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The Official Publication of Autodesk User Group International

March 2017

Tips & Tricks for

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- Revit
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and More

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Cover image:
Dulles Airport Main Terminal
2016- Blair Hanuschak

Letter from the President



As you read this, spring is beginning to arrive for us in the northern hemisphere. The changing seasons can be an excuse for some “spring cleaning”—dusting off some old skills, organizing a closet or two, and maybe even conducting the equivalent of an archaeological dig to uncover the surface of your desk again.

One of the side benefits of spring cleaning is that you rediscover items you didn’t even know you still had. (“So *that’s* where that went...”) Sometimes those items should head for the recycle bin, but sometimes you’re really glad to find them again, either because you can use them or because you know someone else who can.

For me, tips and tricks can be a lot like those surprise finds from spring cleaning. Maybe you knew them once upon a time, but you haven’t needed them for a while and forgot about them. And now that you’ve found them again, you know exactly how to put them to use.

Autodesk software products have some amazingly powerful—and complicated—features. There’s a reason that there have been entire AU sessions dedicated to AutoCAD® Tool Palettes for the last 12 years. But tips and tricks are some of my favorite things to collect and share with people. (As I keep writing these letters to you, please don’t count how many things I call my “favorites.” What can I say? When you’re enthusiastic about a topic, you have a lot of favorites.)

I think one of the reasons I like tips and tricks so much is that they’re often focused around usability. Many of them fall into what I call the “small but significant” category: little things that don’t take long to understand or master, but can have a big effect on the way you interact with your software.

Keyboard shortcuts are a great example of this. They’re available in all the flagship Autodesk products, and many of them can be customized to fit your preferences and workflow. Are you one of the people (like me) who immediately changes a new AutoCAD installation to use “C” for “COPY” instead of “CIRCLE”? If you are, check with your neighbor to see if she is, too. Compare notes on your favorite shortcuts. Who knows, you might discover some new ones to adopt for yourself!

(True story: I knew someone who refused to learn keyboard shortcuts. He wouldn’t type “L,” but instead always used “LINE.” It was weird to watch, but I guess it worked for him!)

That kind of sharing is when the true power of a tip or trick comes into play. You never know what the person sitting next to you hasn’t heard before. It’s like the old TV tagline: “If you haven’t seen it, it’s new to you!” A tip that is old hat to you might be the best thing your cubicle mate has heard all day.

I will close this month with some news from the Board of Directors. In January, Phil Russo stepped down as a director, and Robert Green and Chris Linder were elected as Treasurer and Secretary, respectively. We wish Phil all the best in his future endeavors, and welcome Robert and Chris to their new roles.

Got a tip to share? Tweet it to us! We’re @AUGI, of course.

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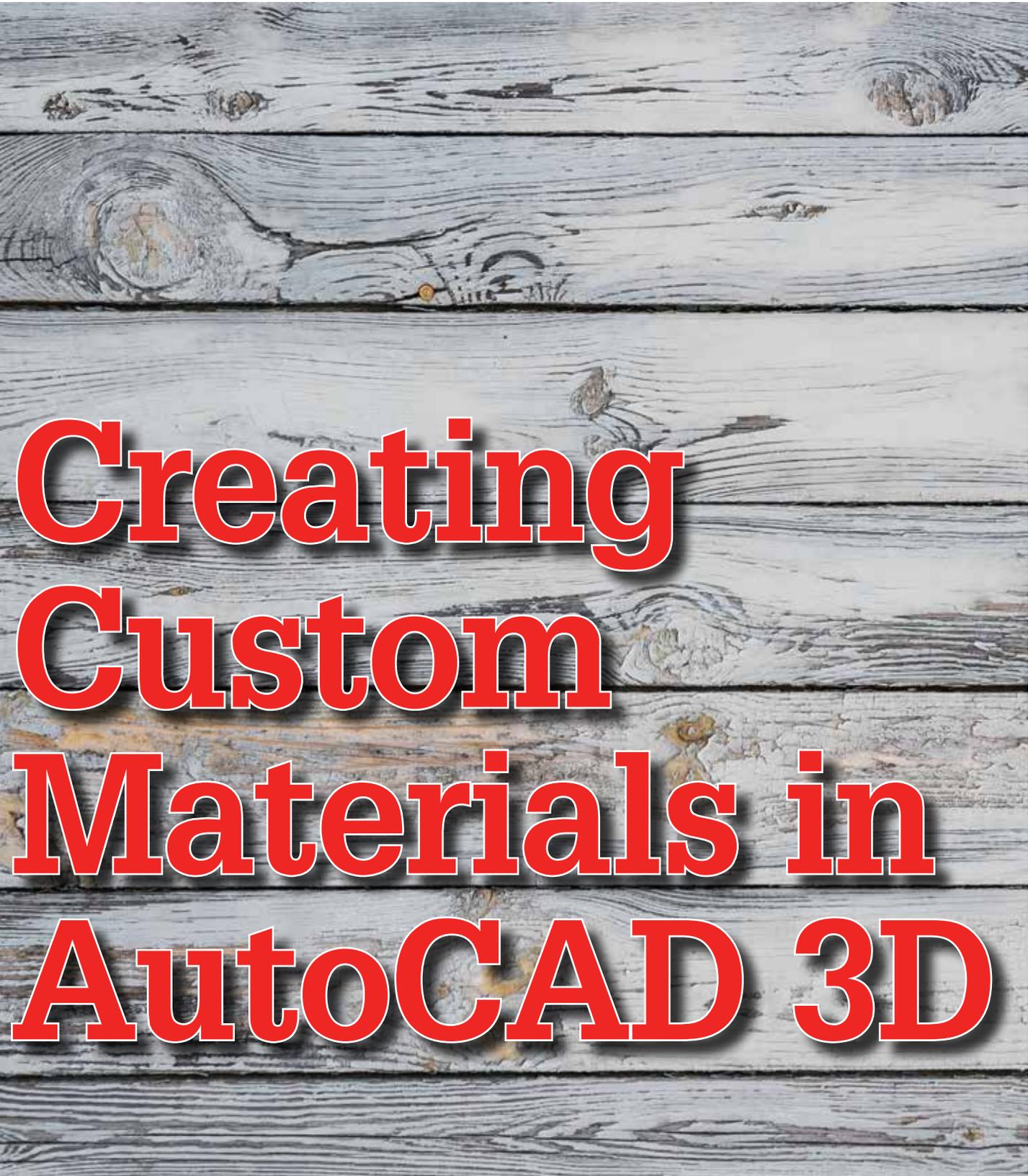
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Creating Custom Materials in AutoCAD 3D

