and how you build your families. Many of the parameters below are simple “text” parameters that are added to each custom plant family. Other parameters are what you will use to build into the nested families within your RPCs, or used for tagging purposes. You may wish to build more parameters into your families, but the list below is what we started with, and Figure 3.1A shows the spreadsheet that we populated with information on what kind of parameters were needed:
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Each item in the highlighted area becomes a parameter:

- **Common Name**
- **Botanical Name**
- **Abbreviation**
  - Used for tags and/or scheduling

- **Size**
- **Container**
  - Used for scheduling

- **Mature Height**
- **Spread**

- **Elevation Symbol**
- **Plan Symbol**
  - Used for nested families
2. **CAD and PDF details:** Provides an idea of the detail items you will need to create, as well as symbols and line weights.

![Figure 3.1B](image1.png)

This detail can be imported into Revit and then split up into detail components for the team’s content library, and can show you line weights and patterns for reference.

3. **CAD and PDF drawings sets:** Provides information about how sheet sets are organized, and how to develop the template. They also help ascertain the overall graphics, such as line weights and larger surface patterns.

![Figure 3.1C](image2.png)

*Figure 3.1C: This image shows that the L400 series is dedicated to Layout Plans, and the L800 series is dedicated to details.*

You may have additional information to consider, such as concrete finishes, but the team’s drawing sets should provide enough of an idea about what you need to create for content, as well as develop for their template.
3.2 Develop Content

Once you have received most of the above information, you can start creating your content. At DIALOG, we started with the plant schedules, which took care of a large portion of both the family content, as well as the parameters for developing schedules (custom plant families with symbols and parameters require a strong understanding of nested families and parameter mapping). It is important that the majority of your content is created before your users are trained, and have started their first test project, or a live project. Because projects have time constraints, you do not want to be holding back the progress of a project because content is unavailable. You need to get your team to the point where adding content is easy to do, and very minimal.

1. **Collaboration Setup:** When you start making content, make sure to use a sensible folder structure. You will have different types of nested families (detail items or generic models, RPCs), as well as their symbols and annotations. The organization that I found worked best was to separate “working” files (families that still need development) from “finalized” families. Within each of those folders, there were several more breakdowns, all based on the family type (category).

2. **Setting a Standard for Graphics with Symbology:** If we go back to our plant schedule, you will notice two columns: *Elevation Symbol* and *Plan Symbol*:

![Revit Plant Model Info](image)

*Figure 3.2A*
To help make the development of the custom plant families easier for both parties, we developed a series of families for both the plan views and elevation views, and created a “catalogue” for them to choose from and assign to their various plants in the plant schedule. These were all based on their CAD details:

The CAD elevations and plan symbols were turned into detail items, then assigned alpha-numeric designations for the team to choose from, shown in Figure 3.2D and 3.2E. It is important when using CAD files that you import them into a blank detail item family and swap out all the line styles with proper Revit line styles. After cleaning up the lines, copy your detail lines to your clipboard, then paste them into a new detail item family. This ensures that no CAD lines from the imported CAD files will come into the family. If you have CAD hatches as well, swap those out with Revit filled regions. If you do not have a line style that your CAD file is using, make one from scratch with a Revit line pattern. Do not use the imported CAD line patterns. Do as much clean-up in the first detail item family before bringing the lines/patterns/filled regions into the new detail item family.
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<table>
<thead>
<tr>
<th>DECIDUOUS</th>
<th>EXISTING</th>
<th>PROPOSED</th>
<th>REMOVED</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td><img src="image1" alt="Existing Diagram" /></td>
<td><img src="image2" alt="Proposed Diagram" /></td>
<td><img src="image3" alt="Removed Diagram" /></td>
</tr>
<tr>
<td>11</td>
<td><img src="image4" alt="Existing Diagram" /></td>
<td><img src="image5" alt="Proposed Diagram" /></td>
<td><img src="image6" alt="Removed Diagram" /></td>
</tr>
</tbody>
</table>

![Figure 3.2D](image7)

![Figure 3.2E](image8)
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These symbol combinations from figures 3.2D and 3.2E were then indicated on the spread sheet:

