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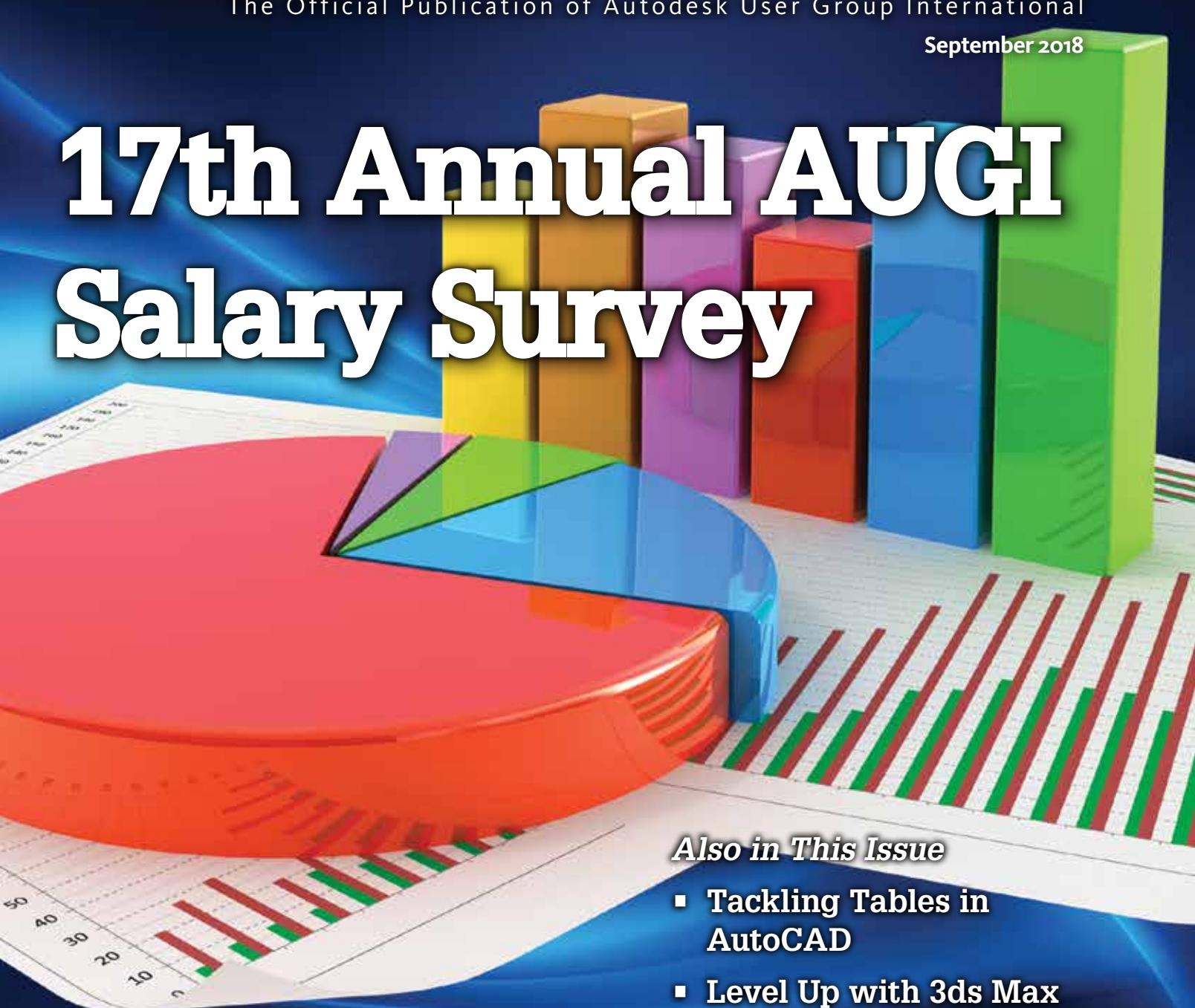


AUGIWorld

The Official Publication of Autodesk User Group International

September 2018

17th Annual AUGI Salary Survey



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Letter from the President



AUGI

As the summer winds down and hints of fall begin to appear, it seems the conference season is kicking into high gear. (Although these days, does it ever really slow down?) BILT North America has just wrapped up, BIMforum is just around the corner, and registration for Autodesk University Las Vegas is in full swing... to say nothing of the industry-specific events around the country and around the world.

It's got me thinking about a crucial skill for having a successful conference experience: networking. And it's not just for conferences: in my opinion, being able to introduce yourself to strangers is an important life skill. Think about it... how often do you meet new people? Or, how often *could* you meet new people? All the time.

And yes, I know, it's intimidating. But it matters, so I thought I'd share a few of the things I've learned after almost 15 years of attending conventions for business and for fun.

Nobody else knows anybody either. Okay, this is probably a slight exaggeration... but not much! I'm willing to bet that most of the conversations you see happening at receptions and during breaks are between new acquaintances. Don't be afraid to join a group, or walk up to someone who's standing alone.

You've got built-in conversation topics. I can hear you now... "But I don't know what to SAY!" Well, you're at the same conference, aren't you? When you sit down in a session, ask your neighbor, "How are you enjoying the event so far?" On your way out of a session, try, "What did you think of that speaker?" Those are my two favorite icebreakers, because they're open-ended and they draw on your shared experience of the conference or session.

Use your breaks. Sometimes at a busy event, you need some legitimate down time. (Fellow introverts, I salute you.) But if you're not out of energy, the interval between sessions can be a networking gold mine. I mean, you can't exactly chat with people during class time... unless you've decided to opt out of a session or two and spend that time in the lounge or exhibit hall—also a legitimate strategy!

Don't wait around, follow up. If you have questions or compliments for a speaker whose session you attended, it's tempting to hang around and introduce yourself right away. And if the line is short, go for it! But an email after the event will carry even more weight. The presenter has more time to give you a thoughtful answer, and it might lead to a more in-depth conversation than you'd be able to have during the session switcheroo (when the speakers just want to pack up their stuff and leave the room anyway).

Business cards still matter. I know, those little cardboard squares are almost archaic these days... almost. Even if you're just going to take them home and plug the information into LinkedIn, they're still useful in the moment. Exchanging cards is a nice reciprocal gesture with a new acquaintance, and they give you the opportunity to jot down a note or two about who goes with the card and what you might want to follow up on. You might not use them at any other time of year, but bring a handful (or two) to conferences.

This advice goes double if you're job-hunting... maybe even triple. According to LinkedIn research, social networks and word of mouth are essentially tied with job boards as the top search methods people use to find new positions. I know they have an interest in saying that, but my experience backs it up. My firm's hires definitely come both from responses to posted listings and from referrals. And the last two positions I've had myself came via my own professional network.

I hope these tips give you a bit more confidence the next time you have the opportunity to "work the room," as they say. And you know what to do now if you see me at a conference or event: come say hello!

Kate Morrical
AUGI President

AUGIWorld

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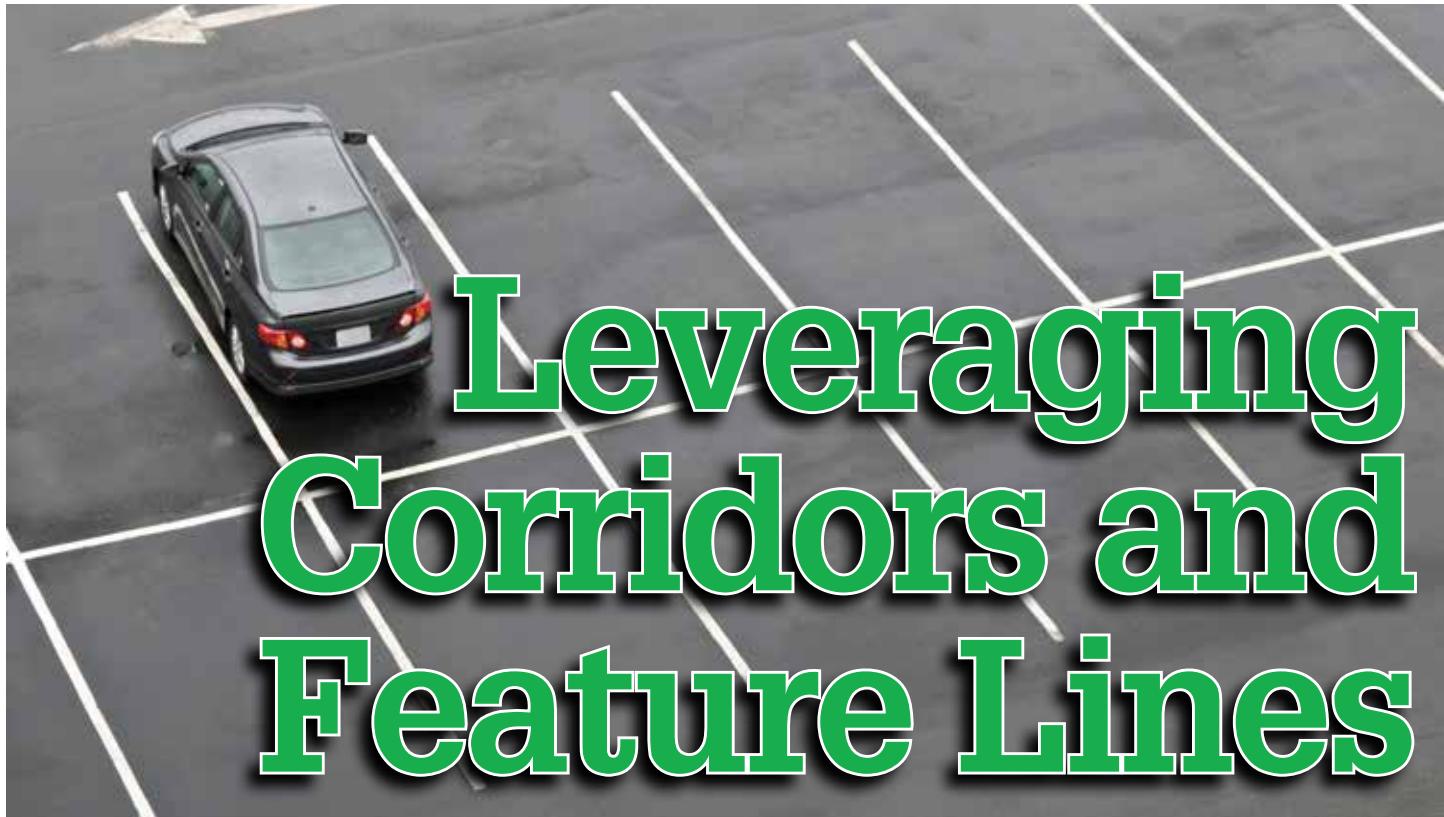
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NEWSLETTER



Leveraging Corridors and Feature Lines



Over the past few releases of AutoCAD® Civil 3D®, there has been a lot of emphasis on corridor modeling, corridor modeling techniques, and advanced modeling workflows. Much of this is because the Department of Transportation is getting deeper into Civil 3D workflows and larger companies are pushing for things to behave a certain way. But even for those doing “simple” site plans and subdivision roads, Civil 3D 2019 has a great new way to increase your productivity and help streamline your workflows.

This article walks through a couple scenarios of when you could possibly use feature lines in your corridor modeling. If you would like the data used for this article, please email me and I will send the files.

NEW IN CIVIL 3D 2017

Let's start with a couple features that came out in Civil 3D 2017.

In addition to alignments and profiles, feature lines can now be used as corridor baselines. Feature lines can also be selected when creating the corridor and when adding baselines (Figure 1).

A parking lot is a good example of where to apply this new workflow. When I design a parking lot, I typically design the edge of pavement in order to see true slopes of asphalt. I then use the stepped offset command to give me flow line and/or back of curb elevations, and sometimes I may use grading objects to keep some level of dynamics. But now you can add the feature line to a corridor along with a curb & gutter assembly and have a much more dynamic and accurate surface.

An intersection is also a great example of using feature lines within your corridor model. Many people feature line intersections, but up until now it was more of a manual process and not very dynamic. Extracting and targeting these feature lines is very simple and easy to use in corridor modeling (Figure 2).

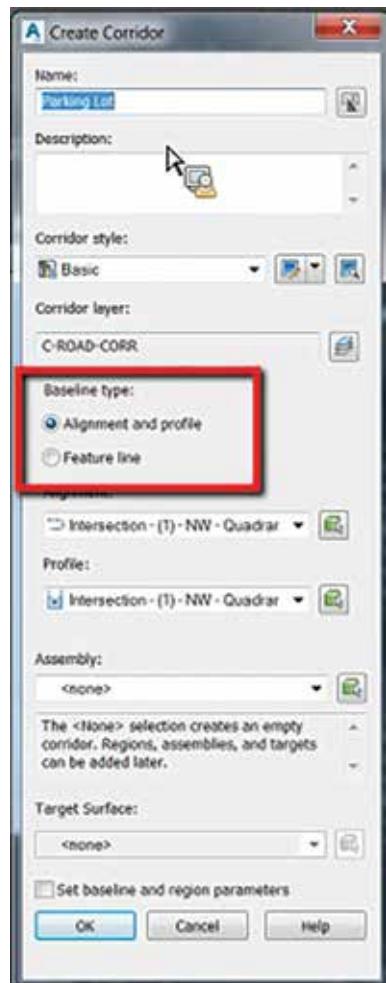


Figure 1

The functionality of extracting feature lines, and keeping them dynamic, has been in Civil 3D for as long as I can remember. However, this functionality has now been enhanced with many new options. The options for selecting which feature lines to extract include:

- Extract all feature lines at once
- Select them one by one
- Define Station Range
- Select a subset based on a corridor region or a simple polyline

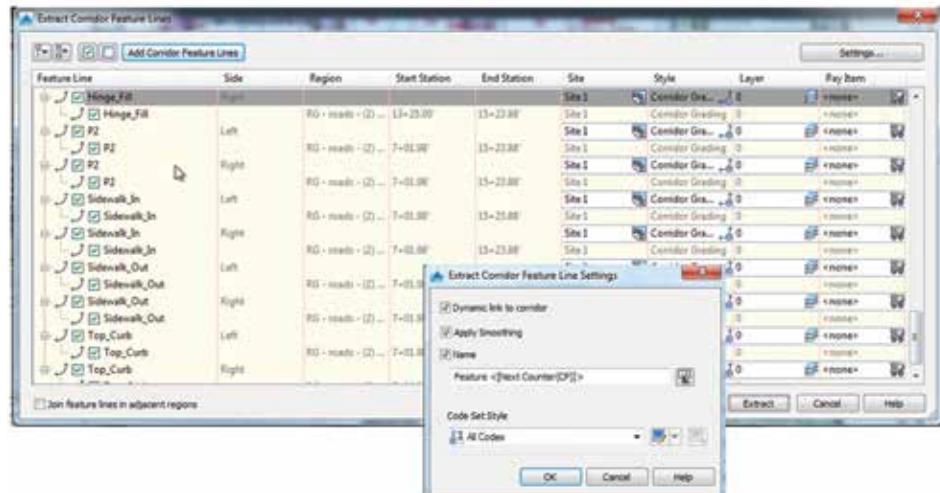


Figure 2

By selecting a polyline, you will then be given the option of which feature lines to include/exclude for the extraction procedure. Select the Settings option to choose whether or not to dynamically link them to the corridor. You can choose to add them to a site, or now use the "Siteless" feature line options.

THE ASSEMBLY

We will need to create an assembly for our curb & gutter. We will use this assembly for both examples. This will typically be a simple assembly, and can even be a copy/modification of your corridor's full assembly. Figure 3 is a screenshot of what I will be using.

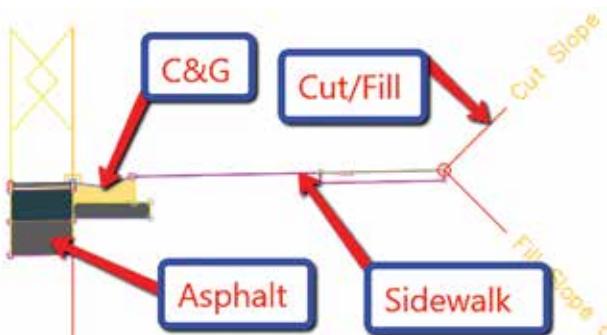


Figure 3

INTERSECTION WORKFLOW

Yes, we could use the intersection tool to create this, but sometimes that doesn't accomplish what we want to do. Sometimes you need just a bit more control, and feature lines will allow you to do so.

Let's take a 4-way intersection, for example. I first start with extracting the centerline feature lines as a dynamic link to either my profile or corridor. In this case I chose to use my FG profile as the feature from which to extract a feature line. (We will keep both crowns maintained.)

1. From the Home tab > Create Design panel > Feature Line drop-down > Create Feature Lines from Alignment (Figure 4)
2. Select your alignment, then select the profile you wish to dynamically link to. You will then have a dynamic feature line—therefore, when your alignment and/or profile changes, your feature line does as well.
3. Create your feature lines along the Lip of Gutter (Edge of Asphalt) using either a polyline and create from objects command, or manually draw in your feature line.
4. Set the grades as you would like along that feature line. For this example, I will assume you know how to do so.

The example I am using would look something like Figure 5. The corridor has already been started, with gaps for the intersection area to be modeled.

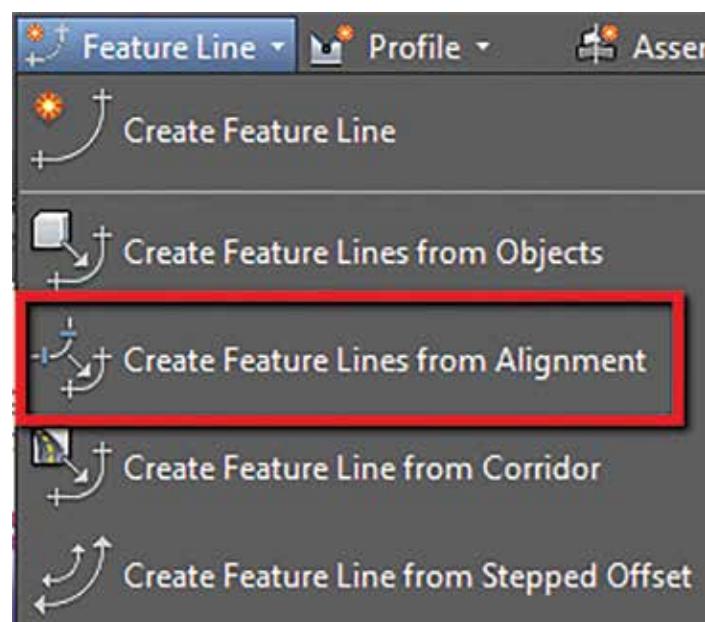


Figure 4

AutoCAD Civil 3D 2019

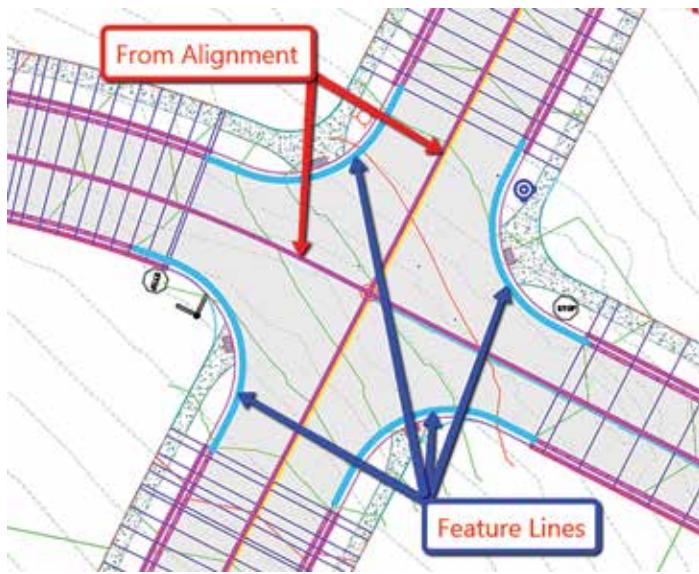


Figure 5

Once we have our assembly created and our feature lines in place, we are ready to begin modeling the intersection.

5. Select the Corridor, go into your Corridor Properties and select the Parameters tab.
6. From the Parameters tab, select Add Baseline. The Create Corridor Baseline dialog box will appear, select Feature Line from the Baseline type (Figure 6).

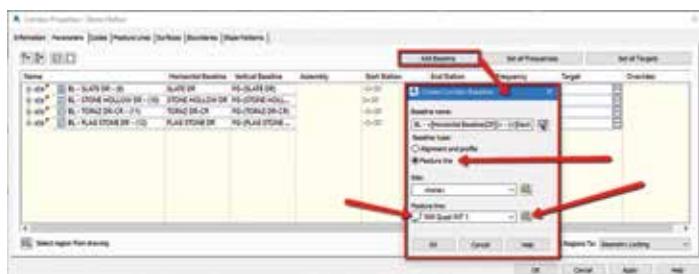


Figure 6

7. Use the icon next to the Feature Line drop-down to select your feature line from the screen. Once selected, you may be prompted to name the feature line, I chose to name mine NW Quad INT 1. Select OK.
8. The Baseline is now added to your corridor and we need to add the region and select the assembly.
9. Right-click on the new baseline and select Add Region.
10. Choose your assembly, and select OK. Rebuild corridor if needed.

This will not put in the assembly along that feature line. And no need to do a stepped offset! Pretty good so far, right? Let's finish up the intersection quadrant by targeting our centerline feature lines for width and elevation. I use the contextual ribbon for some very useful shortcuts. Use these to really speed up your corridor modeling workflows!

11. Select your corridor from the screen.

12. From the contextual ribbon for said corridor, select Edit Targets from the Modify Region panel (Figure 7).

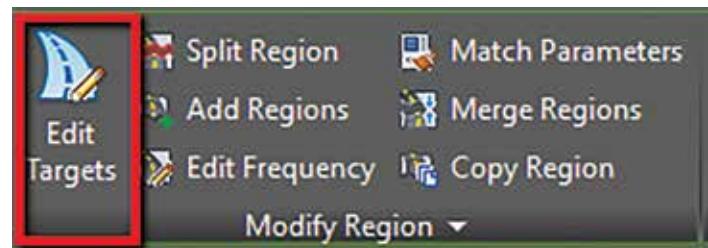


Figure 7

13. Select within the region for the intersection. The Target Mapping dialog box will appear.
14. We first will select the targets to set our Width. Select None next to Width Target for the asphalt portion.
15. Set the object type to Feature Lines, Survey Figures, and polylines. Then select both centerline feature lines from the screen.
16. Select OK.
17. We now need to select the same feature lines for the Outside Elevation Target. Select None next to Outside Elevation Target and follow the same steps as outlined above for setting width targets.
18. Select OK to exit the Target Mapping dialog box and Select OK to complete the Corridor edits.

Repeat all the above for each intersection. Remember to use your contextual ribbon to assist. There is a Match Parameters command that is very helpful in this case. This will allow you to set similar targets without going through all the same steps.