 AutoCAD® has a large library of materials, but you can create your own custom material or import materials from other drawings. If you have a specific material requirement with specific properties, then you can create a custom material.

In this article, I will demonstrate by making three different types of materials with totally different properties. Let's start with a wood type material.

WOOD TYPE MATERIAL

To make this material I will use the texture image as shown in Figure 1. You can use your own texture as well.



Figure 1: Wood texture

Type `RMAT` on the command line and press `Enter` to open the Materials Browser palette. Select the Global material from the Document Materials panel and name it Wood. Double-click on this Wood material to open the Materials Editor palette.

From the Generic tab, click on the Image panel and select the Wood texture. Again double-click on the Image panel of the Materials Editor palette to open the Texture Editor palette. Locate the Scale panel and set the scale of this texture to 12 inches in both the length and width fields. Select `Tile` from the Horizontal and Vertical fields of the Repeat panel.

Close all open palettes except Materials Browser and make a 3D geometry in the drawing area to test the material. I made a simple cube of 8 inches along length, width, and height. To see the effect of this material, change the Visual Style to Realistic. Now drag and drop the material from the Materials Browser palette to the object in the drawing area. After applying the wood material, the object will look like the image shown in Figure 2.

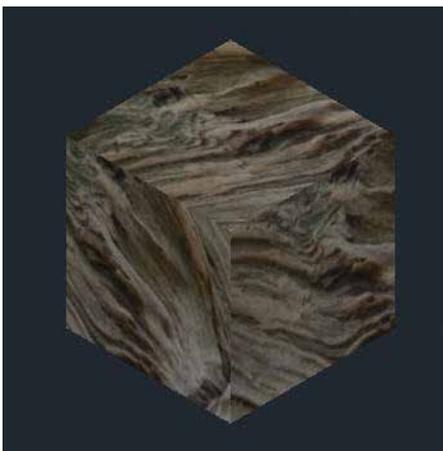


Figure 2: Material with wood texture applied on an object

TRANSLUCENT GLASS

In the next example, I will make a simple translucent glass type material, generally seen in window panes and curtain walls. To make this material, make another copy of Global material from the Document Materials panel of the Materials Browser palette. Name it Glass.

Double-click on the Glass material to open the Materials Editor palette and click on the Color field from the Generic panel. Select a color from the color swatch—I have selected 170 index color for the material. Also change the Glossiness value to 100 from the Generic panel.

Click on the Transparency check box in the Materials Editor window to make its options active. Change the Transparency value to 40 and Translucency to 70. You can also experiment with slightly dissimilar values of transparency and translucency. Also, select Glass from the Refraction drop-down menu.

Click on the Tint check box to make its options active. Select index color 252 for the tint and close the Materials Editor window. Now drag and drop this material on a 3D solid. The final object after applying material looks like the image shown in Figure 3.

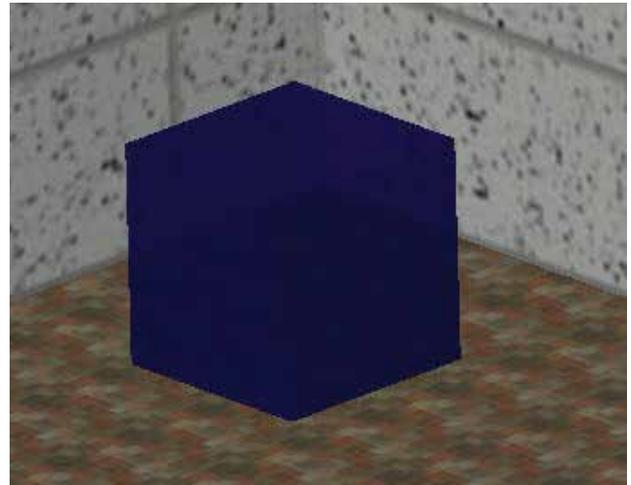


Figure 3: Translucent glass material applied on an object

TREE WITH MATERIAL MAP

You can also make a material in AutoCAD that looks like a real-life object such as a tree, person, or vehicle using Material Mapping. To use the material map, you need to use an image with a white background and its alpha or opacity map, which is the black and white part of the image. In the alpha, the black part represents transparent while the white part represents opaque portions of the image. For our example, I am using image and alpha as shown in Figure 4.