![Spread sheet image](image)

Figure 3.2F

They were then nested into the corresponding RPC families. Note that you will want to consider the shared parameter file at this stage. At DIALOG, we have a company shared parameter file which houses parameters (through groups) for every discipline. You will want to add the parameters for your Landscape families to this file. An example of how this looks in the shared parameter file:

![Shared parameter file image](image)

Figure 3.2G

Note: Using a naming convention of some sort will help you easily grab the parameters you need when you are setting up your schedule in the Revit template, as shown in Figure 3.2H
3. **Naming Convention:** A major aspect of creating content to consider is the naming convention. This not only applies to family names, but to shared parameters, and even your Revit template. We use the concept of “generic to specific” when naming elements in the Revit environment. For our families, at DIALOG, we use a three-letter code at the start of every family in our content library, such as “PLN” or “DET” in the following examples. This helps with filtering, as well as separates and easily groups our company’s content from the out of the box content, downloaded content, or other companies’ content. The Landscape team decided to use the Botanical names in the plant family names, which sorted nicely, based on Genus, Species, and Variety (which happens to be “generic to specific”):

```
PLN_Genus_species_Variety
```

...and division numbers for detail items (which applies to all disciplines within DIALOG):

```
DET_Div_item name/description
```
As you can see, the result is that the families, no matter what type of category, sort efficiently and for ease of use:

4. **Other Tools**: You may need to consider tools like **ArchVision** and **Photoshop** when making custom plant families. **ArchVision** is a custom RPC family maker, where you can “bake” your own images into an RPC family.

“RPC” stands for “Rich Photorealistic Content” in the context of Revit. They are image-based files that are applied to families that contain a “plane” where the
image is applied. As you navigate around the object, the image follows. In a 3D view, if your view is set to “realistic”, you will see the image you have applied to the family, in place of the “wire frame” that you see in “hidden line”.

Photoshop is what you may need to create your custom images. In Canada, about 90% of the out of the box RPC plant families are not indigenous to our region, which is why we decided to use what we could from the default Revit families, but had to make plenty more of our own. The main benefit of the ArchVision program is that you can render your RPC families based on the image you have used. There are further benefits, such as being able to turn off the “baseball diamond” at the base of your plant, and other graphic settings. The program also has over 1000 extra plant families available. However, it can be complicated to work with the image files and their folder location, and the program has no network licensing. It is slightly clunky to set up for each user, especially if you have multiple studios. Additionally, if you are using Revizto, your plants will not “render” in 3D, and will be invisible. Only the out of the box RPCs will show up in 3D in Revizto, due to some additional programming on Revizto’s part. This is why we use Enscape, because any custom RPC families will always show.

With your setting at “Realistic”, you can render your views, either through Revit or a program like Enscape, and see the plant object displayed as your image. Please note, that your rendered tree is only as good as your Photoshop skills!
Enscape is an addin that has really made a difference for our team at DIALOG. Enscape is a 3D rendering tool that can read directly from your Revit model in real-time, but can also produce 3D .exe files that can be shared with anyone without having the program installed. The .exe file is a “copy” of a 3D view, allowing the viewer to navigate by walking or flying around or in the model. It is a great communication tool for clients, or during design. Being able to walk through a park with rendered trees provides a sense of how the area will “feel”, or even how the shadows will land on various objects throughout different times of day.
5. **Content Manager:** Lastly, I strongly recommend a content manager. It helps maintain integrity of your families, and provides control over company standards and downloaded content. It also provides an easily accessible “toolbox” of families in one place, and actually encourages the team to provide more since they can see what is available at a glance. People are always eager to tell you what is missing. The content manager should be an add-in that users can access directly through Revit. You will want to investigate what kind of content manager you need, its complexity, and its access: local, network, or cloud.

There are many content managers out there, and a few examples are:
- AVAIL (Archvision is the vendor)
- Unify
- Content Studio
- Spectrum BIM
- Family Browser

It is important to remember to print off check-sets throughout the progress of your content development, similar to how you would for a live project. Collaborate with the
team to ensure the families you create follow their graphic standards. If they do not have graphic standards, you may have to assist and guide them in establishing this.