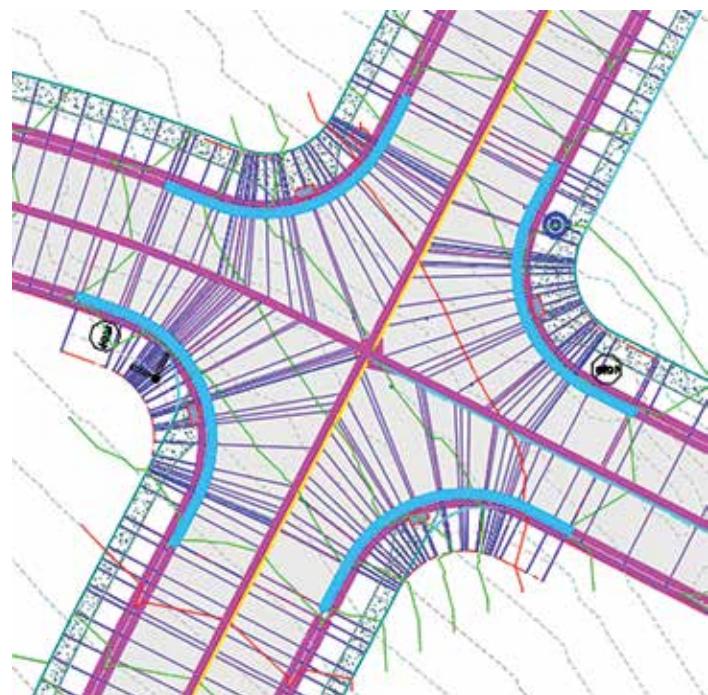


Figure 8

SITE/PARKING LOT WORKFLOW

This is a question I probably get at least once a month: "Should I use corridors for parking lots?" Before now, in order to corridor a parking lot, you would end up with numerous alignment, profiles, assemblies, etc. It just wasn't worth the hassle of managing all that data, and a lot of times resulted in a lot of re-work.

Now for parking lots of any shape and size, you can simply add each feature line to the corridor as a baseline (not separate corridors) and apply the correct assembly. You also get the extended data a corridor offers with different materials and surface—something that can't easily be done with just feature lines and stepped offsets. The workflows are practically the same as I outlined within the intersection example, so I won't repeat everything, but a quick outline of this new workflow is below.

1. Add features lines to corridor as a baseline and apply the assembly.
2. Repeat as needed for all curbing.
3. After the first couple are in place, create a surface from your corridor model for the finished grade.

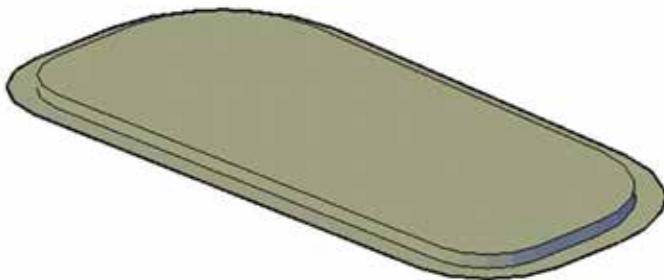


Figure 9

4. As you add additional baselines, you can see your parking lot take shape! You can allow the surface to tin from island to island, or even target using an asphalt subassembly.
5. If the surface/corridor seems to be upside down, you simply need to select the feature line and use the reverse tool from the contextual ribbon (Figure 10).
6. One common issue in corridor modeling is inside and outside corners. Avoiding "bowties" and "non-mitered" issues has always been painful. Inspect some of the island and parking areas to see how Civil 3D has now fixed the majority of those issues.

Try this on your next site design to really see the benefit of using corridors in this situation. I would love to see your final product!

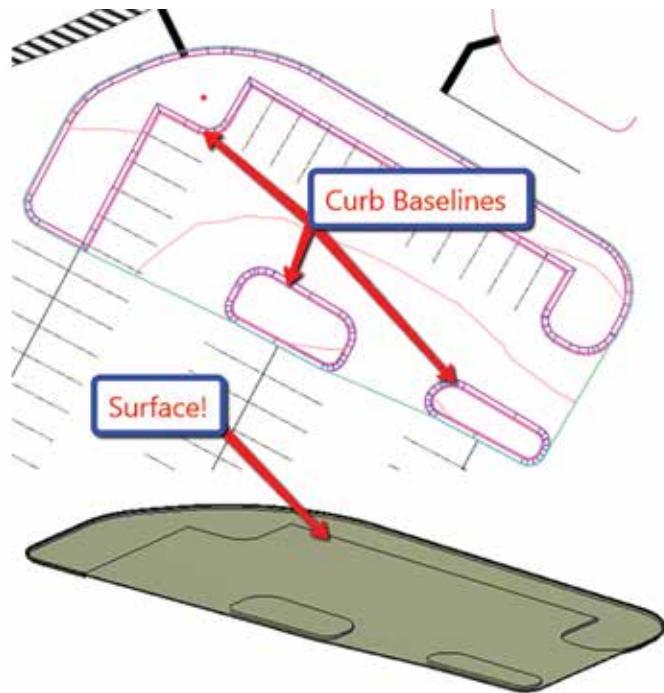


Figure 10

CONCLUSION

There are many ways to model a corridor and corridor intersection. Some like to create alignments and profiles, some like to use the intersection tool and modify from there, and some just ignore the intersection (I have from time to time). This was my attempt to display a workflow that you may try and see if it fits your needs. So hopefully this gives you a little direct to at least give the feature line as baseline a shot within your corridor modeling workflows.

As always, I am interested to hear what you think and see how we can improve upon this topic.

Good Luck and Happy Modeling!!



Shawn Herring has been a part of the design engineering community for roughly 13 years in all aspects of design, construction, and software implementations. He has implemented and trained companies across the country on Civil 3D and other infrastructure tools and their best practice workflows including many reality capture workflows. Shawn can be reached for comments or questions at awautocadcivil3dcm@audi.com.

InfraWorks BIM 360 Docs & Shared Views



One of the hottest topics in the AEC industry is BIM software collaboration. Like most companies, collaboration between client, stakeholders, design teams, departments, and offices are a crucial key to keeping companies updated with projects milestones, design status, and construction updates. With the latest 2019 version of InfraWorks®, designers can now use BIM 360 Docs for their collaboration needs.

InfraWorks with BIM 360 provides powerful collaboration tools, which allow design professionals to share, view, edit, and comment online models between design teams and clients. InfraWorks 2019 uses BIM 360 Document Management (BIM 360 Docs), a web services cloud-based platform, and the Share View feature to provide a better way to monitor and streamline the approval process on projects.

BIM 360

Autodesk BIM 360 is a cloud-based collaboration technology platform that has been around for a few years and has already been incorporated into software such as AutoCAD®, Revit®, and AutoCAD® Civil 3D®. There are various types of BIM 360 web service applications including BIM 360 Design, BIM 360 Glue, BIM 360 Docs, BIM 360 Build, BIM 360 Plan, and BIM 360 Ops.

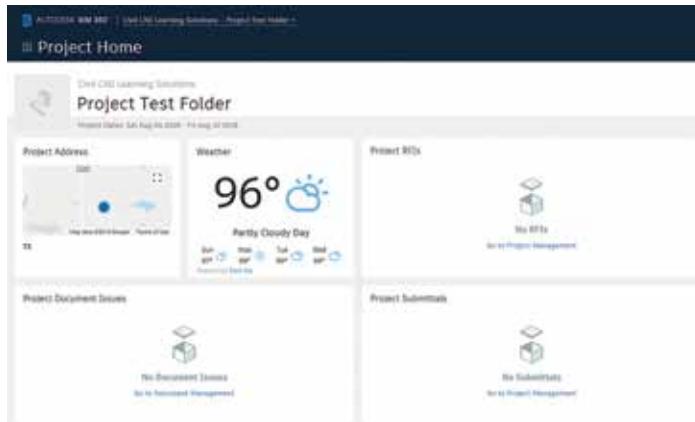


Figure 1

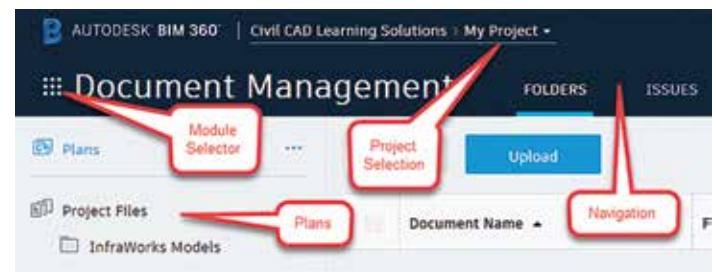


Figure 2

If you have an AEC collection license, Autodesk provides a 12-month free preview, allowing designers to evaluate the online cloud collaboration platform and features. If you don't have a BIM 360 account or an AEC collection license you can sign up for a free 30-day trial through the BIM360.Autodesk.com website.

USING BIM 360 DOCS

The first step in using BIM 360 Docs with InfraWorks is logging into the Autodesk BIM 360 account (b2.autodesk.com/access).

Figure 3

After login, the Project Home page will appear with the current projects, weather conditions, and document issues (Figure 1).

If you are using BIM 360 Docs for the first time, it is best to create a new Project folder by clicking the Module Selector and selecting the Account Admin option (Figure 2).

Then click the Add button to create a new project folder. A Create Project Profile dialog box will appear (Figure 3) where you can input all the information about the project.

After clicking the Save & Continue button, a dialog box will appear prompting you to activate the Document Management and Project Management features. Click the Activate button and then assign project administrator by just typing in your email address (Figure 4).

Once the project is created, click on the Project name under the Name column. The next display will show the current members

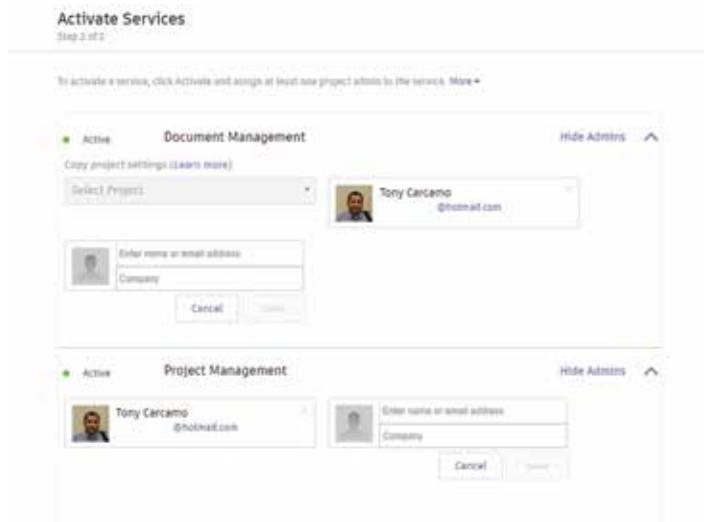


Figure 4

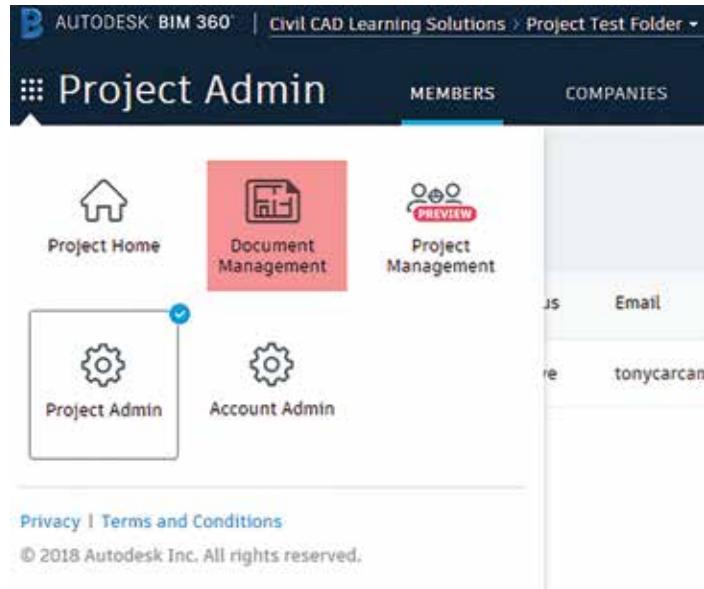


Figure 5

who have access to the project. You can click Add to add more member and assign permissions.

Next, click the Module Selector and select Document Management (Figure 5).

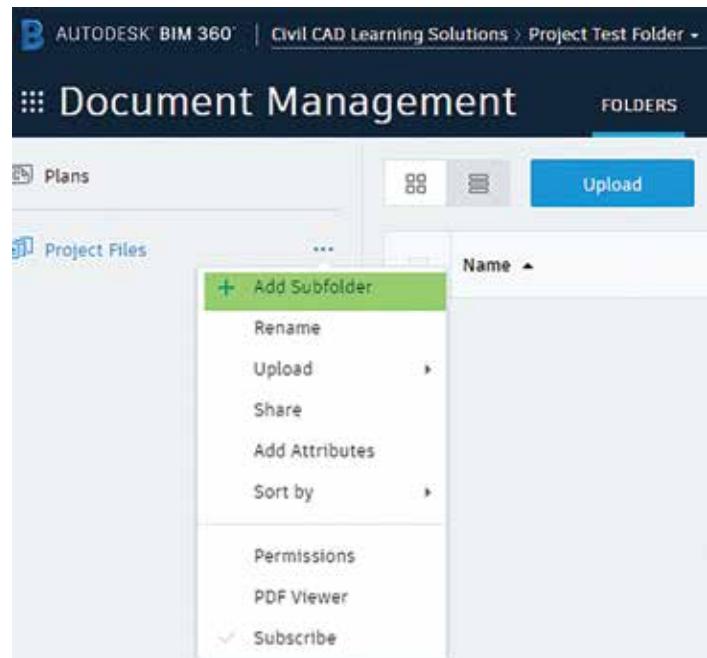


Figure 6

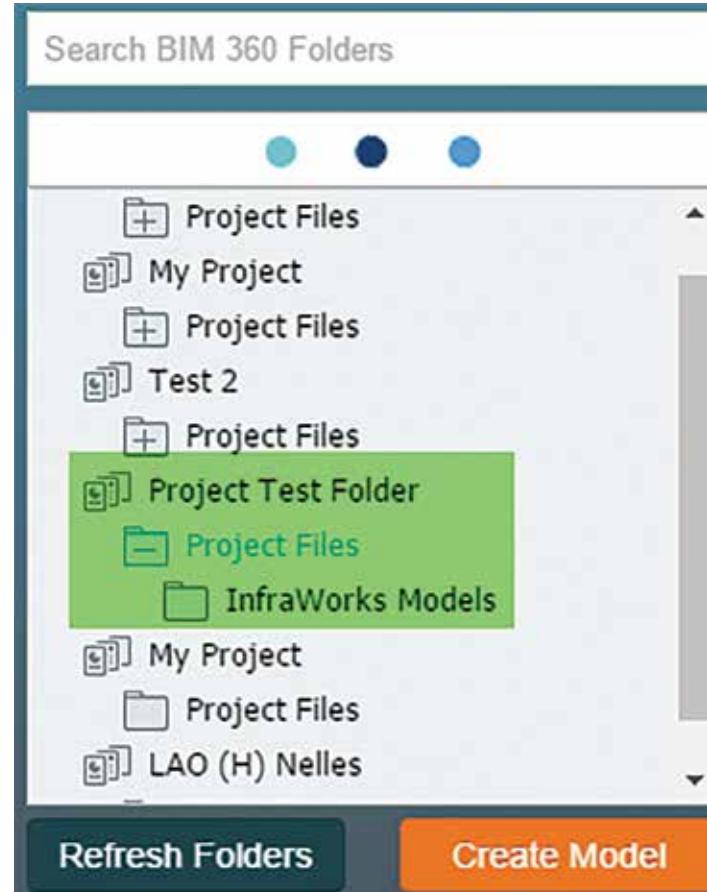


Figure 7

InfraWorks

On the next page display, you will see the Project Files folder that was created. To place all the InfraWorks models in one location, hover over the Project Files folder to activate folder editing tools. Select Add Subfolder from the list and name the folder InfraWorks models (Figure 6).

Now that a project folder has been created in BIM 360 Docs, you can then open InfraWorks and open Model Builder. Within Model Builder at the bottom right, you see the BIM 360 Docs projects that have been created and available (Figure 7). Select your InfraWorks Models folder under your project folder, then select the project location with your map viewer, assign a name, and click Create Model.

After a few seconds or minutes, depending on the size of your model, the site model will appear on the Home dashboard. You will notice the new BIM 360 Docs cloud icon. Once you open the new model site you will notice that the cloud icon now has a check mark (Figure 8). This means the model has been cached locally and within the BIM 360 Docs cloud platform.



Figure 8

SHARED VIEWS

Shared Views is another new collaboration tool that allows a designer within InfraWorks to share a visual presentation model to other design teams or clients that don't have a BIM 360 account. The ability to quickly and easily share a model through the Shared View feature helps streamline the approval process during the design, analysis, and construction phases of a project.

The Shared View feature is located on the utility bar on the top left (Figure 9).



Figure 9

Once activated, the Shared View stack appears. Click the New Shared View button to create a new Shared View (Figure 10).

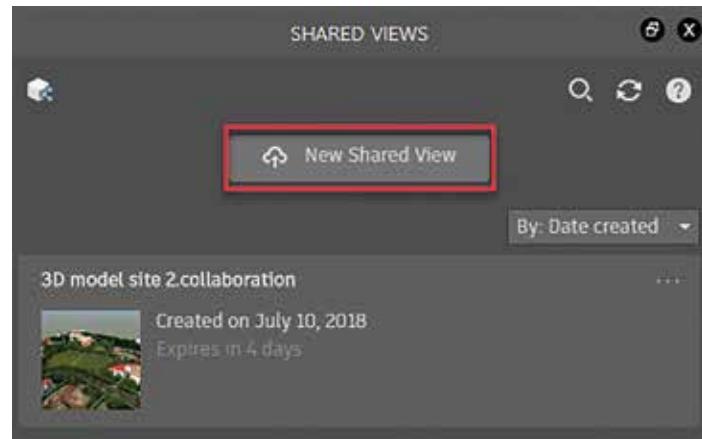


Figure 10

The Create a Shared View dialog box appears. Here, you can assign a shared view name, the extents of the model, and bookmarks and properties to be shared. If the model is small, I would recommend selecting the Use Entire Model option (Figure 11).

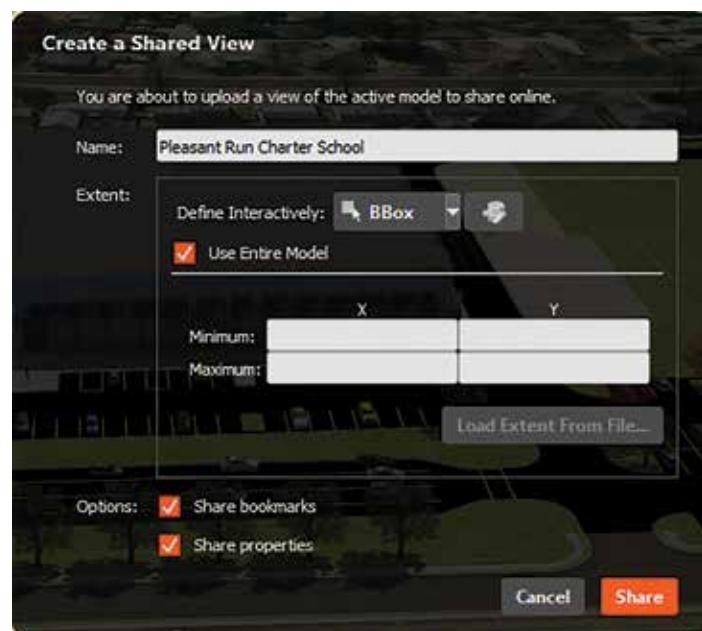


Figure 11

After clicking the Share button, InfraWorks will spend a few seconds generating and uploading the Shared View. Once completed, the Create a Shared View dialog box appears (Figure 12). From here you can copy the hyperlink webpage to email to other design teams or clients, or you can open the shared view through the View in Browser option.

When viewing the shared view through the browser, the model is displayed with the Autodesk Viewer web application (Figure 13). The shared view is available online for 30 days, but can always be extended.

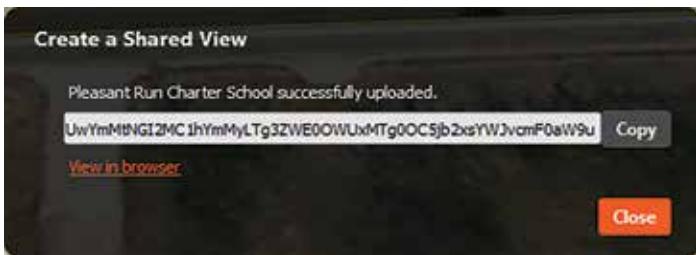


Figure 12



Figure 13

The Autodesk Viewer is a free viewer that allows users to view Shared Views models with a few measurement, visualization, and collaboration features. Within the Autodesk Viewer, the user can view different proposals, 1st Person views, and section views. In addition, collaboration features such as markup and comments can also be used to make design changes instantly (Figure 14).



Figure 14

To take advantage of the comments features, users need to sign into their Autodesk Account. Autodesk Viewer also provides visualization control features that allow the user to turn on/off objects such as roads, trees, coverage areas, water areas, and builds. It is important to understand that the Autodesk Viewer can only view models that have been published to BIM 360 Docs from InfraWorks desktop software. Autodesk Viewer cannot generate or create views from InfraWorks models that were uploaded to BIM 360 Docs from a web browser.

Q & A

Here are few questions that have been asked about the new BIM 360 Docs and InfraWorks.

Do I need to have a BIM 360 account or a BIM 360 Document Management project to work with InfraWorks 2019?

No, InfraWorks models can still be saved locally.

Can InfraWorks files be downloaded from BIM 360 Docs online platform?

No, the online InfraWorks models are saved as an IWM file, which can only be used online by the viewer.

What happens when an InfraWorks model is upgraded?

First is it important to understand that once a model is upgraded to the 2019 version, it is not backwards compatible. When upgrading an older InfraWorks model you are provided two options: Upgrade Model or Upgrade a Copy.

The Upgrade Model option will upgrade the local cache copy. A cloud model will be created and synced.

The Upgrade a Copy option will copy the local cache files and prompt you for a new a new location and name. Once you sync the model to BIM 360, a copy is created within the BIM 360 Docs cloud platform.

What happens after my 30-day or 12-month trial preview of BIM 360? Can I still access my data files?

Autodesk provides access to your data for 30 days. Within that time frame you will need to subscribe to BIM 360 to continue access to your online data.

How are permissions handled with the new BIM 360?

Project folders and project member permissions are now controlled through the online BIM 360 account under Project Admin and Account Admin.

What happened to InfraWorks mobile apps?

The Apple InfraWorks app has been discontinued. InfraWorks models are now viewed through the new BIM 360 app for Apple and Android platforms.



Tony Carcamo is President of Civil CAD Learning Solutions in Dallas, Texas. He has 21 years of experience in the civil engineering field performing different task from surveying, plating to site and utility design. In addition, he has also spent several years as CAD Manager with several engineering firms. Tony is also a blogger, on most Autodesk committees and council groups, president of the DFW BIM Infrastructure User Group, a certified professional in AutoCAD Civil 3D and InfraWorks 360 and an Autodesk Expert Elite member.



Next Level: the most over-used term in the 3D world (IMO). There is a reason for it, though. If you think of it like we are characters in a video game, the term should inspire us. To move on, we need to gain experience, work hard, practice, try, fail, try, and fail again until we finally reach our potential, the reward, the feeling of accomplishment. So let's level up, and start by focusing on hard-surface scene construction concepts that allow us to reach the highest standard of quality.

BREAKING IT DOWN

The best way to understand anything is to break it down into smaller pieces. For this article, I'll cover those parts mentioned in the model displayed in Figure 1. These include patterns, reflection, geometry, noise (visual noise in particular), and panels.

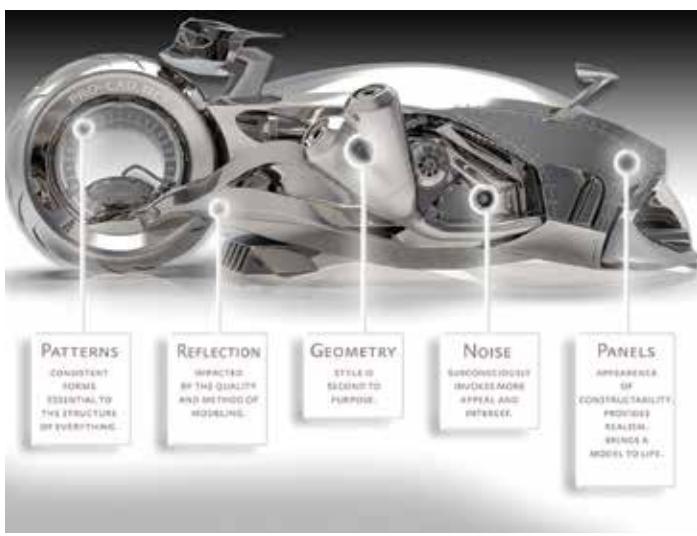


Figure 1: Topics of discussion

PATTERNS

Patterns exist in everything. Think of them as building blocks. Applied appropriately, patterns reveal structure in a seemingly chaotic world. Without those building blocks, objects appear mundane or can even fall apart completely. 3ds Max® comes with powerful tools that allow us to apply patterns to our objects quickly. One of these is ShapeMerge. The power behind ShapeMerge rests in how it gives us the ability to cut objects using simple or complex geometry. Additionally, we can combine ShapeMerge with modifiers such as Edit Poly and Face Extrude. The relationship can remain dynamic, allowing us to adjust the shape and see the changes occur on our object simultaneously. See Figure 2 for an example.

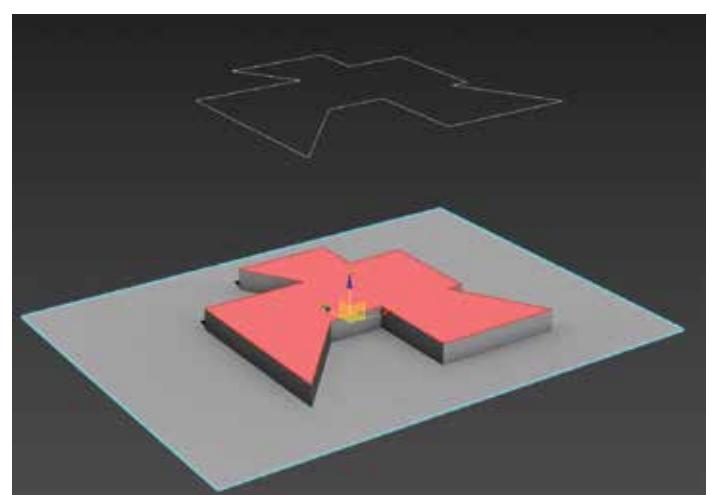


Figure 2: ShapeMerge with Edit Poly and Face Extrude Modifier

REFLECTION

Every object reflects and absorbs light. There is no exception. This is a natural function of life, but as 3ds Max users, when our objects reflect our scenes inappropriately, it is difficult to miss. A poor reflection can draw the attention of the viewer away from the intent of our design. Understanding this takes time, but sooner or later every single 3ds Max user begins to see reflections in a new light (pun intended). For 3ds Max (and any modeling application) topology is fundamental to create proper reflections. The key is to ensure surfaces we use to construct our objects are flat, tangent, or curvilinear. Out-of-place vertices in our surfaces stretch, pinch, and pull reflections to make them appear unrealistic.

GEOMETRY

For hard-surface elements, we need to visualize its purpose by asking ourselves questions like “what is this intended to do” and “how can this appear to function properly” (note that I say “appear to function properly”). As 3ds Max professionals, we don’t necessarily have to understand exactly how everything we create functions, but we still need to make it appear as though it can. Doing this allows our viewers to connect to the object in a way they can understand. When we determine the elements we want to include with our objects to accomplish this, then we construct it in the style that suits our needs.

NOISE

Noise, or visual noise, is a way to make simple objects appear more interesting. For hard-surface scene construction, it is typical for 3ds Max users to develop libraries they use for “kit-bashing.” Essentially kit-bashing is using a library of objects to construct a scene. These objects can be scattered throughout our scene to generate exciting detail with minimal effort. Using modifiers such as Bend and Symmetry, we can reuse the same elements and make them appear completely different, giving us an infinite number of possibilities for every object. Kits like “Tech Kit Bash Elements 3D” from Turbo-squid displayed in Figure 3 can be found in various locations online, though building our own library can be more rewarding.

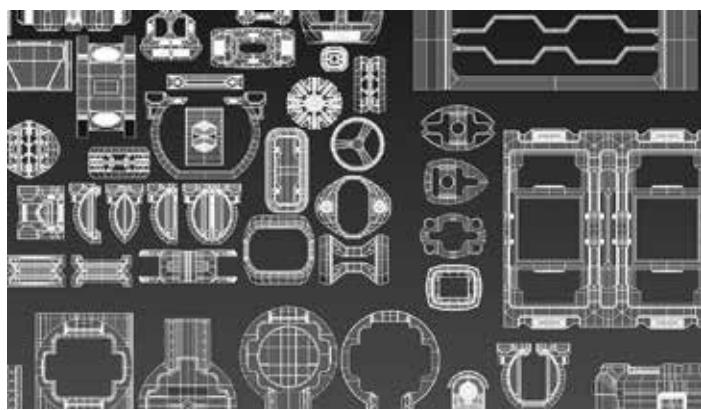


Figure 3: Tech Kit Bash Elements 3D

PANELS

The concept behind panels has less to do with the panel itself than it has to do with the believability of the object. Our entire lives we witness objects assembled and disassembled, whether it starts with toys when we’re children or the construction of skyscrapers. We normalize this. We ignore the seams in structures, toys, electronics, mechanical devices, and more because they are part of them. An example of our natural reaction to elements like this might be someone with an eye patch. Most of us don’t pay much attention to the average stranger on the street, but if someone were to appear with an eye patch that could be hard not to notice. We approach hard-surface scene construction the same way. By applying panels, seams, bevels, chamfers, and extrusions, we make our objects appear more life-like, relatable, and real.

FINAL RENDERING AND PRESENTATION



Figure 4: Final rendering and presentation

The final step is to present our object in a way that is appealing to the viewers. You’ll hear artists refer to this as composition. In the end, all anyone is ever looking for is if our presentation is appealing (enough). We develop our style of composition with time, but there are some things we can consider to help us improve. These are balance, proportions, unity, variety, harmony, emphasis, rhythm, and movement.



Brian Chapman is an Autodesk Authorized Developer, creator of Pro-Cad.Net and a Senior Designer for an engineering firm located in Las Vegas, Nevada. Brian can be reached at procadman@pro-cad.net.



The annual AUGI Salary Survey is of interest to just about everyone. In fact I don't think I know anyone who can resist looking at a chart and list of salaries for the industry they serve. But with publication of the numbers, and review by our readers, comes an emotional response. While I do not know where you might fall on the emotional rollercoaster after looking at this issue of *AUGIWorld*, I can say that I have been through this, too.

I AM DOING REALLY WELL

Some of you might see that you are compensated better than most. The firm you work for appreciates you and your contributions. You can say, "I have given superior service and support to our staff and I am worth what they pay me (and maybe a little more, now that I think about it.)" You are doing pretty well, the firm is on solid ground, you love the people, and things are good.

I AM NOT PAID ENOUGH

This might be you. You have tried to prove your worth, but the firm is not responding. You might be waiting for them to notice what a great job you are doing, but they never seem to get it. You are frustrated, but still motivated to do a great job. Maybe they will notice that you have added on new tasks and helped on more projects. They will wake up soon.

I NEED TO FIND ANOTHER JOB

"That's it. I'm done." You look at the charts and graphs and get depressed. You know you are worth more than what your firm pays. You provide more value than they compensate you for. You should be paid more. You are frustrated and hate looking at what others make. You think, "My firm does not know what a gold mine they

have in me. This firm is a bunch of cheapskates and I am never going to get paid what I am worth. I am going to jump ship." You may not say that out loud... or maybe you do. This might be a good time to do that with the low level of unemployment right now. Finding good people is hard for firms. You may be worth more than you are making.

Back in 2008, I wrote an article for *AUGIWorld* on this topic. Here is a snip (with a few edits) from that article that still applies today.

The salary situation you may be in is a reflection of several things.

First, it could be a reflection on you. Are you willing to stay at a job that pays less than the going rate for someone at your level of experience and education? Then that says something about you. And if you have been underpaid for some time, then the firm knows that you will put up with it. Maybe you should start looking around... BUT—some people stay in a position knowing that they are underpaid, but knowing that they are with a firm where they want to be, building their resume, learning great things, and working with great people. They stay because it will pay off later. Make sure you stay focused on why you are still there and don't get frustrated with a little smaller paycheck.

Second, it could be a reflection on your firm. Some firms just do not pay as much as others. They run lean and mean and squeeze every last dime out of every area to stay profitable. This could be because the firm is not run as efficiently as it could be. They may not realize your value in the industry. They need to know what value you bring. If the firm's overall salary and compensation is low for everyone, then don't expect something great from them.

Third, it could be a reflection on your industry or the economy. (This does not apply as much as it did when I wrote this back in 2008.) If your industry is experiencing a temporary downturn in production and employment levels, then there may be limitation on the availability of higher wages. Slowdowns in the number of contracts that are out on the street means that your firm may have to be cautious about spending. If that is what is happening in your industry, making a change may be difficult. But in 2018, most industries are stable or doing better. Now may be a great time to look around.

But here is where I really wanted to go in this article...

YOU ARE MORE THAN WHAT YOU MAKE

Don't get trapped into thinking that your take-home pay is the only thing that defines your value and enhances your life. Salary is very important and you need to provide for and contribute to the upkeep of the family. But before you storm into your boss's office and demand a raise, or quit, think about the other things at your firm that provide rewards.

There are many ways for your company to reward your efforts. Company culture (often the #1 reason for job contentment), workload, tech opportunities, and so much more can enhance your job satisfaction. If the budget is too tight for your supervisor to bump your salary any higher, then look for some of these.

- Bonuses may be easier on some companies, so ask if you can develop a system where you challenge and push yourself, with the commitment from the company to reward you for achieving various goals. You never know, they might go for it.
- Work Life balance, when used well, is a great benefit. Consider asking (or actually using) flextime, work at home days, or some vacation time.
- Seek out new projects and responsibilities. Nothing invigorates like a new challenge. And it sets you up for success and a possible raise next time.
- Ask for career development options, such as new assignments, training, more education benefits, professional development, or conference attendance money (for Autodesk University, of course).
- Move to a new office or location. See if you can move your desk to a new area. Get more natural light. Be more in the mix of activity.
- Start teaching others. When you share knowledge, it strengthens the firm, heightens your value and encourages you as others are thankful for your time and talent.
- Request a job title change to better position yourself for promotions and raises in the future.

Some of these may sound trivial, but if you like the work, the workers, and the workplace, then seek other ways of gaining more job satisfaction than just the money in your pocket. Before you ponder quitting or looking for another job, think about what you like about your current position. Maybe even make a list. Then think hard. If you still want to make a move, then it might be a great time to do just that.



Mark Kiker has more than 25 years of hands-on experience with technology. He is fully versed in every area of management from deployment planning, installation, and configuration to training and strategic planning. As an internationally known speaker and writer, he is a returning speaker at Autodesk University since 1996. Mark is currently serving as Director of IT for SIATech, a non-profit public charter high school focused on dropout recovery. He maintains two blog sites, www.caddmanager.com and www.bimmanager.com.



Your Work and Work Your Plan

In today's world, although we create information-rich 3D models, we still need to submit 2D drawings. Plan view drawings should be presented in such a way that the information is clear and concise. As we all experiment the various ways to display Autodesk® Revit® information, we learn some procedures are better than others. Often the fastest way isn't the best way and there is not a "one-size-fits-all" for every scenario. This article will share a few helpful tips on creating plan views, things to look out for, experiments to try, maybe break a few rules, and try to avoid some headaches.

LET'S START OFF ON THE RIGHT FOOT

There is a saying, "*In order to go faster, you must go slower...*" To bring clarity to your plan view you must investigate the following.

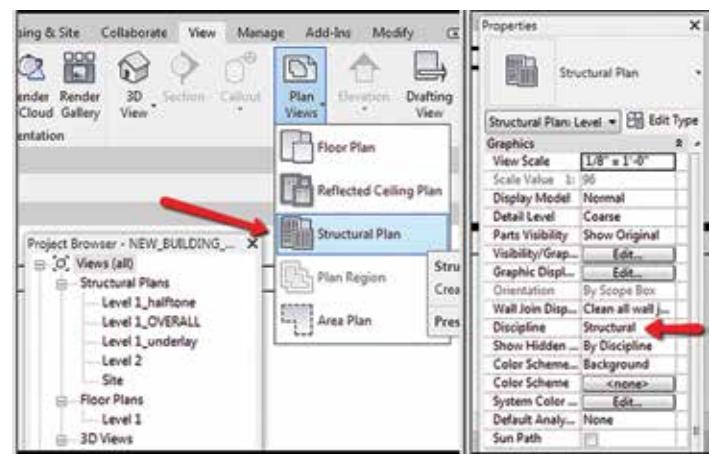


Figure 1: Be sure to select Structural Plan. This will control the initial discipline visibility property of that view.

What are the company standards for the various plan views? Are they documented in the office BIM/CADD Manual? Does a BEP (BIM Execution Plan) or MPS/LOD (Model Progressions Specification/Level of Detail) have it all spelled out for you?

Ask your fellow Revit experts how they overcome various visibility graphics issues. They may even be able to teach you a thing or two. At least you can get that conversation started with your team and avoid working in the dreaded BIM silo.

It's good to open up dialogue even to debate how best to assemble and present that next complex model. Soon you could be joining forces, testing out ideas together, and improving workflows with your fellow Revit team members.

While resolving Revit visibility issues, based on the problem, you will get better at prioritizing the order of places to look first. One recurring snag to note is the incorrect discipline being utilized on objects and views. The discipline view property is initially set by the View Type chosen when the Plan is first created as an (architectural) Floor Plan or a Structural Plan (see Figure 1).

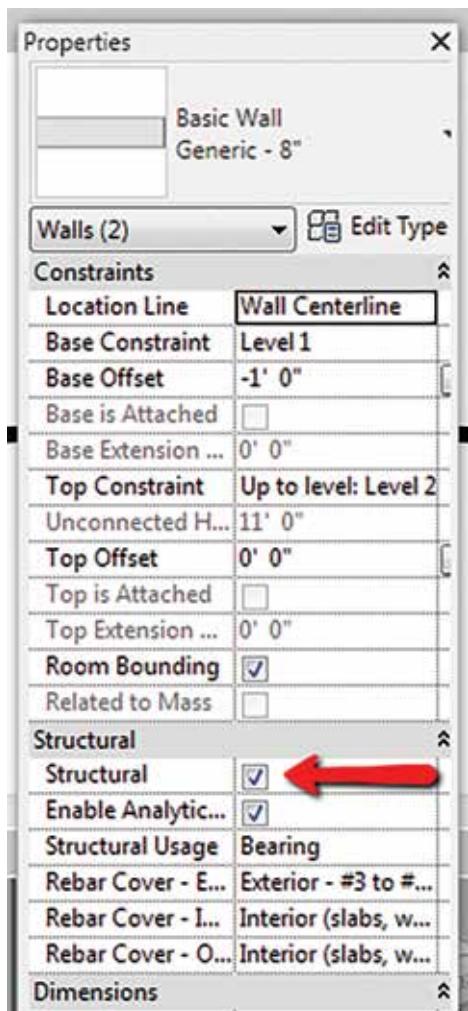


Figure 2: Walls will only show up on the Structural Plan if they're assigned as Structural (assuming the discipline is set to Structural).

The plan view may have already been created based on the template utilized (Autodesk provides pre-created plans in its Structural Template as do most company templates.) You can check this by selecting a view in the Project Browser or by simply activating a view—now the view's properties are available. Is the view property discipline set to Structural? How about the discipline of your elements? (See Figure 2.)

Many forget that walls must also be set to Structural for them to show up in a view also set to Structural—hence, why the Architectural walls do not show up on your Structural Plan unless the views discipline is set to "Coordination." Good or bad, to utilize this option of the architectural walls, you will have to somehow get the specific architectural walls you want to be assigned as "Structural." Time to coordinate!

REVIT LINKED GRAPHICS IN CONSTRUCTION DOCS

In some scenarios, the architect has already created an Architectural Revit model that you're then able to utilize for your own construction documents. All teams can save time by utilizing each other's work already created, such as walls, roof outlines, footings, structural beams, etc. Some companies and Revit experts know how to utilize "Parts" and/or "Copy/Monitor" for various items, which I highly suggest learning and utilizing. After a few bad experiences some will argue "Copy/Monitor" should be used sparingly. I beg to differ; don't give up, keep practicing, and become the expert.

After the link is loaded, within the view Visibility Graphics go to Revit links (see Figure 3), then 1) Select "By Linked View"; 2) Select the Linked View desired. Before the third step, apply the changes to the view and see how the view looks. Something to note is that that Linked View Plan displays just as the chosen view from the Link—annotation and everything. If the Linked View contains Plan Regions/Masking Regions or some other view range trickery, you're seeing it because that is how you set it: by the linked view.

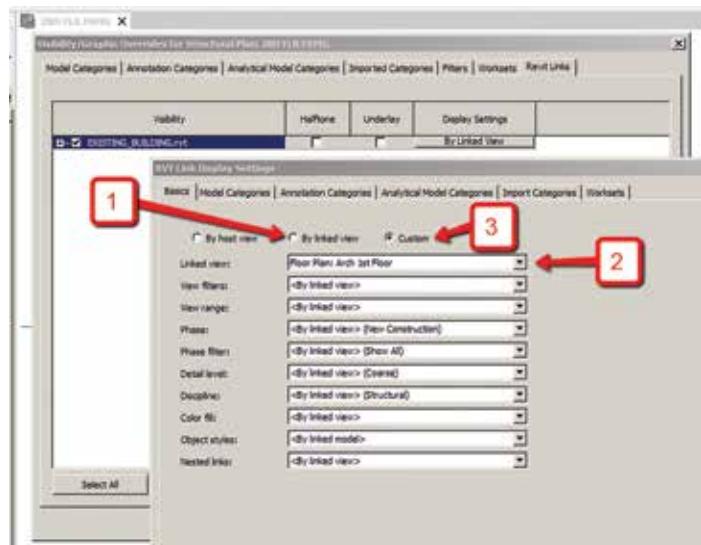


Figure 3: Revit Link display settings.

Revit Structure 2018

Now you can go back to the visibility graphics of the link and move on to step 3) Select Custom, and then go to town! Notice even though Custom is set, the view is still starting off with the Linked View and allowing you to edit from that point on. A good first thing to do is turn off the Architects annotation category. Next maybe thin up all the projection and cut lines, and maybe assign all architectural model categories to have 100 percent transparency. If you need to you can adjust the Wall Detail Level to Coarse. Some of these procedures can help bring clarity to your structural plans.

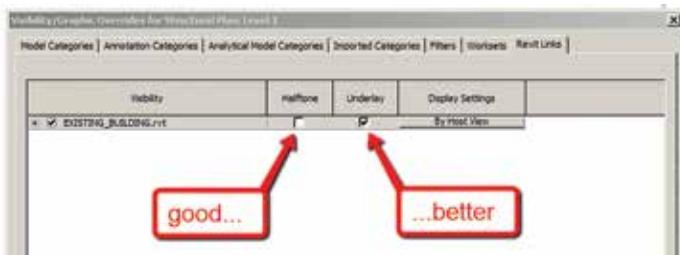


Figure 4: Visibility Graphics for Revit Links.

HALFTONE OR UNDERLAY?

One project setup example is for the entire existing building to be modeled as its own external link. Before I could fully understand/brace view filters and phase filters, I often used the halftone option for my Existing Building/Revit Link (see Figure 4). "Ahhh..." I remember thinking, *my first Revit battle has been won with the halftone check box—maybe this isn't going to be so bad.*" Boy, was I wrong. After a Print Preview, the existing edge of concrete line was plotted over the new concrete slab edge. This can be a problem as we want to see the extent of the new concrete slab. Understanding how to best control draw order will help your plans tell the story.

If you search the Autodesk Knowledge Network "Revit: Halftone/Object style gray line is printing on top of black lines" you will find Incident ID: 111621 – the Issue: Users reported that Halftone/Object style grey lines is printing on top of black lines. Status: No issue has been identified and the software is behaving as designed. For you old-school AutoCAD® users, this was overcome by overwriting your PC3 Properties...>Device and Document Settings>Graphics>Merge Control to Lines Merge. Revit does not have a way to globally control this, so one must learn how to best utilize draw order.

On plan views we should try not to fix visibility issues using the Linework tool or 2D detail lines. It is not fun keeping track of detail lines on plan views. Try to avoid this unless absolutely necessary. Eventually I learned the "Underlay" option is a better choice as it understands and plots as though it is "under" my more important information! (See Figure 4.)

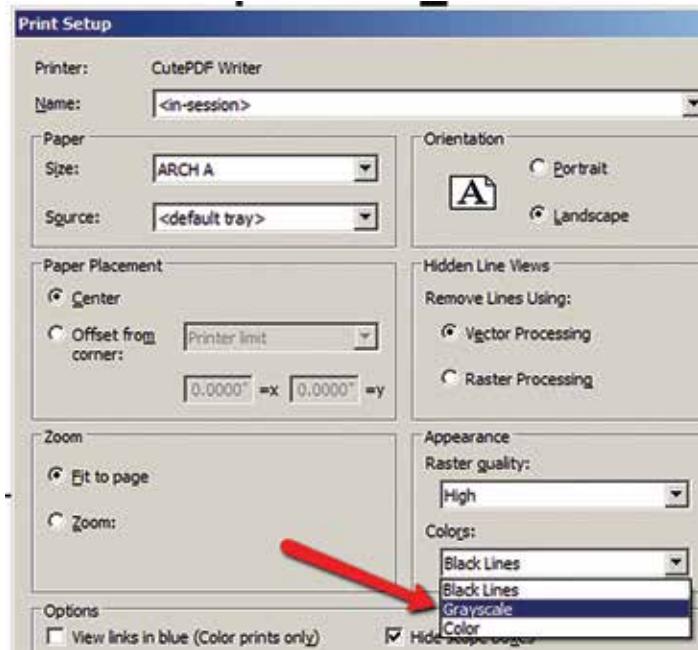


Figure 5: Some halftones show up when utilizing blacklines, but grayscale is mostly used if grey shades are utilized.

Before you get too far, always check the printing settings (Figure 5) and the output of any halftones/gray scales. I'm always getting unexpected results. What you see in the view (on the computer) isn't always what comes out on the PDFs or the full-size plots. Printing test plots is a good way to evaluate and refine your results. Remember, half-tones on half-size sheets are twice as dark!