3.3 Create a Template in Revit

Welcome Page for the DIALOG Landscape Revit template

Once you have the majority of your content worked out, you can start a template. For example, if your plant families have all the correct parameters, you can create pre-set schedules in the template. Your graphic settings (object styles, filters, and view templates) are also reliant on having content created first. Other aspects, such as your project browser, and even your line weights, are not dependent on having families created first. However, since most of your template is content-driven, it is logical to start there before moving into this phase.
Items that you will want to have set up in your template are:

- Project Browser
- Sheets
- Views
- View templates
- Annotation and other Family Content
- Schedules and Legends
- Company graphic standards

1. **Project Browser**: There is no definite starting point to creating a Revit template, so you may choose to begin with a different task. We started with the project browser, because that related to the series of the drawings sets and allowed the setup of title blocks. At DIALOG, all templates have their browsers set up to be organized first by “stage” (Working Views, Schematic Design, etc.), then by “series” (01 Site Plans, 02 Grading Plans, etc.), as shown in Figure 3.3A.

![Figure 3.3A](image)

2. **Sheets**: After you have your project browser, you can set up blank sheets, which helps maintain a standard with drawing sets. Note how the names in Figure 3.3B of the sheets correspond with the project browser in Figure 3.3A (01 Site Plans becomes L1 Site Plans on sheets, for example).

![Figure 3.3B](image)
3. **Views:** It is a good idea to set up some views in your template so that users have an easier place to start. It also helps encourage a proper naming convention that your company uses. At DIALOG, we use a simple formula for view naming. All views that are in the Development Permit phase begin with “DP”, followed by an underscore. This format continues for all stages: WV, SD, DD, CD, and so on. This format helps our users find exactly what they are looking for, as well as ensuring the proper views are being referenced in either linked models and on sheets.

![Image of Project Browser with a hierarchical view structure](image)

Again, using naming conventions in all aspects of Revit is important, as it encourages workflow, as well as provides consistency for all users. When a project does not have any naming conventions, whether it is views, families, and even view templates, users struggle to find what they are looking for.
4. **View Templates**: Your view templates will take time to evolve as your team works on more projects. We set the templates to be basic, with very few settings, so that the users could work out what they needed. When you start working in a collaborative environment with Revit, you suddenly have visibility settings to apply to other discipline models that are linked into your own. The template was set up to have existing view templates, which helped with project browser organization, and then educated the team on how to modify the view templates for their specific needs.

Figure 3D is an example of how naming conventions help with sorting. We chose to organize our template browser by “stage” (SD for Schematic Design, for example), and then “series” (05 for Sections and Elevations), which is the main formula throughout all naming conventions. Any stages that are not being used in the project can be deleted from both the browser and the view templates.

![View Templates](image)

5. **Annotation and other Family Content**: You can now start adding your annotation families and some planting families. If you do not have a content manager, you may need to add several planting families, and even some detail items, for a “start-up kit” in the template. If you have a content manager, you will only need to add a few so that you can set up your schedules easily, but it is recommended
that you remove them after. Templates should not “house” families beyond annotations. Let your content manager be the tool that contains additional families.

6. **Schedules and Legends:** Now that you have some content added, you can start setting up schedules and legends. You will want to use your shared parameter file to assist with this process, as mentioned in section 3.2. Your most obvious schedule will be the planting schedule. We also utilized the Dynamo plug-in to create schedules for capturing x, y, and z coordinates for soil cells, furniture, and all plants. These schedules can then not only be placed on sheets sets, but also update a live Excel spread sheet. When a plant moves in the model, the Revit schedule updates automatically, as can be expected.

![Dynamo graph that is used to pull coordinates for scheduling](image)
7. **Company Graphic Standards:** This last step is where you will need a lot of communication between you and your team. You will want to use the CAD files you were given to sort out any specific line styles and surface patterns, and provide the team with print-outs so they can give feedback on the graphic displays of what they are used to seeing in CAD. You will use the template to implement any of your team’s graphic standards, and better align with the rest of your company’s graphic standards. Note that you will want your scaled line weights to match the other templates within your company.