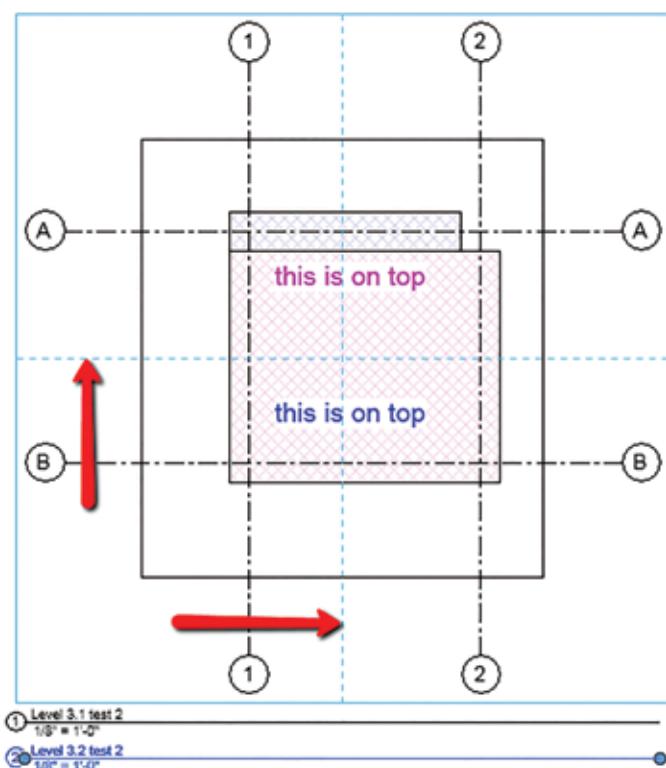


Figure 6: When stacking the second view, notice the two blue location lines that help align and snap together the two views in each direction—north-south, east-west.

STACKING VIEWS ON SHEETS

I wrote briefly about this in an AUGIWorld 2012 article titled "Tips for Revit Project Management"

<https://www.augi.com/articles/detail/tips-for-revit-project-management>

At that time, I called it "*Overlaying Two Plans*" and what I explained was the stacking of two (or multiple) plan views on a sheet (see figure 6). Since then I have learned ways to avoid this—or at least to not have to do this as much. This workflow can get you out of a pickle when the engineer asks to see a specific object from a linked model on the level above and/or below whilst also viewing structural elements, maybe with a completely different phase, view range, discipline, detail level, etc.

Some might say, "Stacking two views on a sheet = totally lousy answer" or "Overlaying two views is not a supported workflow." You can also read some funny debates on Revit Forum, but I think Steve Stafford said it best on his blog: "*Folks get caught up in the notion that they 'need' to put all the pieces and parts in one view.*" You can read more here:

<http://revitoped.blogspot.com/2005/02/overlaying-views-on-sheets.html>

Another good one—"This way we don't have to worry about competing graphics and information on the sheet"—can be followed up here:

<http://revitoped.blogspot.com/2013/11/stacking-views-on-sheets.html>

Ever since I've started stacking plan views I've come across many scenarios in which it was impossible to show all the various family elements in the state or view range requested. Currently we only have control of one View Range per view, but you can also create a Plan Region with a different View Range. The new "Underlay" tool may support some workflows but will only provide you with so many visibility options. For some intricate projects it is impossible to have a mixture of info above and below a level (especially if it is utilizing a Linked View) to show up exactly how one wishes.

Utilizing stacking views with view templates, a project can contain typical plans for engineers to duplicate, rename, and stack for themselves (Figure 7).

Depending on your workflow, if you're having a problem seeing something below a floor or roof (or any other family), you may need to edit the transparency. Under Visibility Graphics>Model Categories>Projection/Surface, you will find the Transparency option that can be overridden to 100 percent, making items below visible.

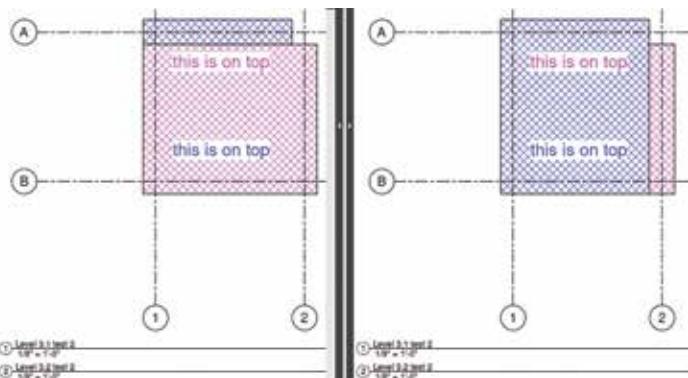


Figure 7: You can see the draw order is based on which order the view is placed. Each view has its own Filled Region graphic to show you which view was placed first. Depending on what views need to be on top or bottom, you may need to delete the plan view that's on the bottom and reapply it to the sheet so it shows up on top.

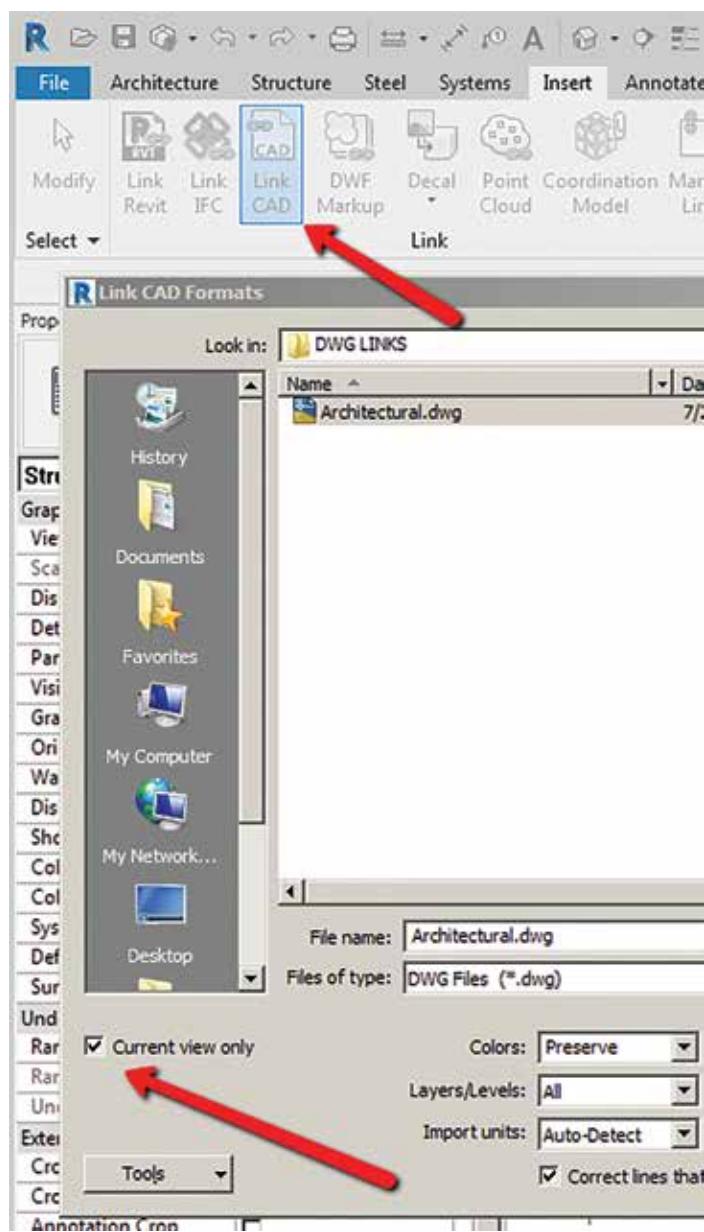


Figure 8: Do you want that AutoCAD link to come in as 2D detail lines (current view only checked) or 3D model lines (current view only unchecked)?

Revit Structure 2018

EMBRACING THE AUTOCAD LINK AND DRAW ORDER

Are you linking an AutoCAD file into Revit? Current View only please! This is my plea about 90 percent of the time. Slow down and be cautious when linking in a DWG. You must ask yourself: 2D or not 2D?

Another way draw order can throw you for a loop is when linking in .DWG files (Figure 8) with current view only not checked—you have different control of your DWG graphics. Do you really want this to happen? Many users often do this accidentally. Do you want to see these DWG lines showing up on unexpected views or just a few views? You can always link it in once to current view only—copy and paste to other views as needed.

Another way to overcome DWGs showing up in the wrong view is to place them on their own workset, which allows you to choose whether they are visible in all views. This way the workset will have to be purposely turned on in that view.

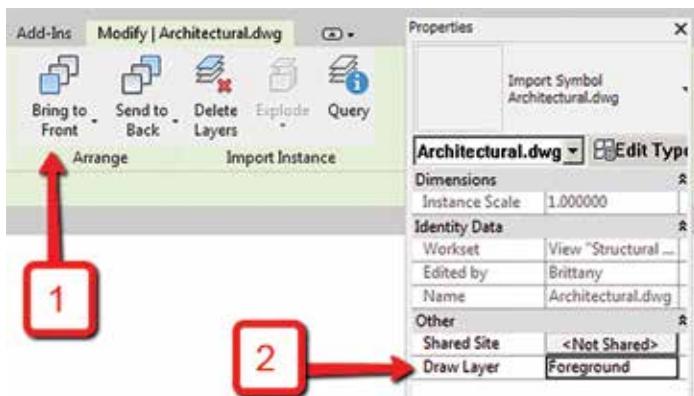


Figure 9: Select the DWG and adjust the draw order in both places; they're two separate controls.

After linking in your AutoCAD file, current view only, select the DWG link and check the properties, as well as the ribbon. Notice the two locations to control DWG visibility to send to back or Draw Layer: Foreground (Figure 9). As you can see, linking a DWG current view only will allow that link to be utilized with draw order functionality.

HIDE IN VIEW, BY ELEMENT (AKA BAD HABIT #1)

While first learning Revit, you are trying to meet deadlines and not destroy the budget or killing yourself trying to make it work, you hopefully have come across these two gems: Hide in View and Override Graphics in View. And right below that, Override Graphics in View, by Element (aka bad habit #2). (See Figure 10.) If something on your plan view doesn't look right and you run out of time trying to figure it out in visibility graphics, maybe you just want to Hide in View.

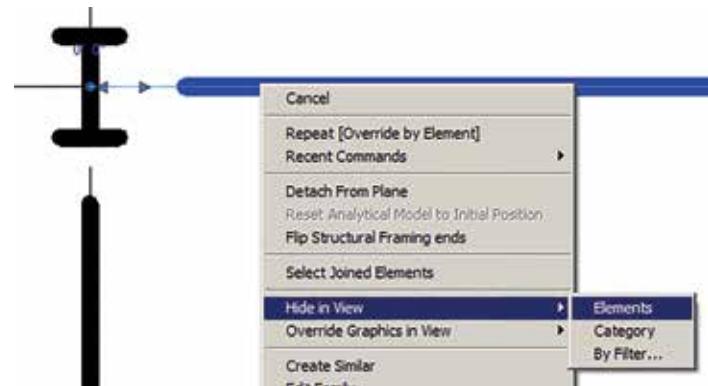


Figure 10: Select object and right-click, Hide in View or just Override Graphics in View, By Element. Like it says, you're only modifying the graphics in this one view.

Since the beginning, these two puppies have got me out of some jams! Some might think I shouldn't be teaching this, but hey, things happen and Autodesk wouldn't provide the tool if they didn't want you to use it! So when you're running out of time, you can't find the answer, after trying so long to hide or change the visibility graphics the correct way, you have to ask yourself: Will the building fall over?" Or can we just hide this object/ change the visibility one way or another just to keep this ball rolling until we have time to figure out what's really going on? Is it a big project? Will others be working on it? Can my action cause problems for others later? These are all things you must ask yourself before you push that button.

If you find yourself repeating the approaches I've described on a lot on projects, it may be best to think of a longer term solution such as a view template modification/creation and perhaps view filters, but don't be scared to stack some views and break some rules.

Take control of your draw order as well as other various visibility graphics in unique ways when confronted with new challenges. Don't fall victim to stating, "Revit just doesn't do that." Anything is possible!



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17th Annual AUGI Salary Survey

Thank you to the over 3,500 members who took the time to contribute to this resource for users, by users!

Lets dig in and see what has been happening in our industry since last year's survey.



I have to start out by thanking so many of our members for taking time out of their days to volunteer the information that makes this report possible. You can be assured that the higher the number of responses received, the more accurate the reported numbers are. Just as with all of the AUGI programs, volunteers like me and these survey participants are what make the magic happen in our community.

In 16 years overseeing this report, I do constantly receive and consider feedback from the membership, so, as always (once you have read the FAQ) feel free to send me any suggestions for Hot Topic issues you'd like to see gauged, or other important statistics that may have been neglected.

The first question is always the differences in Cost of Living in various areas. Metropolitan areas and rural areas can be costly or affordable no matter the location, so be sure to check local resources for those variances. I am a big fan of www.Indeed.com/Salary and the ETC Salary Calculator, as well as industry- or role-specific surveys from other professional organizations. The salaries

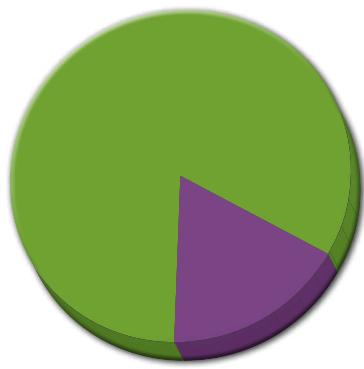
reported here (in US dollars, as participants were given a link to a currency convertor) reflect salary and bonuses for those who work 40 hours a week, and are calculated to exclude overtime pay.

Negative factors (job insecurity, layoffs, reduced pay) continue to decline slowly, while those starting new jobs are on a strong increase, with BIM Coordinators leading the pack in job mobility. 75 percent of members received a pay raise this year. Market share for industry specialties has not changed much since last year. Keep reading to see which market segments are doing the most hiring in 2018.

Also, for the first time, I will make a public request to the wise-aces in the group: please stop inputting false data. I spend more (unpaid) time manually scrubbing outlying numbers than I spend on the rest of this entire report. Your mock information will not get through the simple vetting process, falling so far outside of the range of normal distribution, so there is no point to continue trying. Please be deeply ashamed of yourselves for attempting to manipulate the data in our volunteer, anonymous, totally unique resource, year after year.

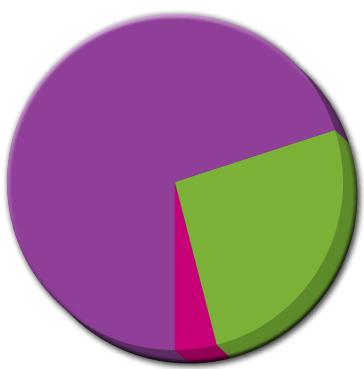
DEMOGRAPHICS

Employee Gender



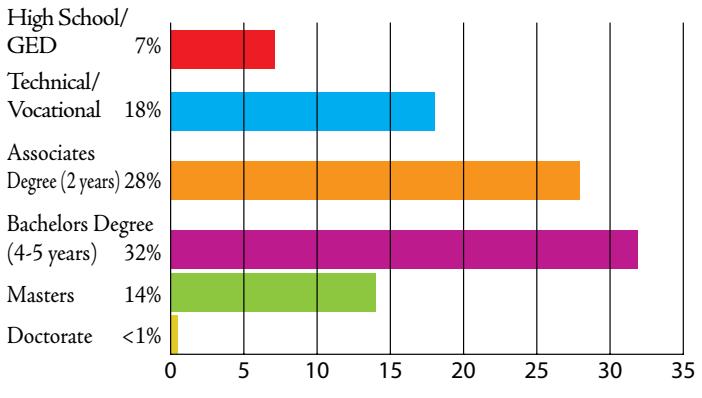
Male
Female

Work Location

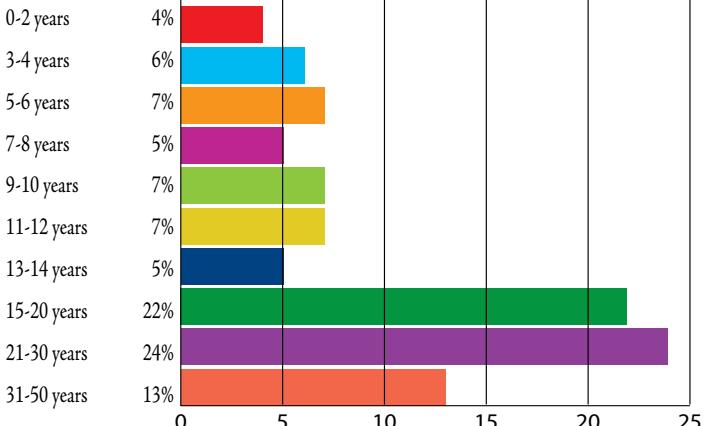


LOCATION PERCENT
Urban 69%
Suburban 27%
Rural 5%

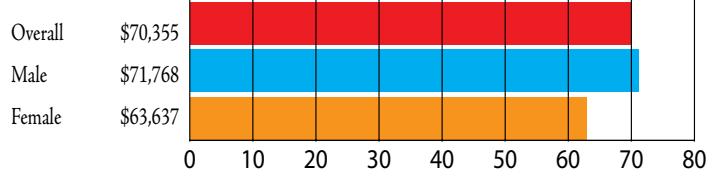
Education Level/Degree Attained



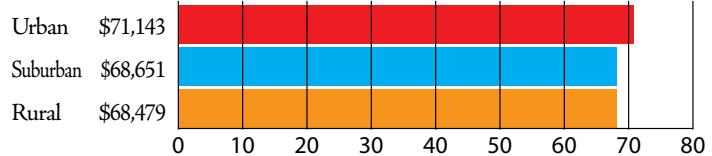
Respondents' Years of Experience



Pay by Gender



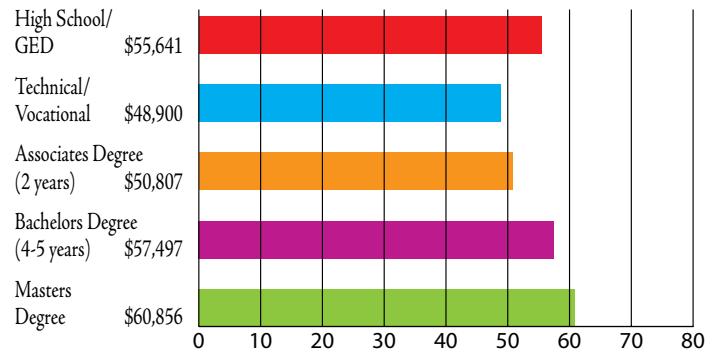
Pay by Work Location



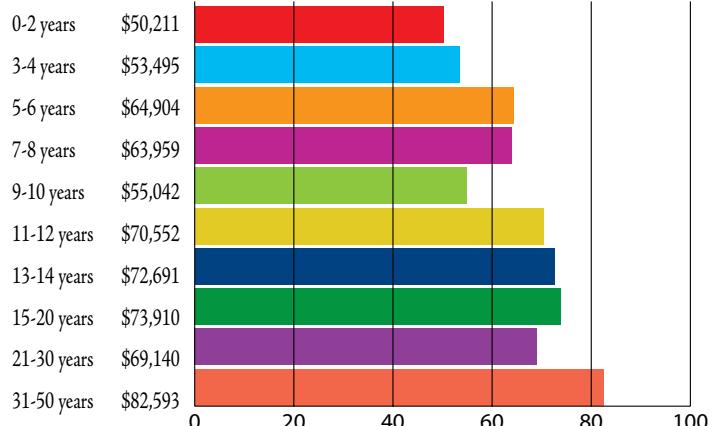
47% of respondents have a Bachelor's degree or higher, compared to 27% when this annual survey began in 2002.

Average Pay By Education Level

(for those with 5 or fewer years of experience)



Average Pay by Years of Experience



Check out these resources for additional information on pay:

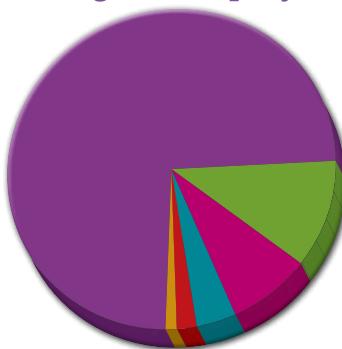
- Indeed.com/salary
- Salary.com
- Payscale.com
- [ETC Salary Calculator](http://ETC.SalaryCalculator.com)
- [Glassdoor](http://Glassdoor.com)

Search for other professional organizations related to your market to get more niche data.

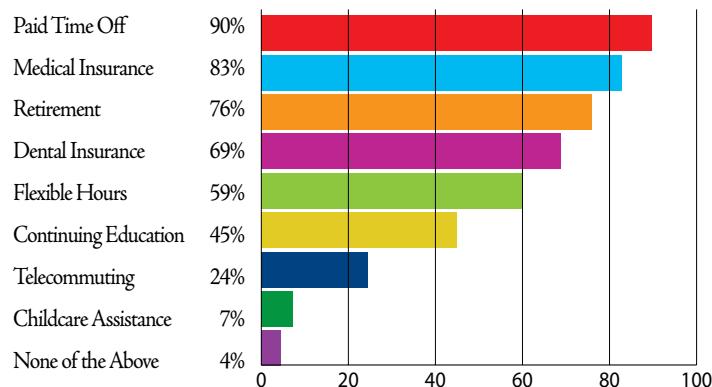
AUGI 2018 Salary Survey

COMPANY DATA

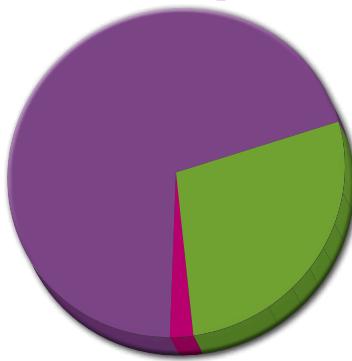
Change in Employment?



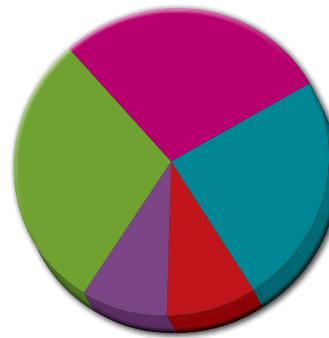
What Benefits Are Available To You?



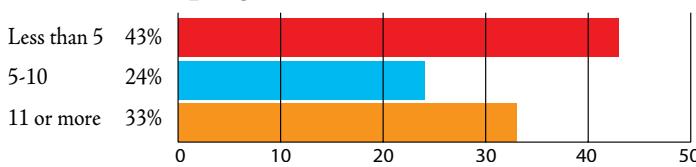
Does Your Company Have a Human Resources Department?



Age of Respondents



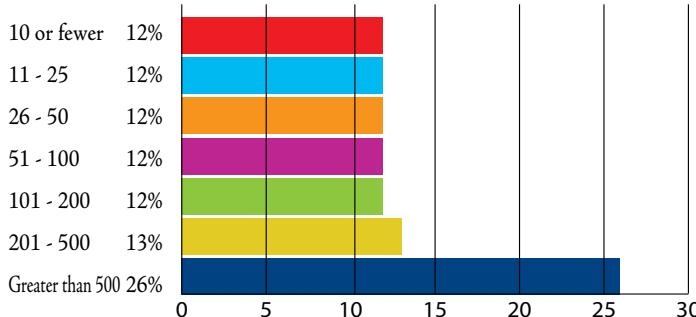
How Many Years Have You Worked for Your Current Employer?



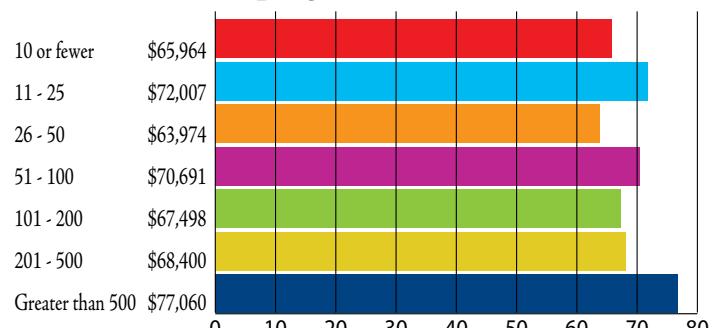
Lack of benefits reduces average job satisfaction scores by more than 17%.

The ability to telecommute translates to job satisfaction 10% higher than the average worker.

Number of Employees in Company

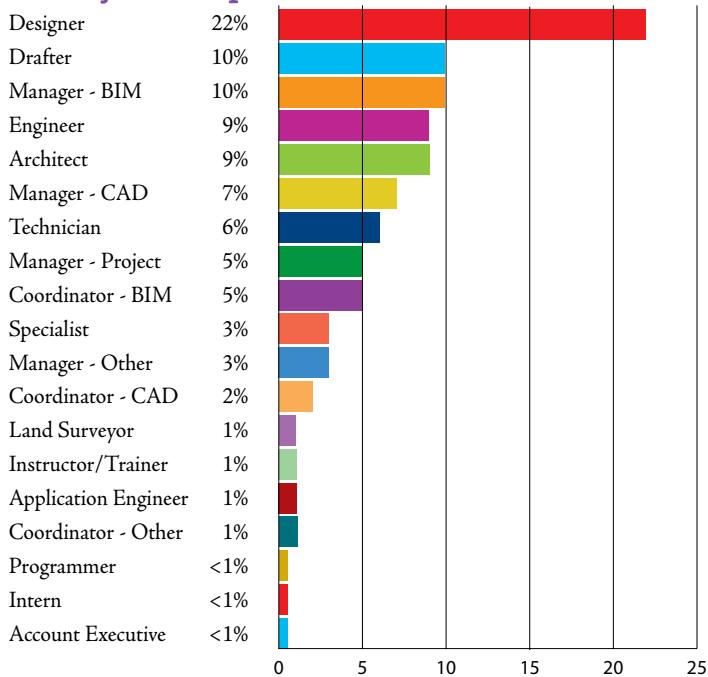


Average Pay by Company Size (Number of Employees)

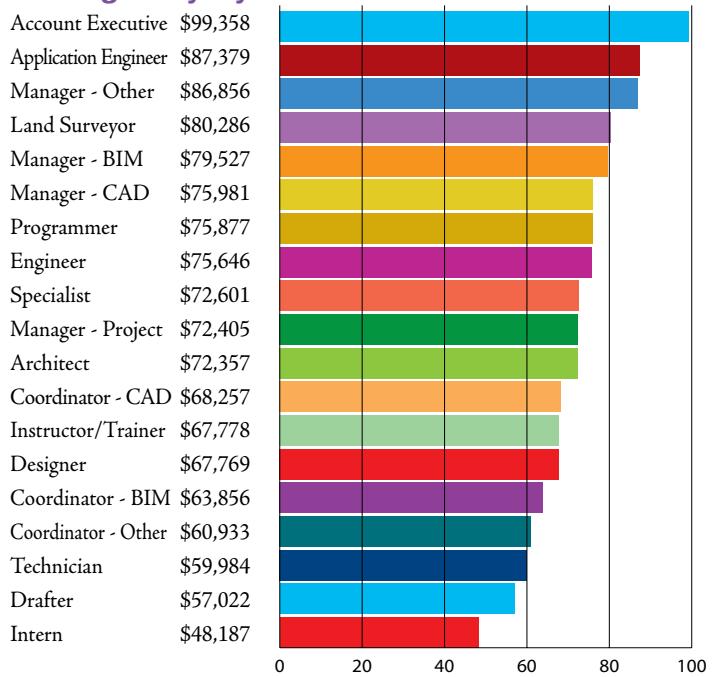


JOB TITLES

Survey Participants



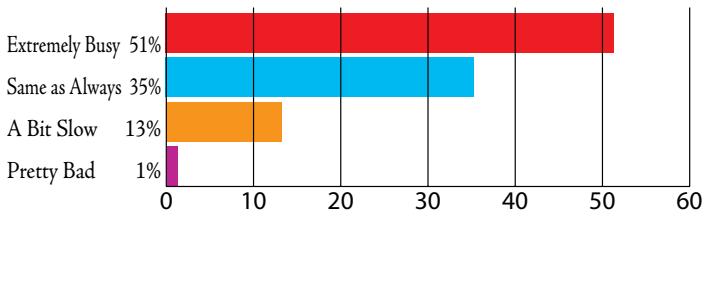
Average Pay by Job Title



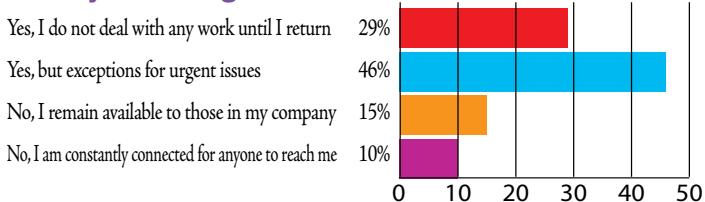
The average age of an intern is 28. BIM Managers and Coordinators tend to be about a decade younger than CAD Managers and Coordinators.

Reminder: All reported average pay is based upon a 40 hour workweek. It would include potential bonuses, but, is calculated to exclude overtime pay.

Current Workload

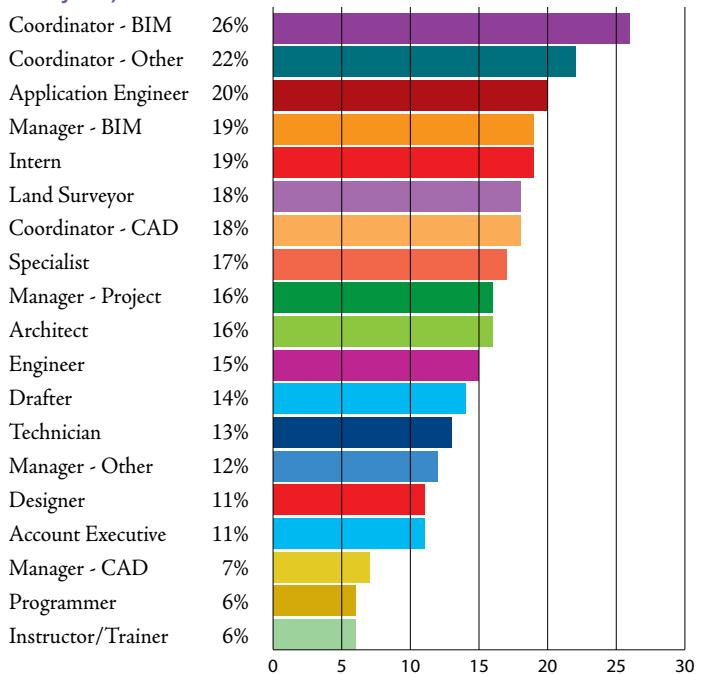


When You Leave for the Day, Are You Really Leaving Work?



Jobs with the Highest Mobility

(Percentage of each title who reported being in a new role this year)

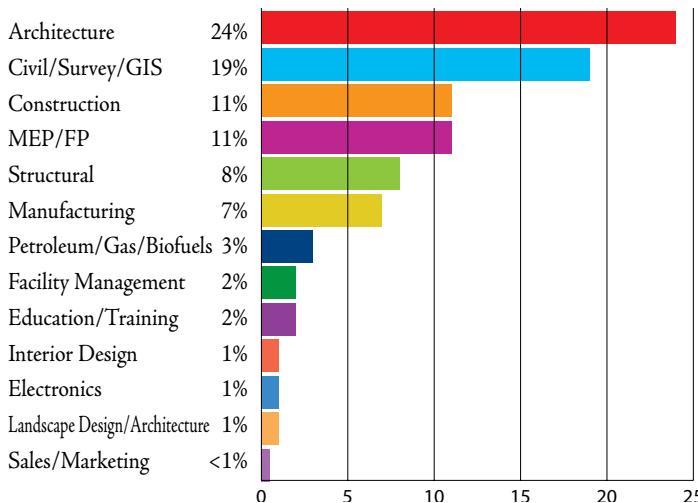


AUGI 2018 Salary Survey

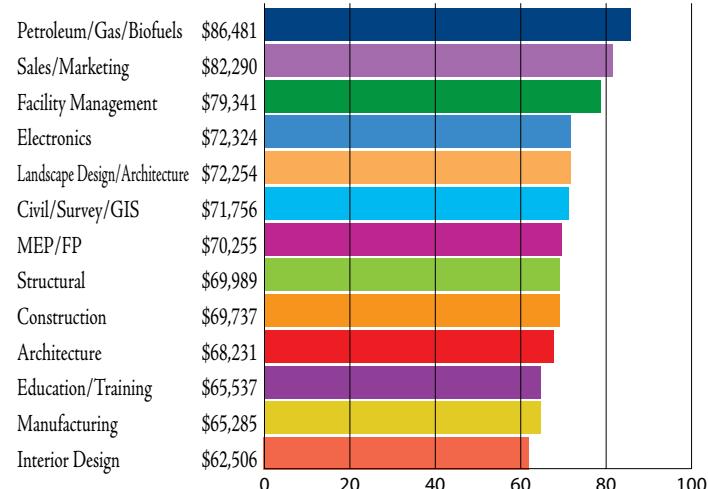
INDUSTRY/DISCIPLINE

SPECIAL FEATURE

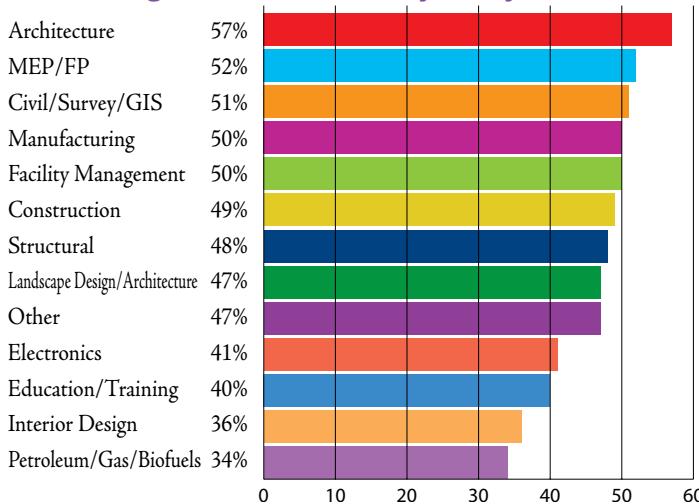
Survey Participants



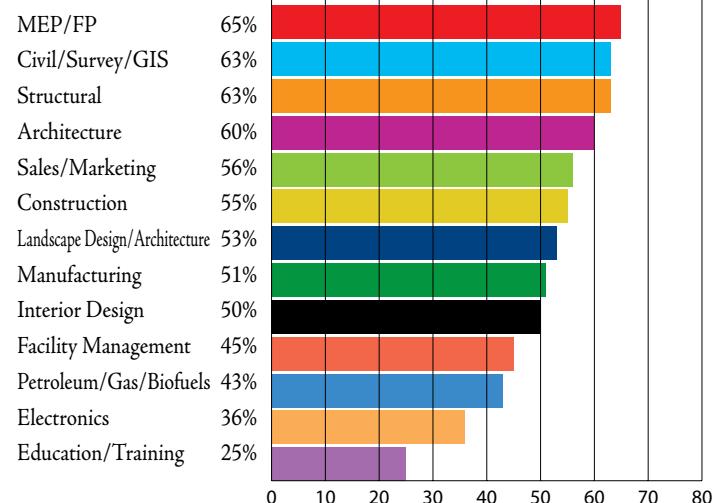
Average Pay by Field/Industry



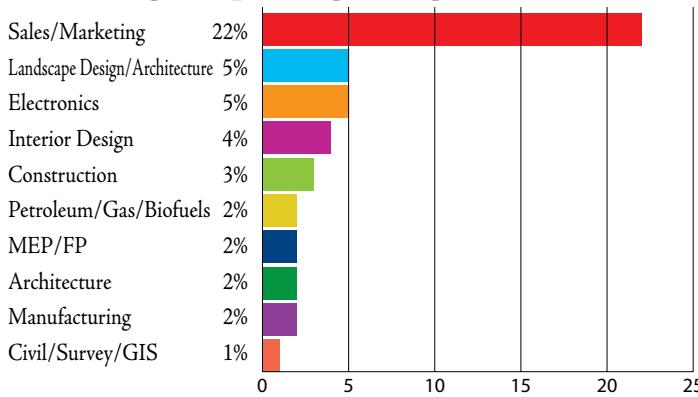
Percentage with Extremely Busy Workload



Percentage of Each Industry Reporting Staffing Increases



Percentage Reporting Being Laid Off



The average age of an AUGI member is 44.

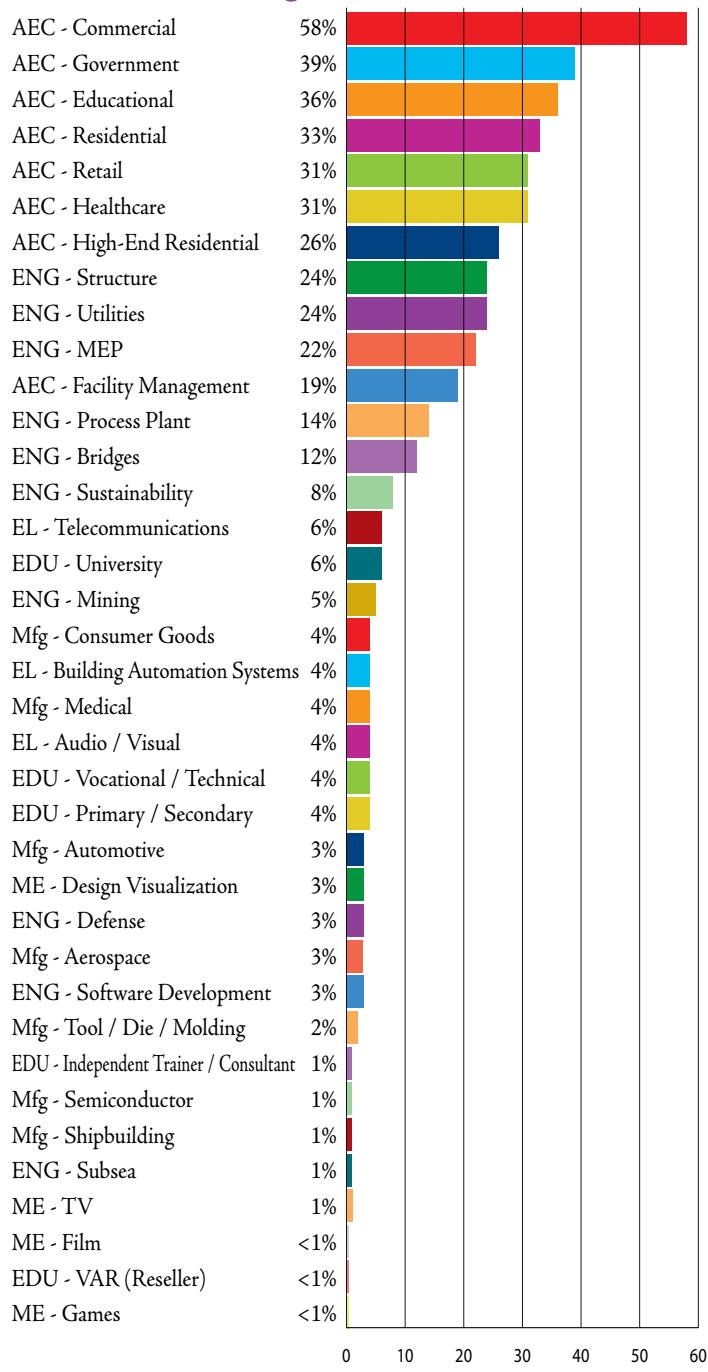
Fields with higher than average employee age are education, electronics, facilities, and manufacturing.

17% of the industry is female.

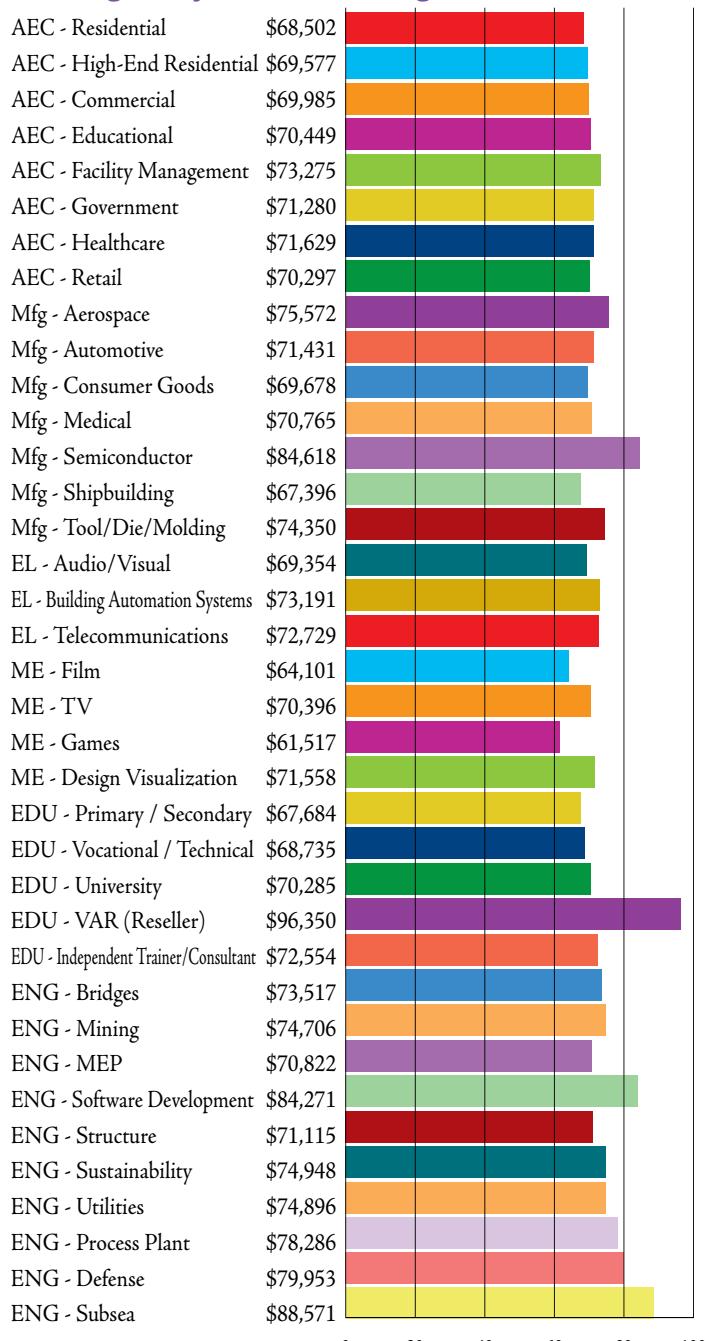
Fields with lower than average female representation are sales, fuels, manufacturing, MEP/FP, and construction.

MARKETS SERVED - INDUSTRY SPECIALTIES

Size of Market Segments



Average Pay of Market Segments



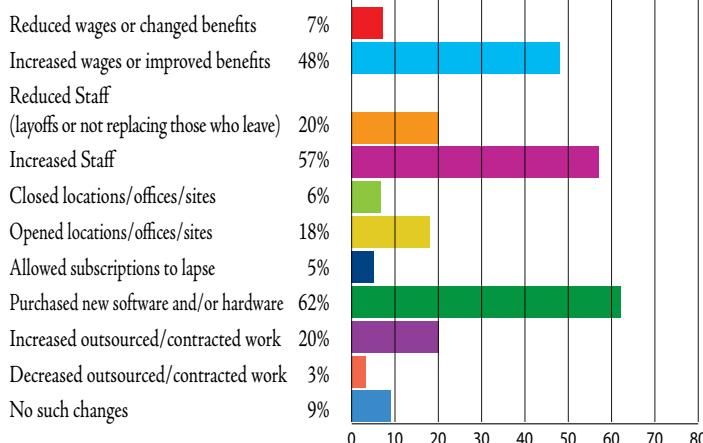
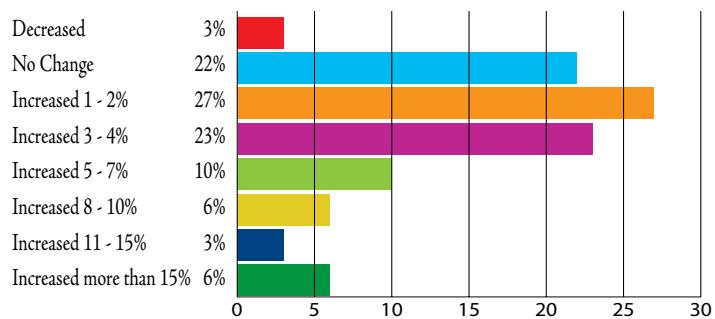
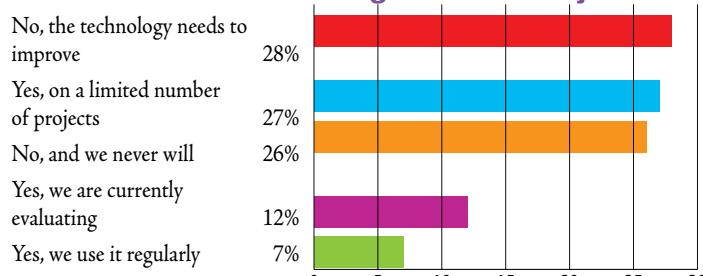
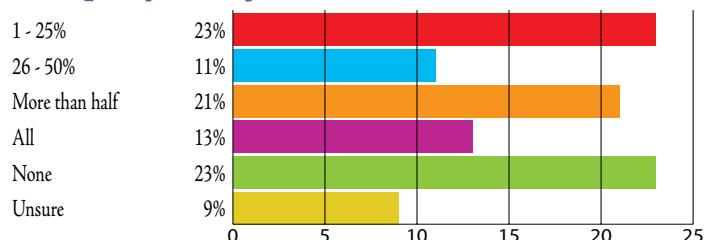
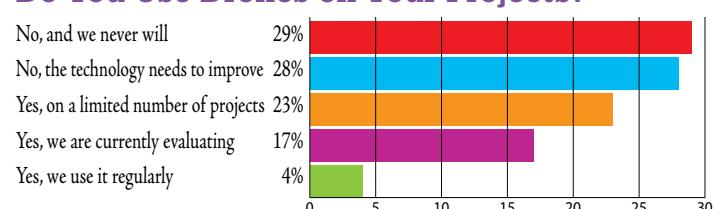
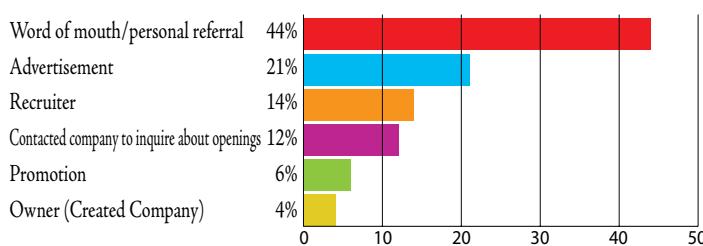
Highest Average Paid Specialty by Industry



Lowest Average Paid Specialty by Industry



HOT TOPICS

Has Your Company Done Any of the Following in the Past Year?**Has Your Salary Changed in the Past Year?****Do You Use 3D Scanning on Your Projects?****(If applicable) What Percentage of Your Company's Projects Are BIM?****Do You Use Drones on Your Projects?****How Did You Find Your Current Role?**

The number of companies reporting increases in staff has gone up and the number that increased wages or improved benefits has jumped up even more.