3.4 Train and Educate the Team

1. **Training the team:** With the first three steps in place, you now have something to work with when you start training your team. We began by including the team in a Revit Fundamentals training class that is typically given to those in the Architectural or Interior Design disciplines, because the same tools that Architecture and Interiors
use will also be used by Landscape. This, as we know, is because of the hurdles discussed in section 1.0. When the team was trained on the fundamentals, they made an easy switch from “floors” to “sidewalks”, “walls” to “curbs” or “tables” to “benches”. They then moved on to learning about more site-dedicated tools such as topography, working with Civil 3D files, and using the Dynamo add-in. There was no specific focus on the Site Designer add-in, mainly due to its clunky functionality. This is a tool with much potential, but Autodesk will need to better develop its capabilities.

2. Educating the team: Training the team on how to use this new tool is just one step in the process. The next step is educating the team on BIM philosophy, and working in 3D. Some of these sessions should include Project Managers, and even Principals. One of the toughest aspects for any discipline in learning Revit is getting used to modelling as opposed to drawing. This is no different for Landscape – take, for example a project we have in a river valley: I had the surprise of opening a 3D view and seeing all the trees placed on the same level, well above the valley, floating in the air. To the team, the tree placements were perfectly fine, since the plan views looked entirely correct.

Figure 3.4A: Floating Trees above the valley
At DIALOG, we also have groups that meet to discuss collaboration with other disciplines, as well as meetings to discuss best practices while using Revit. Once the Landscape team was working in Revit, we were able to add them to these groups with no effort. These meetings are integral for your Landscape team to join, so as to gain a better understanding of BIM and collaboration. Without such an understanding, there really is no reason to make the switch from AutoCAD to Revit.

3.5 Use a Test Project

Finally, you are now ready to put your team on a test project or a small project to start. It has always been my opinion that users will learn best by working on actual projects. This particular team did not have the opportunity to use a test project, so they jumped right into a new, albeit small, project right away. It is also key that they work in Revit as soon as they have gone through training, or they will quickly lose what they have learned. It was in this small project that we developed new processes for many things, such as surfaces and using the parts tool to show jointing. As the team felt more comfortable, they moved into more complicated scheduling by using Dynamo, and also using Dynamo for assistance with topography and floor slopes and shapes.
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Your test project will also be a great place to solidify your graphics. You will likely be making edits to your families and your template as you work on this project, so you must remain flexible and willing to make those changes for months and even years to come.

3.6 Overcoming Challenges and Unrealistic Expectations

Now that your team is well on their way with using Revit, you will come across many struggles, more so in the first few months. A very inspiring Architect at our firm once told me that as teams move into Revit, be they Landscape or other disciplines, we will have to take a few bloody noses in the start. This was to imply that there will be struggles, but they will soon even out. As teams become more comfortable and skilled with Revit, the efforts pay off, and your projects are more profitable than they were in AutoCAD.

Having said that, you will have other challenges and expectations that are outside of the Revit tool itself. You will need to encourage the management of expectations that come from the non-Revit users - that is, the Project Managers or Principals. It is easy for those who do not use Revit to have high expectations, or to wish to compare Revit with AutoCAD or other programs. Perhaps they think that Revit will automatically do all the work. It is a good idea to educate the leaders of your team, so as to help keep those expectations in check. Not doing so will result in negative feedback and insecurity about the process of moving from AutoCAD to Revit, therefore potentially putting the brakes on the entire initiative.

4.0 Final Thoughts

The overall process of moving an entire discipline from AutoCAD into Revit is certainly not an easy one. Your success will be determined by the support your team receives, and its ability to continue. At DIALOG, we have a team that is dedicated to support for all Revit users. This takes much of the stress off of your Landscape team so that they can focus on learning and working.

The entire purpose of making a switch from AutoCAD into Revit is to give any discipline a better chance at effective collaboration. With the direction the industry is going,
Architectural Technicians are already creating models and documents for their sites, which actually takes away work from the Landscape teams. Time is lost when one party is working in AutoCAD, and having other parties cut their sections or elevations and exporting them to AutoCAD, when they should be able to do this themselves. By training and educating them how to do this, they are able to work within the industry as they should, or risk being left behind.