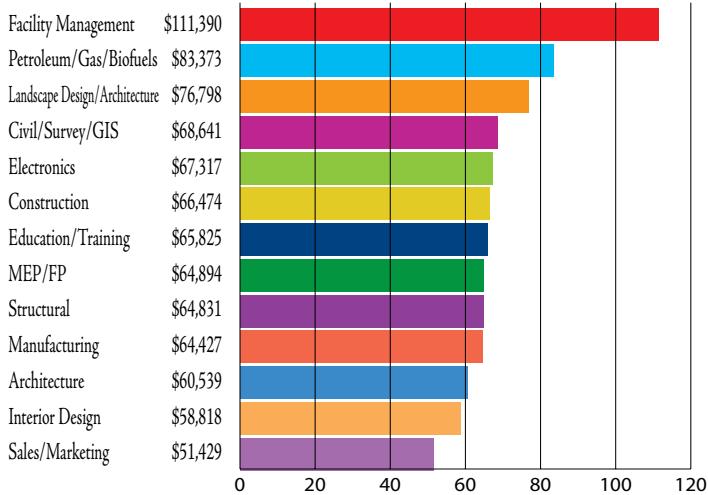
The average pay for firms that do more than half of their applicable projects in BIM is 8% higher than those who use it on a quarter or less of their projects.

Today, 23% of applicable companies are not using BIM, down from 36% when we first asked this question in 2012.

In 2007, 1.6% of respondents were BIM Managers, that number is 10% today, plus the 5% of respondents who are BIM Coordinators.

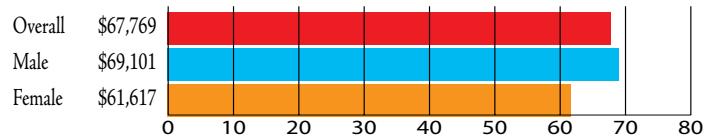
DESIGNER CLOSE-UP

Average AUGI Designer Salary by Industry



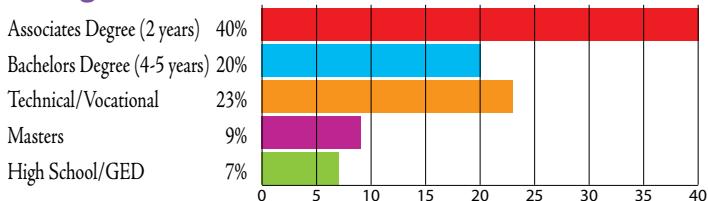
Designers have spent an average of 9 years working with their current company.

Average Designer Salary



65% of Designers can work flexible hours.

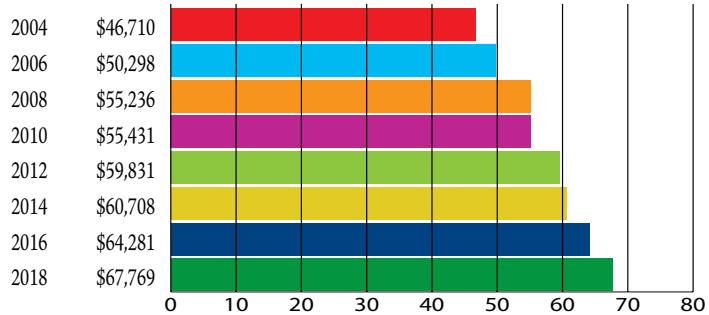
Designer Education Levels



23% of Designers report the ability to telecommute.

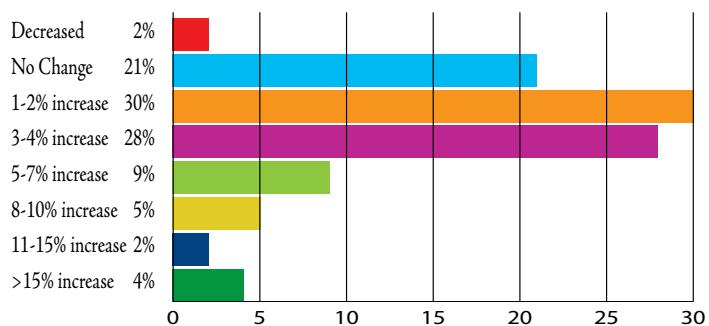
Average age of Designers is 46.

Average Designer Pay



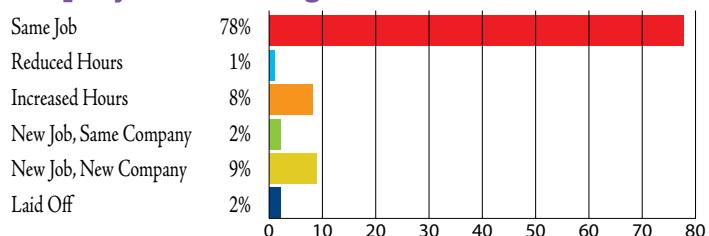
47% of Designers rate their workload as Extremely Busy, which is an increase from last year.

Change in Salary



Average designer has 19 years of experience in the industry.

Employment Change in the Past Year

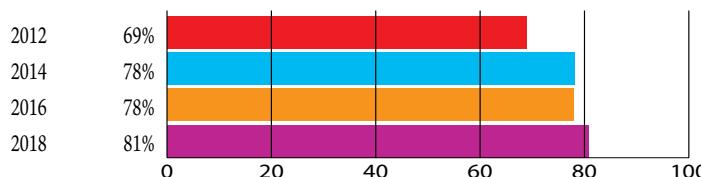


79% of Designers feel secure in their jobs; this is up slightly (3%) from last year.

AUGI 2018 Salary Survey

A LOOK BACK

Percentage of Users Who Feel Secure

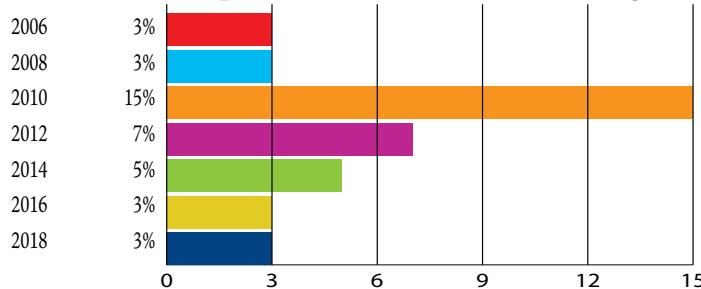


Percentage of Gender Pay Difference

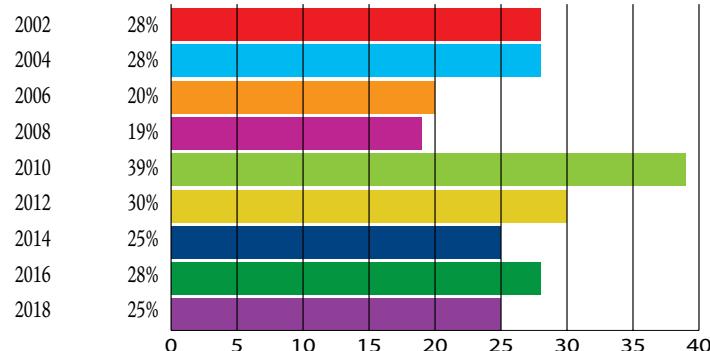


* these numbers reflect a 40 hour work week

Users Who Experienced a Decrease in Pay



Percentage of Respondents Who Received No Raise

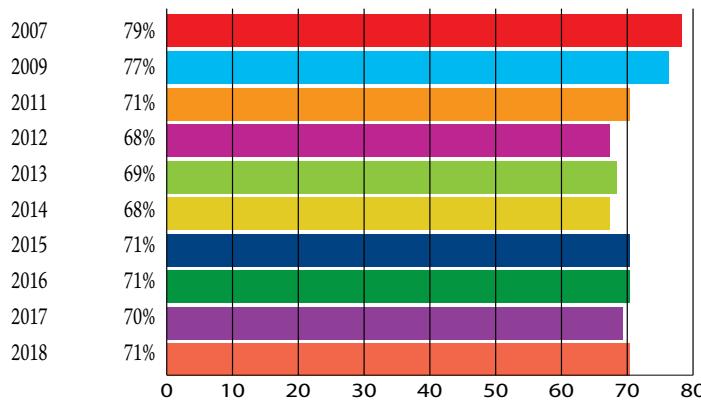


Satisfaction levels fluctuate up and down each year.

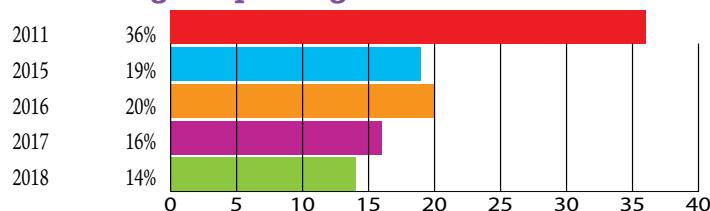
There is some variance in the 'Satisfied' and 'Very Satisfied' rankings.

Both rankings are included in the chart below:

Percent of Users Who Are Satisfied



Percentage Reporting Poor Workload*



*this question was not asked every year



Melanie Stone is a CAFM Solutions Architect with InfoNarus, supporting ARCHIBUS, AutoCAD and Revit. She is a past AUGI Director/Officer and is currently involved with the STLRUG. Melanie can be reached at mistressofthedorkness@gmail.com or found on Twitter as @MistresDorkness

Welcome to *AUGIWorld Inside Track!* Check out the latest opportunities to advance your skills, processes, and workflows in your firm, with the most current AEC-related software and hardware updates available.

WARCHART

<http://archilizer.com>

Warchart, which stands for Warnings (Pie) Chart, is a visual interactive tool that helps you navigate, isolate, and ultimately eliminate Autodesk® Revit® warnings. The real-time update of the chart will follow your progress and give you immediate feedback.

The color scheme is optimized for color-blind readers, but please let us know if you have trouble working with the default shades.

Tackling warnings has never been more enjoyable.

BIRD TOOLS TAG ALIGNMENT TOOL

<https://apps.autodesk.com/RVT/en/Detail/Index?id=2882355899710618005&appLang=en&os=Win64>

The Bird Tools Tag Alignment Tool is an Autodesk® Revit® add-in that aims to arrange Revit TAGS and TEXT NOTES that have



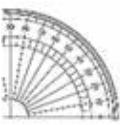
been assigned leaders in a neat form, such that their "landing lines" are straight and all their leaders are parallel. It proves to be extremely useful in areas that are overpopulated with tags and text notes, helping the user move all the tags contained in the aforementioned area to another tag-free area with a single mouse click.

VIEWIT

<https://www.bimoptimized.com>



BIM Optimized ViewIT app for Autodesk® Revit® is a configurable, multi-functional application providing an optimized system for accessing your views and sheets through a variety of tools designed specifically to streamline model navigation. The ViewIT app helps eliminate the inefficiency of task-switching and scrolling through large projects in the Project Browser.



The Sheet Number function provides an interface that allows the user to key in and filter for specific sheet numbers. The Sheet Contains function provides an interface that allows the user to key in and filter for specific values in the Sheet Number & Name, again eliminating the inefficiency of scrolling through large projects in the Project Browser.

ViewIT provides several functions for expanding your capabilities when accessing your views. The Tile Checked Views function provides the ability to open and tile multiple views in a fraction of the time it currently takes. The Close Views function allows the user to close all but the active view.

In addition to the production workflow, ViewIT can be used for collaboration, presentations, and model reviews. Streamline the modeling process, lower the cost of production, accelerate team huddles during design iterations, and enable confidence during impromptu presentations.

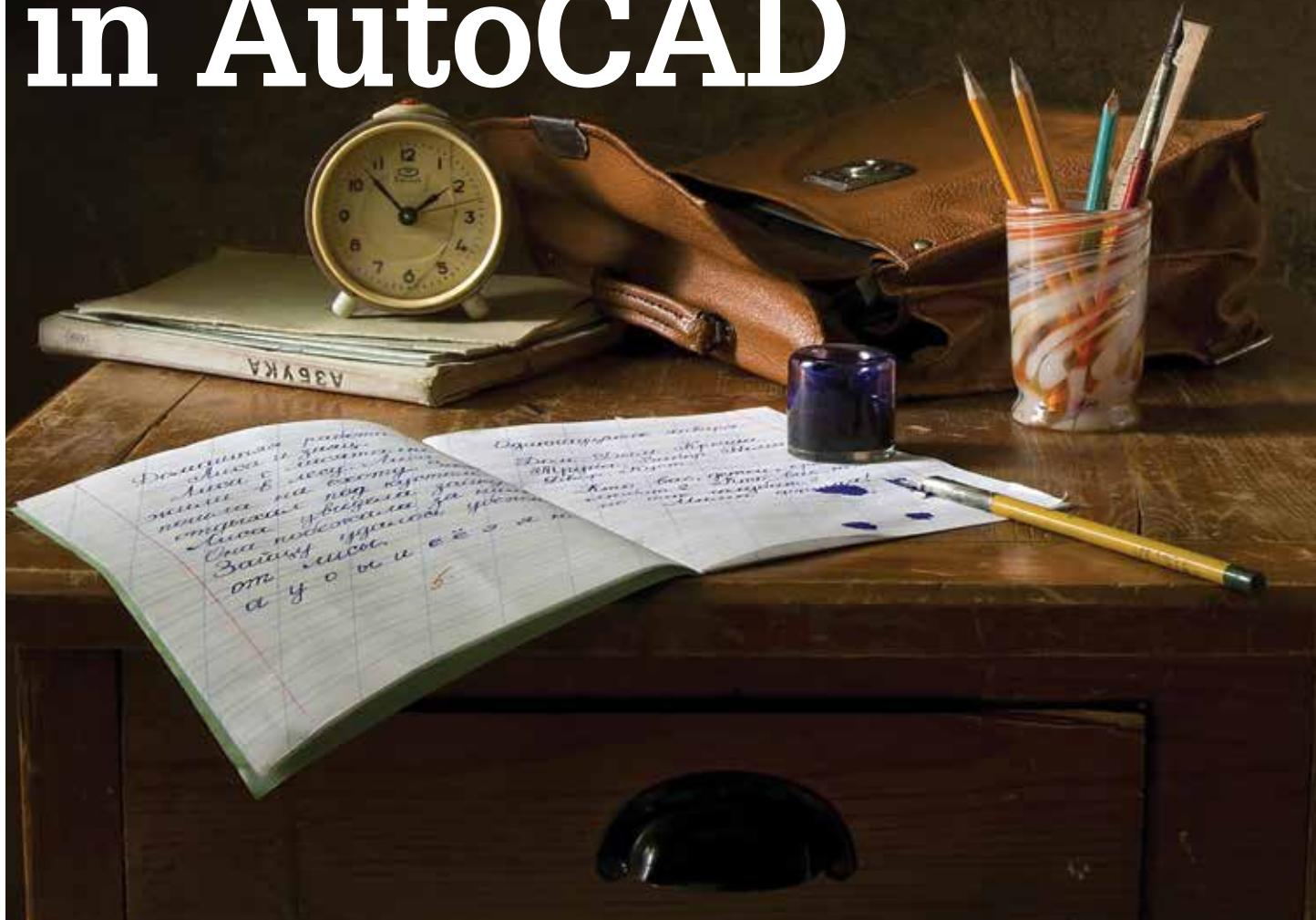
When ViewIT is set up to match your workflow, you can:

- Produce More – Do more by recovering your most valuable asset, time, by eliminating the continuous searches and scrolling for views and info.
- Focus Better – Eliminate the activity of searching for information and costly mental task-switching that occurs with great frequency.
- Stress Less – It is said that 10-20 percent of our work week is spent finding and searching for information. Get what you need, when you need it, and stress less.

If you have some news to share with us for future issues, please let us know. Likewise, if you are a user of a featured product or news item and would like to write a review, we want to know. brian.andresen@augi.com

AUGIWorld brings you recent developments in Autodesk and related software items

Tackling Tables in AutoCAD



WHAT IS A TABLE?

A table in AutoCAD® is a compound object that contains data in rows and columns. A table can be created from an empty table, data derived from the drawing, or data linked to a Microsoft Excel spreadsheet. You can create a schedule, legend, notes, bills of material, and many other associated lists compiled in an organized manner. AutoCAD tables contain rows and columns that create a group of individual cells that are designated by row numbers and column letters in which the cell resides (just as in Microsoft Excel). The table command can be launched from the ribbon under the Annotation panel as shown in Figure 1 or by typing Table at the command prompt. Good practice is to save your company standard table styles within a template or on a tool palette, which can be used each time you launch AutoCAD.

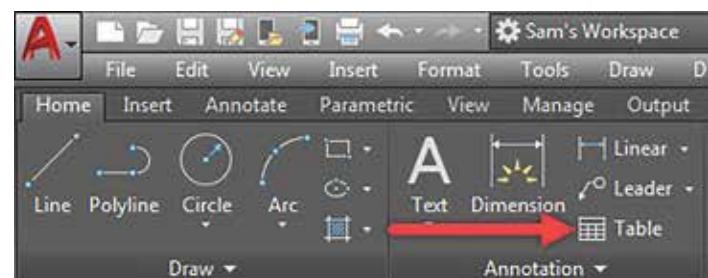


Figure 1: Table command on the ribbon

TABLE PROPERTIES

Tables can be defined by a table style, which presets many of the table characteristics. Tables can be formatted by selecting any of the rows and cells and modifying them to meet your company standards or a client-specified request. Let's explore the tables

and some of the different approaches we can use to become more efficient with AutoCAD. Once you start the table command, the Insert Table dialog box will appear as shown in Figure 2. On the left side of the dialog box you will see a preview of how the current table style will look (i.e., Standard style).

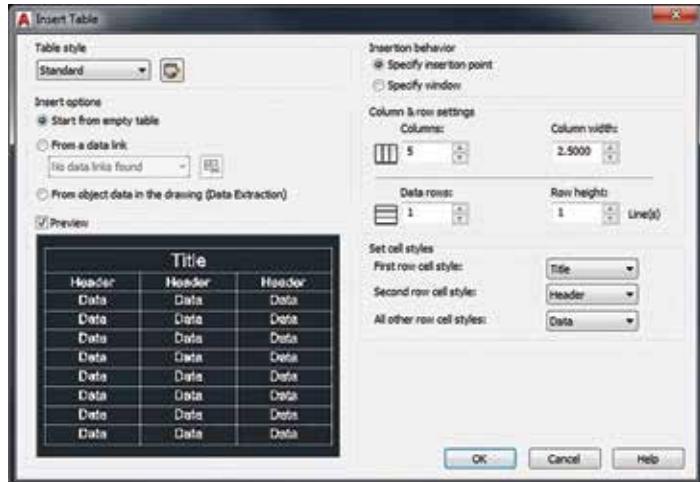


Figure 2: Insert Table

Under the Insert Options section we have three options as shown in Figure 3. A demonstration of each of these three techniques can be found on the Autodesk Knowledge Network (AKN) at <https://knowledge.autodesk.com/community/screencast/7e9503ae-5af8-47c3-b221-147b3fddd85b>

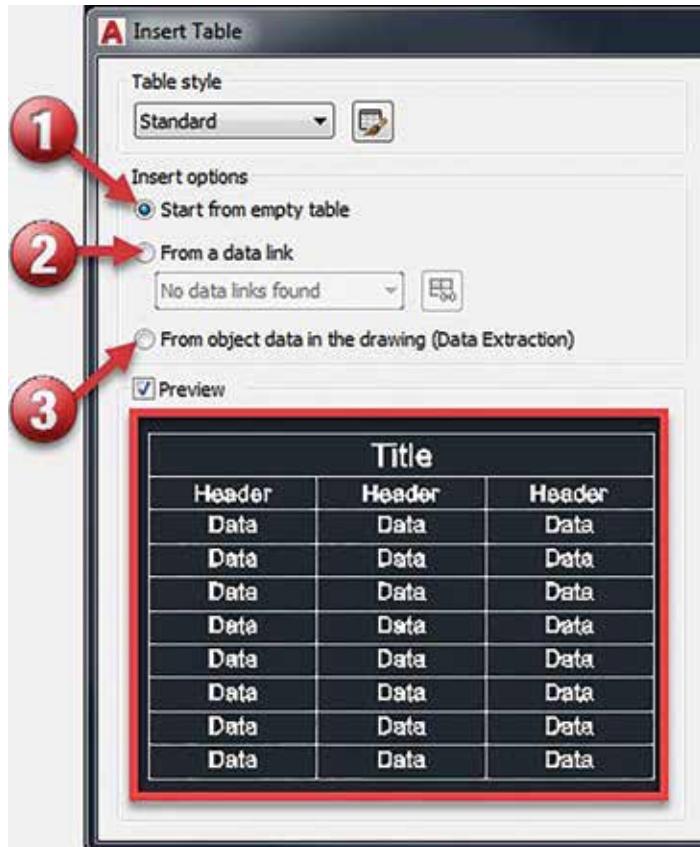


Figure 3: Insert Table options

1. Start from an Empty Table: Use this option when you want to manually enter data. If you start from an empty table, you will retain the default values for rows and columns and the table will be inserted at the top right of the drawing.
2. From a data link: This option gives you the ability to create a table from an Excel spreadsheet or a comma-delimited (.csv) file.
3. From object data in the drawing: This option gives you the ability to create a table from objects in the drawing.

We are going to start by just entering an empty table as in Step 1 and review the properties of the table. After inserting the table and selecting a cell, the contextual ribbon Table Cell will appear as shown in Figure 4. This is where you can make changes to your existing table. When you select a single cell as shown you can perform several functions including modifying the data, locking and unlocking, and insert blocks and fields. You can also access all the options by performing a right-click on the cell to bring up the shortcut menu.

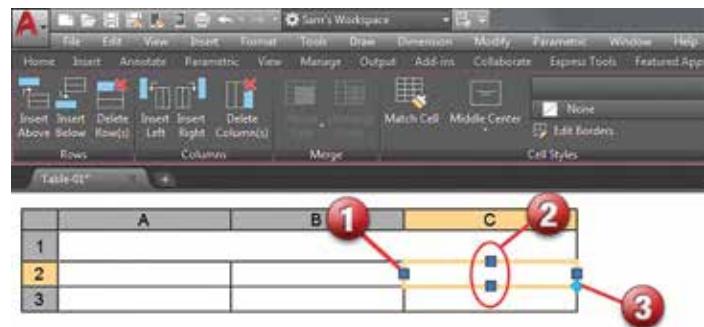


Figure 4: Table Cell contextual ribbon

We can modify the cell size by selecting the grips as shown in Figure 4. The numbers represent the different grips and their functions as shown in Figure 4a.

1. Use this grip (on the right as well) to modify the width of the cell.
2. Use these grips to modify the height of the cell.
3. Use this grip to increment the value of a cell automatically; right-click and the following menu will appear.

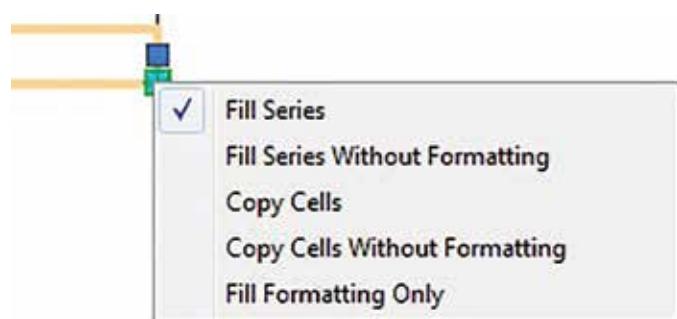


Figure 4a: Increment cell value

AutoCAD 2018

A demonstration of cell properties and how to autofill cells can be found on the AKN at <https://knowledge.autodesk.com/community/screencast/65180e74-118a-48a5-ac21-946e36daad77>

TABLE LINEWORK

Under the Cell Styles panel of the Table Cell contextual ribbon you will find the edit borders section as shown in Figure 5. This properties dialog box will help you define the characteristics of your lines within the table.



Figure 5: Edit Borders

Upon selecting Edit Borders you will have the Cell Border Properties dialog box where you can define the linetypes and their properties of the cells within your table in six steps.



Figure 6: Cell Border Properties

1. This defines the linewidth of your table cell. You must have the linewidth set then select the border lines (red arrow) as to where you want the property to take place. Note: Your change will NOT appear in the preview box; you will have to move back out to AutoCAD and turn your linewidth on to see the change.
2. Set the Linetype.
3. Set the Color.
4. Yes, you can have a double line.
5. Spacing of the cells and lines.
6. Preview button is where you assign the properties of the individual line segments. For example, say you only want the bottom line to be a bold line—this is where you can modify that property.

Watch this screencast to see how to use borders in a table: <https://knowledge.autodesk.com/community/screencast/3d702af2-a06b-4db7-8f86-fdb87ce8b4fa>

Now that we have covered the basics, these next few sections will focus on adding data to your table.

CREATING A LEGEND TABLE

We are going to take what we have learned with Cell Styles and Borders and create a legend table which will contain our block symbols and a description. The power of this feature is that all your blocks and text will be aligned at the same location. The following image shows a base map with four typical symbols that are labeled with fields.

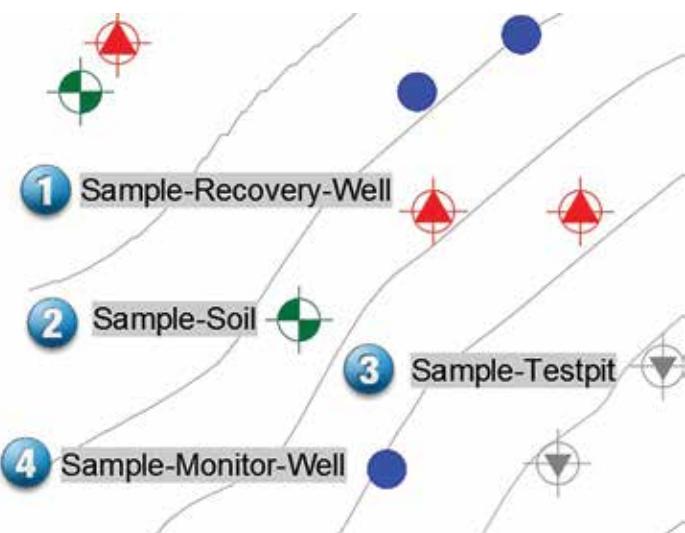


Figure 7: Blocks in AutoCAD

You can perform this in paper space or model space. Move to your standard legend area and select a table with two columns (one for the symbol and one for the description) and four rows (identifying the four symbols we have in our drawing). Once your table is in your drawing select the first cell under the main header cell as shown in Figure 8.



Figure 8: Adding a block to a table

Follow the steps below to add your block to the table cell.

1. Select and highlight the cell where you want your block to be placed. This will bring up the Table Cell contextual ribbon.
2. Select Block from the ribbon.
3. Select your block.
4. Turn AutoFit off. We want to be able to control the size of our symbol, keeping them all consistent. This is good because most legend items are not the same size.

Our table should look like what is shown in Figure 9. Note: I have added the title legend and the words recovery well location for our description. Use standard text tools and justification to get the text to appear the way you want. For the legend I used a top left justification, bold text, and underline. For the description use the middle left and a standard text. Use the Autofill setting to copy the symbols and text to the remaining three sections. Change the symbols by selecting the cell and changing the block.

LEGEND	
	RECOVERY WELL LOCATION

Figure 9: The Legend table

After copying all the symbols and editing the text, your final legend table should look like the left portion of Figure 10.

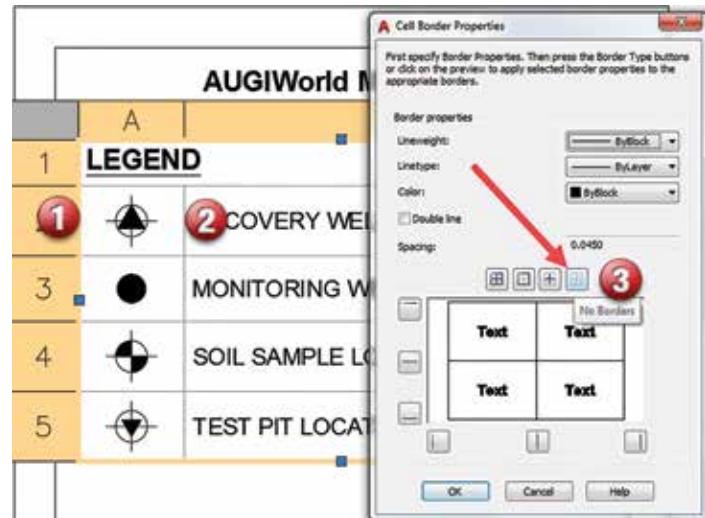


Figure 10: Turn off the borders

Let's review the three steps to complete our legend table.

1. Insert the blocks into the cell and create a proportional size (be consistent).
2. Enter the descriptions of the symbol for your legend.
3. Important! Turn all the borders off. This way they will not print, and all of your symbols and text will be perfectly aligned in your legend.

A complete demonstration of this technique is illustrated in a screen-cast found at <https://knowledge.autodesk.com/community/screen-cast/f5684b6a-5141-4bfe-880a-09ab3354dfa9>

CREATING A TABLE WITH FIELDS

Another great function of tables is the ability to add formulas and field data. In this example we are going to use a table to display the square footage of three separate areas and then total them up all in one table. We have three areas in our drawing that are enclosed with a single object—in this case a polyline.

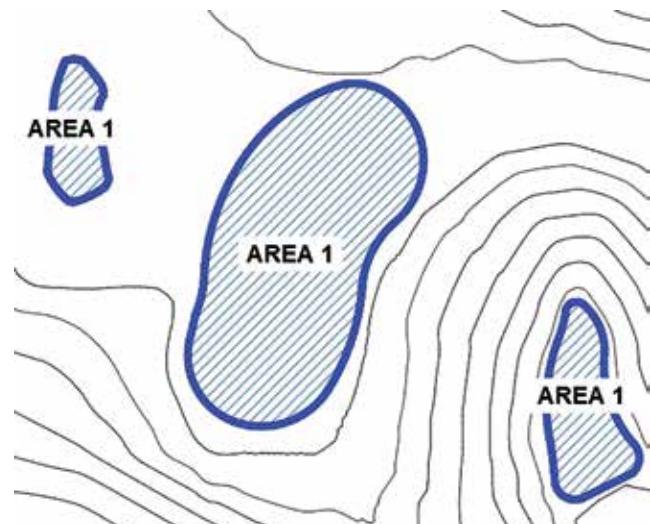


Figure 11: The areas to be defined

AutoCAD 2018

Insert your table into your drawing with the header, four rows, and two columns. Enter the title and the three areas as shown in Figure 12. Next, we are going to follow steps 1 and 2.

A	B
1	POND AREA CALCULATIONS
2	AREA 1
3	AREA 2
4	AREA 3
5	TOTAL

Figure 12: Pond Calculations table

1. Select your Table Cell for the area.
2. Select Field from the Table Cell contextual ribbon.

From the field dialog box, we are going to go through five options as shown in Figure 13.

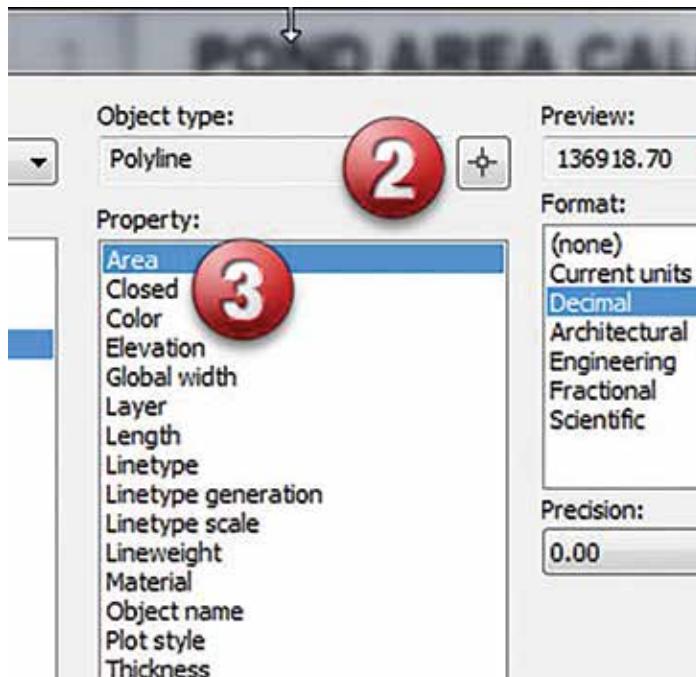


Figure 13: Field dialog box

1. Move the field category to object.
2. Select the button and you will be taken back out to AutoCAD to select your object. Select the Area 1 polyline.
3. Select Area from the Property window.

4. Select your preferred units. Note: there are additional formatting options available here for adding a prefix, suffix, or additional mathematical expressions for control of your output.
5. Select OK and your field will be added to the table.

A	B
POND AREA CALCULATIONS	
2	AREA 1
3	AREA 2
4	AREA 3
5	TOTAL

Figure 14: The table

Continue to add the areas 2 and 3. When complete, select the TOTAL cell and perform the sum function. Select formula, then Sum. You will now window select the three cells to total (shown in red) and hit enter. The sum of Areas 1 through 3 are now displayed in the table. Please see the screencast below for a demonstration on this topic. <https://knowledge.autodesk.com/community/screencast/a2e18b05-14b2-4a68-88fc-2754f72ca0c0>

A	B
POND AREA CALCULATIONS	
2	AREA 1
3	136918.70
4	AREA 3
5	TOTAL

Figure 15: Using a formula to add up the data

CREATING A SHEET SET INDEX TABLE

Open an existing sheet set, which contains layouts (sheets) with drawing numbers, sheet description, and a sheet title. We would like a sheet index placed on the cover page and linked to the sheet set. Why do things twice, right? As a prerequisite you can create a table that is your standard for design set title sheets; for this example, I have one named Sheet Index. You don't have to do this, but when working on future projects for your design you should create your table according to your company standard. The generic table will get you

what you need, but some up-front formatting can help you with consistency and efficiency.

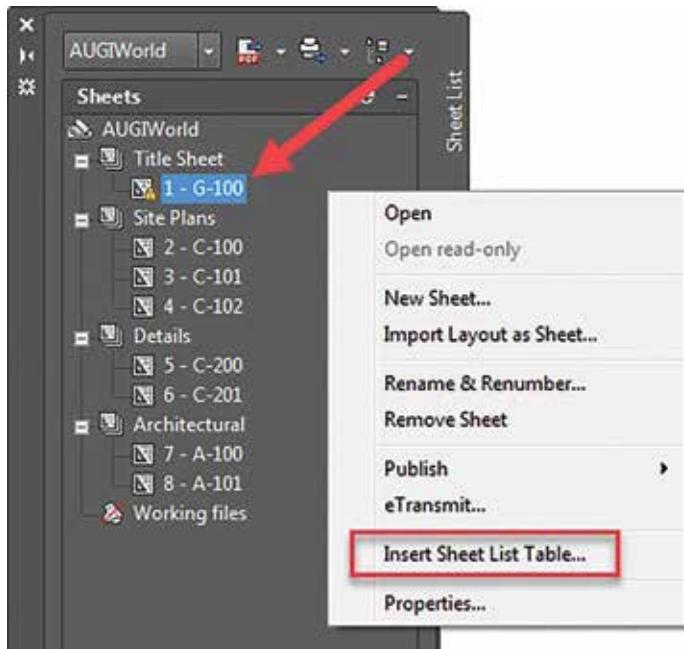


Figure 16: Insert Sheet List Table

After selecting Insert Sheet List Table, the following dialog box will appear where you select the properties of your table.



Figure 17: Sheet List Table properties

1. Select your table style. This is where you can create the table in the current drawing or have it preloaded as a template.
2. Enter the name of the Sheet Index table.
3. Enter the Column settings. Depending on your design project you can customize your table to enter the data you need or your company standard. We have the three options as shown.

When you have all the fields you need, hit OK and place the table on your drawing. The table is now linked to the sheet set and you can modify the properties directly on your title sheet. For a demonstration, go to <https://knowledge.autodesk.com/community/screenCast/bddae72-698b-4015-b3de-fb557e4414f8>

DRAWING INDEX		
Sheet Number	Sheet Title	Sheet Description
1	G-100	TACKLING TABLES IN AUTOCAD
2	C-100	RESTORATION CONDITIONS
3	C-101	DEMOLITION PLAN
4	C-102	SITE PLAN
5	C-200	EROSION CONTROL DETAILS
6	C-201	STORMWATER MANAGEMENT PLAN
7	A-100	ARCHTECTURAL DRAWING CLIENT
8	A-101	ARCHTECTURAL DRAWING CLIENT

Figure 18: The Drawing Index table

CONCLUSION

Tables are an extremely powerful way to capture and display data within a drawing. This article is just a snapshot of some of the table functionality in AutoCAD—there is so much more to explore. Use tables for organizing your data and becoming more efficient by displaying the properties of objects and geometry within your designs. Take what I have shown and delve into the properties of tables and how they can help you become more efficient and productive within your daily design activities.



On a final note, registration for Autodesk University 2018 has begun. This is a great conference to learn, connect, and explore all things CAD and Design. I will be there speaking again, and I look forward to seeing everyone in November during the most wonderful time of the year.



Sam Lucido is a CAD Services Manager with Haley & Aldrich, Inc. He has more than 25 years of experience involving design, user support, and customization. Sam is professionally certified in AutoCAD and is an Autodesk Expert Elite Member. He uses his vast knowledge about AutoCAD to help provide support to engineering and design teams with monthly tip sheets and online training. Sam will be teaching three classes at Autodesk University 2018 in November. You can find him at CADProTips.com and he can also be reached at silcudo@haleyaldrich.com

The Stuff Revit Legends Are Made Of



When I first began using Autodesk® Revit® over 10 years ago, my excitement over certain features and functionality was quickly dampened when I began looking into the legend tools provided in the software. It's no secret that the legend tools in Revit are lacking, specifically for symbol legends so commonly used in engineering design. In those 10 years not much has changed. One can only assume further development is not planned in this area of the software.

Legends are an essential but often overlooked tool in construction documents. Perhaps it goes without saying, but legends provide explanation and information for the various symbols and visual elements in use on a project. When considering what approach to take with legends, a fundamental question is: can the legend be all-encompassing and generic or must it be project specific, accounting for elements in use in the project only? The former typically includes all possible symbols that might be used with a disclaimer

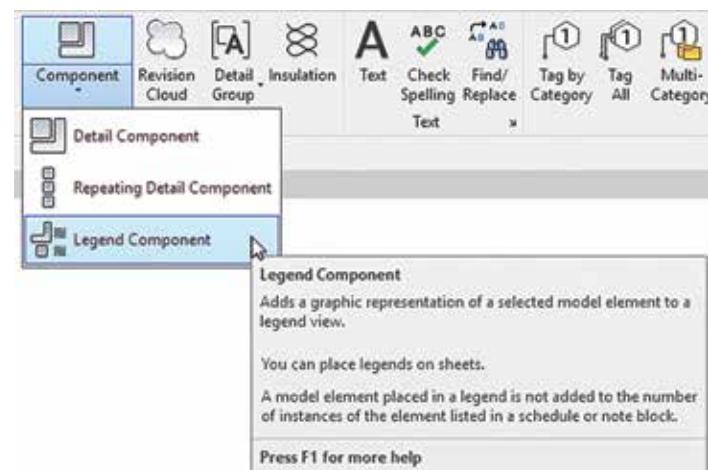


Figure 1

indicating that not all symbols listed may be used in the project. This approach significantly reduces the time associated with editing legends that otherwise need to be updated as the project progresses and content is added or removed. But it isn't the most elegant or relevant either.

At this point, regardless of whether or not a project specific legend is needed, the second question is: should the legend use parametric information from elements and families in the model? The answer to this question is the main pain point and the focus for the rest of this article.

If you answered "yes" to this second fundamental question, your decision is pretty well made for you already, but let's play along. Revit has built-in legend tools for this purpose, but they leave a lot to be desired. To create this type of legend, from the Create panel in the View tab, access the Legend button. You will be prompted to give it a name and specify a scale. This same result can be achieved by right-clicking the Legends node in the Project Browser (Figure 1).

Similar to other views in Revit, you can also adjust the detail level and visibility graphics or assign a view template. Once created, to add families to the legend go to the Detail panel in the Annotate tab and select Legend Component (Figure 2). Alternatively, you can drag the desired family type from the Project Browser into the legend.

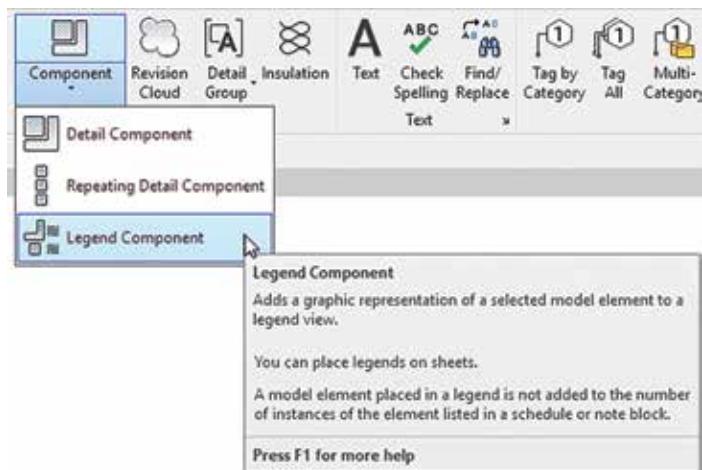


Figure 2

A feature unique to legends is that a drop-down of all content available in the model appears in the options bar, as well as a view type control and host length parameter (Figure 3).



Figure 3

Excitement quickly turns to frustration as you try to get your legend components for device categories (electrical fixtures, se-

curity devices, data devices, etc.) to display properly. Using this method, I would describe Revit legends as inflexible at best and useless at worst.

It is common practice to use nested generic annotations in MEP devices. This effectively places a symbol while also placing the family and its geometry. Symbol visibility is then commonly controlled via the detail level of the view, usually in tandem with other visibility functionalities of the family.

The problem in a true Revit legend then becomes that the orientation of the family cannot be rotated, forcing this to be a function of how the family is built, which most likely is not desirable. (If any of your content is face-based, hiding the geometry in this type of legend is that much more complicated.) This all but requires the use of generic annotations or detail components in the legend to represent the content in the model, and you are no longer using live model information.

Second, even if placement and orientation of legend components had no issues, parameters of the elements placed in these legends cannot be tagged or otherwise accessed, so you are left to use text. Don't be fooled! The tagging tools are available in the ribbon, seemingly inviting you to start tagging components, but they are powerless in these legends.

Third, there is nothing to help with creation of a tabular format. This means any lines for rows and columns must be manually added if desired. If you have gone down this path and gotten this far, you might be wondering what you liked about this program in the first place.

These legends are not without their advantages, however. Model elements placed in a legend view are not "included" in the model. That is to say, they won't also appear or be counted in schedules. Also, as true legends, the same legend can be placed on multiple sheets, unlike the limitation of all other views in Revit. Nice, but barely one step better than a drafting view of annotations, lines, and text.

If these solutions thus far are unacceptable, you might be wondering if there are any other options. The answer is yes, but they are workarounds. As such, there are some trade-offs to consider. The following solutions achieve a desired result, but make use of functionality in Revit that is not its intended purpose.

One such workaround that is fairly common is to use the phasing functionality of Revit to assist in making legends (Figure 4). Yes, that is as crazy as it sounds. I am not going to explain in detail this method because there are plenty of blog entries and forum posts covering this approach. But the main goal, having ruled out a true Revit legend, is to be able to access model and parameter information for use in a legend. The elements you want in a legend are placed in a "documentation" phase, past or future. This is done by creating the legend in a floor plan or similar. From here, tags can be used to display the desired parameter information. Finally, because these elements are being placed in their own phase, they can be kept separate from the rest of the model both in plans and in schedules.

Revit MEP

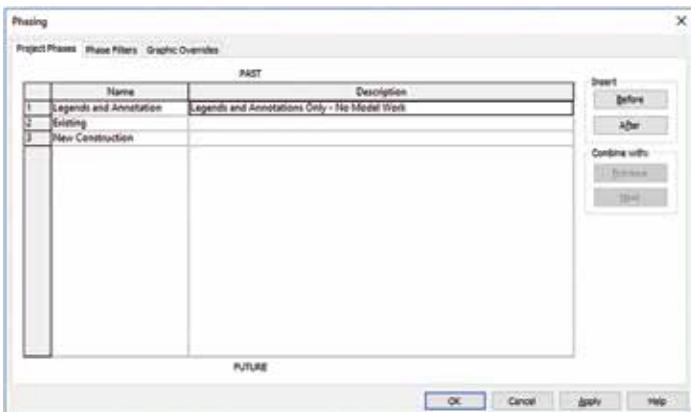


Figure 4

A few drawbacks to this method are that separate phases just for this purpose must be used and maintained; users must be trained on their proper use. If lines are desired for the tabular format, they must be created (and adjusted) manually. And lastly, it does not respond automatically to elements being added or removed in the project. If only content in use in the project is desired in the legend, this must also be managed manually.

A second option is very similar to the above phasing method but uses design options instead (Figure 5). Again, the idea is to sequester the elements for the legend in a part of the model where visibility can be controlled in plan and schedules, but access to the parameter information is still possible. As with the phasing option, there are plenty of entries on the web outlining the process to help you decide what approach you may want to try.

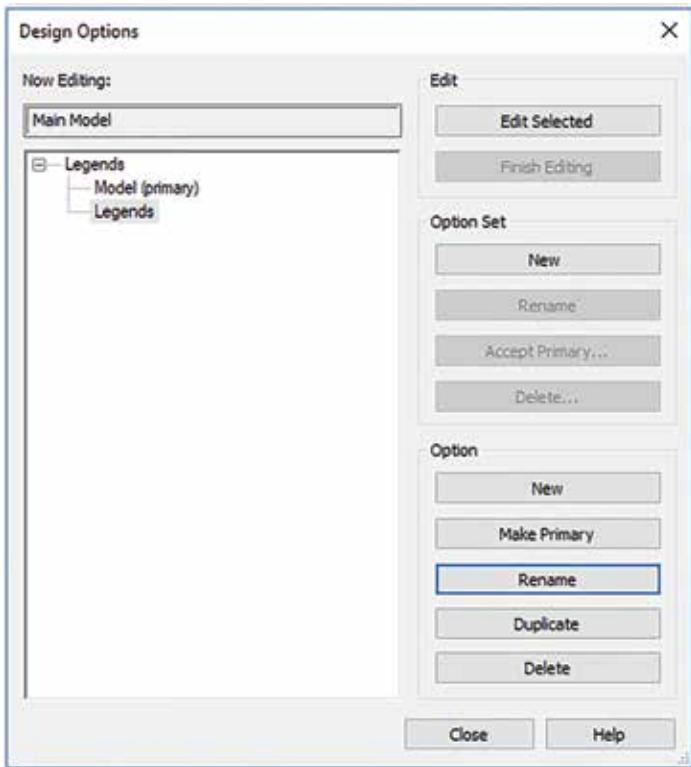


Figure 5

This brings us to a last option: schedules. There are three main advantages to this approach. First, the symbol legend uses only model content in use. Second, parameter information is easily accessible. Third, schedules greatly assist in the standardization, formatting, and overall appearance of the legend.

A legend is basically a type schedule. Obviously, every instance of an element should not be represented so “itemize every instance” must be unchecked under sorting/grouping. Because it is a schedule it also responds to phasing and filtering to allow for multiple “legends” for specific phases or scope in a given project. As many parameters as are needed can be added for information display or just for filtering and sorting/grouping controls (Figure 6).

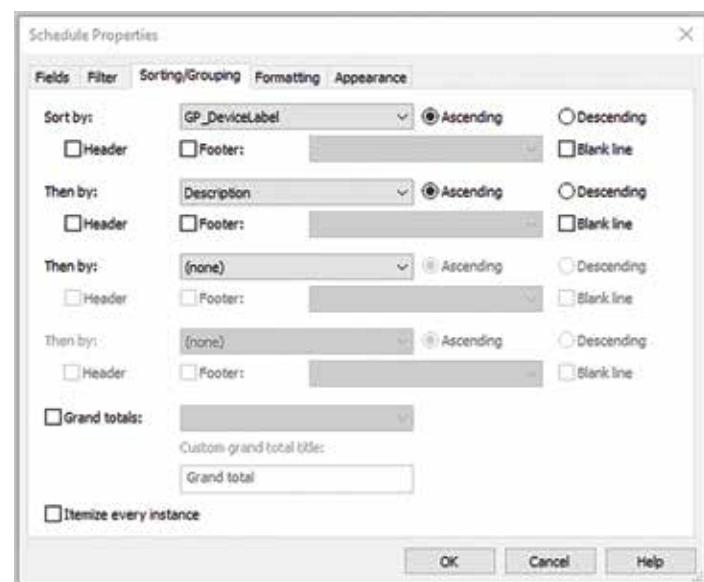


Figure 6

Finally, this approach also allows for either category-specific or multi-category schedules. Category specific can act as a built-in filter. For example, if I only want to show security devices in my legend I can do so by creating a schedule for that category only. No other Revit categories will be shown.

The opposite is also possible. A multi-category schedule can be used to create a legend that spans more than one Revit category (Figure 7). Keep in mind these kinds of schedules behave a little differently. Make sure at least one shared parameter is available to all desired categories so the schedule will “see” the expected elements. From here, filtering out elements you don’t want to see can be achieved most easily using parameters for just this purpose.



Figure 7

Because we are still in the land of workarounds, this approach is not without its problems. A schedule can only report content in the model, so it is difficult to have a “starting” legend. If it isn’t in the model it can’t be in a component schedule, thus it can’t be in the legend. Also, we need more than just the information—we also need to display a graphical representation. How does a schedule do that?

Alas, again we are met with more decisions based on what we are trying to achieve, weighing the pros and cons. One approach is to create actual fonts in a font editor program that depict the symbols you are using. These font characters are entered into a parameter of your choosing that is used in the schedule. Voila! Your schedule is now showing symbols and information for live model content.

There are two main drawbacks to this approach. First, an entire font character library must be created for this purpose. Second, almost as important as the first, is that creating non-standard fonts creates its own problems. This font must be available on all users’ computers. This is poignant when sharing digital files with outside entities.

If creating fonts have such big drawbacks, what other options are left? Beginning with Revit 2015, images can now be associated with families as instance or type parameters. These images can then be used in a schedule. All the benefits of a schedule without the drawbacks of creating a font character library! We are almost there. All that is left to decide is which parameter to use: type or instance?

First let’s consider the type image parameter, which works well because we want an image to correspond with its type. The up-front work here is to create an image file that depicts all of your desired symbols. Once loaded, however, any content that is added to or removed from the model is automatically updated! Problem solved. We now have a legend that responds to model changes, can display parameter information associated with the elements, and has the formatting controls to help with standardization and appearance.

DEVICE AND WIRING LEGEND		
SYMBOL	DESCRIPTION	WIRING
ACR	ACCESS CONTROL PANEL	1 - 12VDC EMERGENCY DEDICATED SHUNT CIRCUIT; 1 - LAW MAIN NETWORK CONNECTION
C PROX	PROXIMITY CARD READER - WALL MOUNTED	1 - #22 AWG SHIELDED PLUMIN CABLE FROM ACR (SHUNT); 1 - #22 AWG SHIELDED PLUMIN CABLE FROM READER TO 12V DC
CR	REQUEST TO EXIT	1 - #18 AWG PLUMIN (FROM READER TO 12V ABOVE DOOR); USE GREENWIRE OF 18GA ABOVE TO POWER READER OR

Figure 8

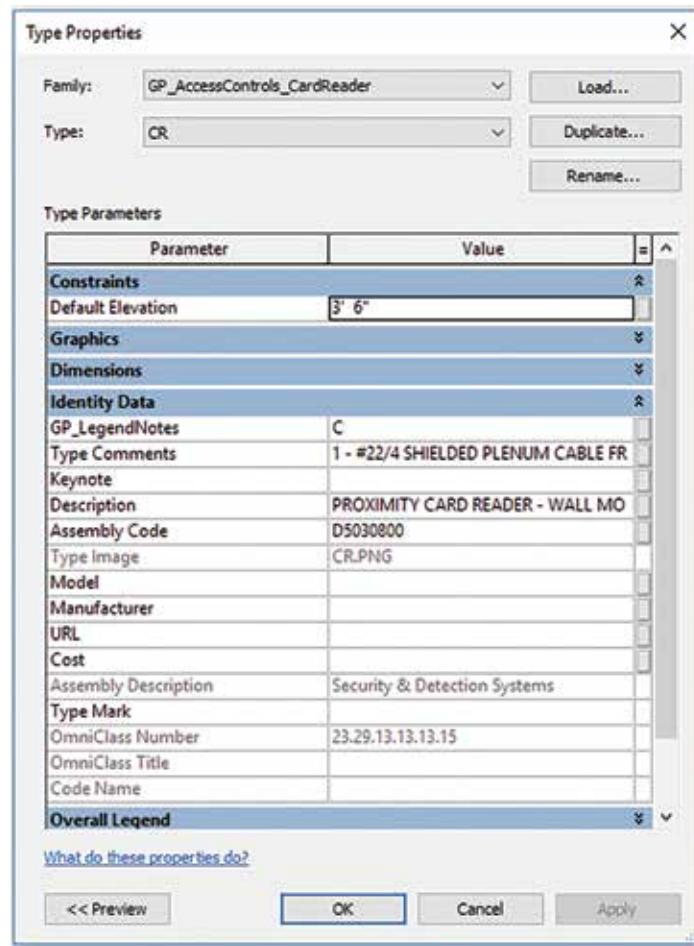
A few necessary considerations to keep in mind. Trial and error is required to get your images created and sized properly. Those experienced with image editing software will have no problem. Those less experienced soon will be! Once the trial and error is over and the correct size is determined, it is easy to make the bulk of a library without reinventing the wheel each time.

DEVICE AND WIRING LEGEND		
SYMBOL	DESCRIPTION	WIRING
ACR	ACCESS CONTROL PANEL	1 - 12VDC EMERGENCY DEDICATED SHUNT CIRCUIT; 1 - LAW MAIN NETWORK CONNECTION
CC	PIRE IP CAMERA (CEILING SURFACE)	1 - CAT5e NETWORK CONNECTOR TO ONBOARD SWITCH (POE)
CR	PROXIMITY CARD READER - WALL MOUNTED	1 - #22 AWG SHIELDED PLUMIN CABLE FROM ACR (SHUNT); 1 - #22 AWG SHIELDED PLUMIN CABLE FROM READER TO 12V DC
RE	REQUEST TO EXIT	1 - #18 AWG PLUMIN (FROM READER TO 12V ABOVE DOOR); USE GREENWIRE OF 18GA ABOVE TO POWER READER OR

Figure 9

With everything this method has in its favor, it also is not without its disadvantages. First, this does require the somewhat duplicate work of creating an image file that equals the needed symbols. Substantially easier and more universal than creating fonts, it nonetheless takes additional time. But, since we are talking about standard legends, hopefully your symbols are not changing from project to project. And once created they can be reused.

A second drawback is that if the image does need to be edited or changed for whatever reason, it cannot be done in the project. The family must be opened in the family editor in order to change or reload the type image. Furthermore, if any changes are made in the family editor, not even affecting the type image, “overwrite parameters” must be selected when reloading the family back into the project (Figure 10). Autodesk admits this is a defect, but as of version 2019 it is not fixed. Not a deal breaker, but definitely something to keep in mind.



Revit MEP

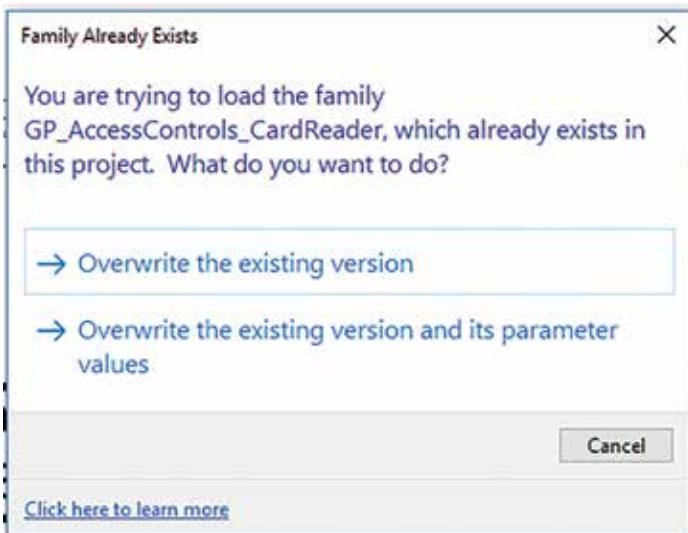


Figure 10

A third consideration is to understand how a schedule controls the image size. An image in a schedule is controlled by two basic methods: 1) column width of the image column; 2) row height of the image column. This, in combination with the size of your images, controls their size on the sheet and applies to the entire schedule.

With the first approach, images in a schedule scale proportionately as its column width is changed. Changing the width of other columns in the schedule does not affect the image. This is the default setting.

The second approach is to control row height. With the schedule selected on sheet, this is achieved by using the control in the ribbon. This allows for width changes to the image column without changing the size of the image. However, changing the row height of other parameter columns in the schedule (changing their column width) will change the image size in the image column. This approach effectively means that to avoid unintended changes to the image column, a specified maximum of text lines in a row must be honored at all times in the other parameter columns.



Figure 11

These two approaches are mutually exclusive and can't be in use simultaneously. The best approach is probably to build your images to work with the default column width method.

From here the specified row height method can still be utilized if changing the width of the image column is required for some reason. Starting with the specified row height approach forces you to stay with that approach.

There is a fourth negative to consider, which Autodesk also admits is a defect. If sorted by a parameter with identical values across families, a schedule does not know what to do with two different families that make use of the same type image. Sort by whatever parameter you want; the type image will not display in this scenario.

Mostly a rare situation, it nevertheless has happened and forces you to address the problem by other inventive means.

In Figure 12, the top schedule is not itemized and sorting by description. The bottom schedule is itemized and also sorting by description. In the top schedule, notice the empty symbol column. Because the schedule is being sorted by the description parameter, which is identical in both families, the type image is not displayed. Interestingly, this same behavior also occurs if you sort by type image but do not itemize the schedule. It is as if the schedule treats the type image parameter as unique if it is from a different family even if it is the same image.



Figure 12

One more thing that is more of a consideration than a drawback. If exporting files to DWG is a common requirement, once exported, all the images will be exported as images and maintained as external references by AutoCAD®. They are not embedded in the DWG.

A concern I had when first implementing this approach was if the images loaded into the families would have a negative impact on model performance. I can pretty confidently say that it has not. Because the images are in the families, not the model itself, Revit does its normal magic of managing and referencing families, types, and their instances without bloating the model.

Despite these points, the type images approach has been our standard legend approach on all our projects for almost three years. Not without its problems, its benefits outweigh the woes. It does definitely lend itself to engineering trades where the majority of symbols are variations on a theme. The applicability of this approach may not be as well suited for non-MEP disciplines.

If the idea of creating an entire image library that matches your symbol library is too much to bear, there is another option that still takes advantage of schedules. This approach is a hybrid of sorts between the automatic nature of a type image schedule and the manual method of placing symbols.

First, create a blank image (Figure 13). This image is blank and contains no graphics or information. As with the type image method, some trial and error may be necessary to achieve the desired result. This image file is loaded into the model itself. Once in the model, it can be selected in the instance image parameter for each desired element in the "legend." The key is to load this image file into the image parameter for all scheduled elements. This can easily be done by "collapsing" the schedule, filtering by a parameter that only returns one row, and loading the blank image file. A separate schedule devoted to just this purpose could be also be created to help manage adding this image as new elements are added.

Why load a blank image into a schedule? It allows you to set the row height to something other than what the non-image parameters allow. With all of this in place, generic annotations, probably the same ones nested in your families, can be manually placed on the sheet in the legend with the corresponding family (Figure 14). As an aside, because these are native Revit elements, when exported to DWG, they are exported as native AutoCAD elements (the blank image file will be exported as a single image and referenced).

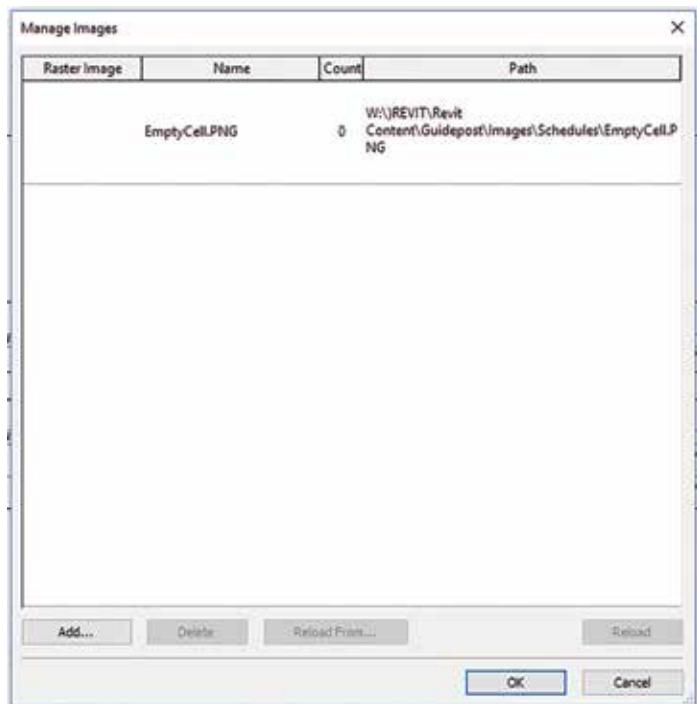


Figure 13

Comparing both finished products in Revit or PDF, the legends are nearly indistinguishable. Why not brush up on your image editing skills and take advantage of an intelligent legend?!

A	B
SYMBOL	DESCRIPTION
EmptyCell.PNG	ACCESS CONTROL PANEL
EmptyCell.PNG	FIXED IP CAMERA (CEILING SURFACE)
EmptyCell.PNG	PROXIMITY CARD READER - WALL MOUNTED
EmptyCell.PNG	REQUEST TO EXIT

Figure 14

As with many things, the lower initial time investment up front of not having to create and load images into each family type translates into continued manual management of the legend that adds up over time. As content is added or removed, the content placed on the sheet must be moved accordingly.

DEV	
SYMBOL	DESCRIPTION
ACP	ACCESS CONTROL PANEL
CS	FIXED IP CAMERA (CEILING SURFACE)
CR	PROXIMITY CARD READER - WALL MOUNTED
RX	REQUEST TO EXIT

DEV	
SYMBOL	DESCRIPTION
ACP	ACCESS CONTROL PANEL
CS	FIXED IP CAMERA (CEILING SURFACE)
CR	PROXIMITY CARD READER - WALL MOUNTED
RX	REQUEST TO EXIT

Figure 15

Perhaps there are other ways of creating legends not covered here. If so, share with the community so we don't all suffer in isolation! Perhaps a mixture of the above approaches will provide a solution for you. Sometimes creative thinking outside the box is required to find solutions and meet deadlines. Whatever the case, I hope this article has provided some ideas to help make your Revit legends legendary!



Nathan Mulder has more than 10 years of experience in the AEC industry. He is currently the BIM and CAD Manager for Guidepost Solutions, a global leader in investigations, compliance, and security consulting offering design services for security, telecom, and technology systems. A Revit MEP Electrical Certified Professional, Nathan is always looking for ways to fully leverage software to improve the project design and management process. Contact him at mulder.nathan@gmail.com or on LinkedIn.

The Revit User: A Soft Cost Factor of AEC



As part of a larger piece I am developing: "Navigating the Hard and Soft Costs of AEC," below is one of the components that every user has impact on, one way or another, with some solutions for creating growing, positively impactful processes.

Whether consciously or not, we all fall somewhere between maximum efficiency and maximum inefficiency on the professional continuum and the impact to budgets are a controllable soft cost of AEC.

We are either consciously maximizing our time on projects (to the extent we control), or we are consciously or unconsciously generating waste. Either case, I forward that these are all intentional actions. We are either getting better or getting worse. Stagnation is included in the getting worse category. Our choice, at every action.

Customizing Revit shortcuts (then using them in a growing manner) can, for instance, make every user 10 to 50 percent fast-

er—immediately and into the future. It is a continuously growing scale too ;)

Bad BIM makes bad architecture, or how soft-costs hurt AEC as a whole:

I understand that a lot of good architecture has been created sans BIM and before computer-assisted design and drafting, but if I can clarify my position let's see if there isn't a bit of sway... some evolution.

In 2018, with all of the available technologies—AI, ML, sociological and computer sciences, cutting-edge human expertise and the best systems available today—the "best of the best" architecture can (and are) able to be dramatically eclipsed and as we continue to find traditional processes and user inefficiencies are being mandated out by finances, owners, BIM guidelines, etc. So "what can I do?" you ask. Become the best you can be, then get better.

Learn to make yourself the best at the tools you [euphemism redacted] use every day of your work life! You may find this learning never stops. Embrace it, it's called responsible professionalism... integrity... life.

EVERY USER CONTROLS ONE THING: THEMSELVES

"A-Team" quality professionals all do one similar thing: continue to refine themselves and get better, better... So, if you aren't pushing to become increasingly better at your craft, please change your ways immediately or please consider leaving AEC. Mediocrity kills projects' ability to be at their utmost best—architecturally, BIM and construction/coordination, budget wise, and so on.

Revit teams actually hold a large part of production, design, construction, and coordination budget control whether they realize it or not. Model adjustment costs range from hundreds to thousands of dollars; but the same issues forced to be on-site adjustments are not just predominantly avoidable, but cost tens to hundreds of thousands of dollars, sometimes more.

Yes, Revit users can save or cost the project literally millions of dollars depending on their modeling chops (architectural, construction, BIM chops are other topics ;)

Conversely, users can keep much of this waste from happening in many, if not most cases. How? Become an expert at the tools and processes used day-to-day... all of them.

- Becoming an Expert | A How-To
- Perfect Practice makes Perfection¹
- Automate Repetitive Actions²
- Learn 3 to 10+ (in-your-software) things a day³
- Research and study something new for 1-3 hours a day
- Research and study something already known to a deeper level for 1-3 hours a day
- Teach others what you learn
- Shampoo, Rinse, Repeat...

Look out for more in the future on "Navigating the Hard and Soft Costs of AEC" by following @JayZallan on the tweeties machine too.

¹ FWIW, I disagree with M. Gladwell who proffers that 10,000 hours of practice creates expertise, but practicing badly creates failure. I do agree, though, with the idea that 10,000+ (note the plus) hours of perfect practice creates true success. Ask any top athlete, musician, scientist, machinist, etc.

² See Footnote #3, then develop efficiency generators with Dynamo, Python, etc. ;)

³ I was going to write this as a "How-To Modify Shortcuts for Maximum Personal Efficiency" article but after the throat-clearing and finally the guidance above you may want to choose another subject to explore. If you do want to customize shortcuts: GoTo File>Options, then click the "Keyboard Shortcuts: Customize..." button, as shown in Figure 1 ;)

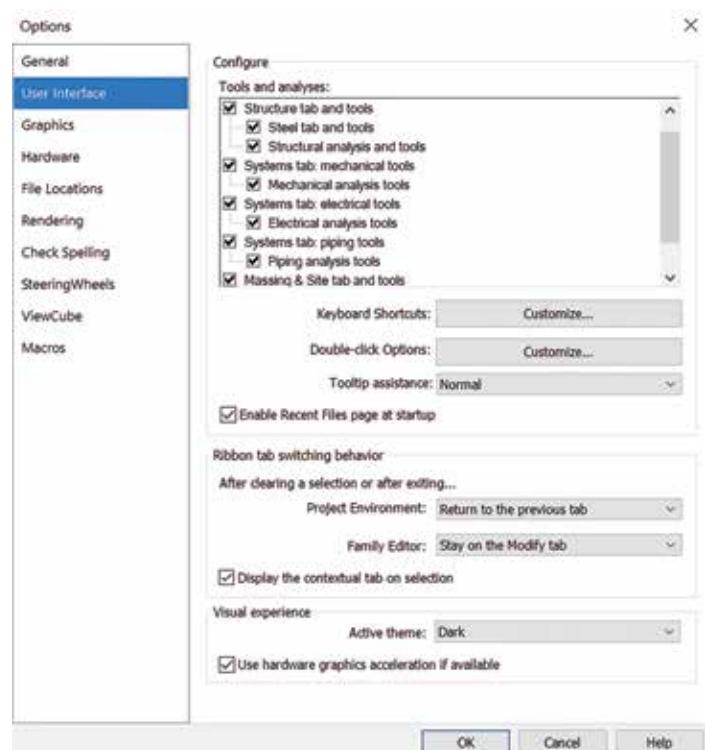


Figure 1



Learn. Always. Push. Change. Inspire.
Art - Architecture - Technology - Creativity

With over 20 years of Architectural experience Jay B. Zallan enjoys a varied and diverse portfolio spanning high-end custom residential design, large mixed-use developments, major transportation and infrastructure projects through most every large-scale project type. President of LARUG (Los Angeles Revit Users Group) and an Autodesk Implementation Certified Expert (ICE), Jay combines unique insights into the creative and business process of AECO with proven management, creativity, and project generating strategies. Enabling, empowering, and inspiring teams to realize their own dreams and potentials beyond limitations (whether real or perceived).

If Revit is your software, make this your hardware.

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Intel® Core™ i7-8086K
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workflows and increase productivity for architects,
engineers, and BIM managers like you.



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