Figure 4: Image and its alpha used for creating tree material

Start with duplicating the Global material and name it Tree. Now double-click on Tree Material from the Document Materials panel and expand the Generic tab.

Click on the image box and select the tree image with the white background. For my example, I have selected an image that is 10 inches in length and width. Double-click on the image in the Materials Editor palette and expand the Scale panel in the Texture Editor palette. Set the scale to 10 inches in width and height and select None in the Horizontal and Vertical fields of the Repeat panel.

Click on the Cutouts check box of the Materials Editor palette (Figure 5) and select Tree Opacity Map. Here, also change the sample size to 10 inches in height and width in the Scale field. Select None in the Horizontal and Vertical fields of the Repeat panel.

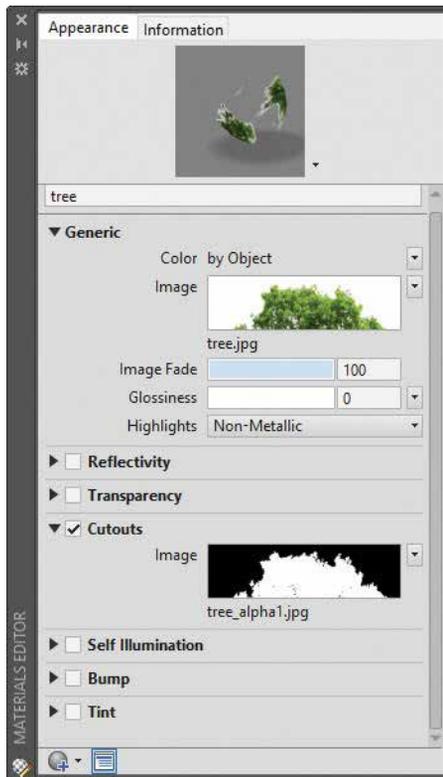


Figure 5: Materials Editor palette

Close all open palettes except Materials Browser and make a rectangular surface that is 10 inches in length and width. Drag and drop the tree material on this surface and change the Visual Style to Realistic if it is not already selected.

After applying the material, the tree looked like the image shown in Figure 6. In renderings, the shadow of the tree will also take the shape of the visible portion of the image and it will appear realistic.



Figure 6: Rendering with tree material

CONCLUSION

Apart from these three materials, you can also make other type of materials with very different properties such as an illuminating material that can be used as a light source. In addition to making the materials, you can export them to other drawings. To export the material, copy any object on which the material is applied to the drawing and the material will also be copied to it. Make sure you also transfer the images used for creating these materials, keeping these images in the same folder that contains the drawing.



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Maintaining Your Environment



My car hit 75,000 miles recently and the “maintenance required” light came on. That means that I need to do some regular maintenance. Changing the oil, checking brake fluid levels, and rotating the tires may just be the things needed to keep my transportation needs met. Regular maintenance will keep a car running a long time. I do regular maintenance on my car pretty judiciously now. It was not always that way. I have in the past run my cars dry, not only on gas, but also oil and other fluids. Letting things go without paying attention caused me some major problems.

So what about a CAD/BIM environment? Are there regular things that need to be done so that things run well? Do things just hum without you watching? Has it been a while since you have looked over the systems, processes, and procedures you have in place? Maybe a maintenance schedule is something you keep in your head. Maybe it is written down. Maybe you check things only when they break. Here are a few things you might want to look into systematically and on a regular basis.

MAINTAIN YOUR FILES

Just about all of the Autodesk products have an Audit command or something similar. AutoCAD® has it and it can actually be run on multiple files called Batch Standards Checker. The Audit commands will clean up or notify you about issues. By regularly checking on the problems that can come with rapid design changes and multiple users interacting with the files and models, you can avoid some derailments in the future.

Don't overlook the obvious tools like Purge, Overkill, Recover, and many-third party tools such as SmartPurger at JTB World.

MAINTAIN YOUR SERVER

Go through and archive old files that are no longer used. Archive projects when they are no longer needed. This may be delayed until after construction is completed, so they may hang around a long time. Get rid of unneeded backups. People often copy files at milestones so they can go back if needed. These clutter up the server and project folders if they are not removed.

MAINTAIN THE STANDARD LIBRARIES AND FAMILIES

Many libraries and families are filled with very good blocks, templates, and files that improve your operations. Others may have leftover clutter. When people are testing things they may have older versions or variations. Clean off all of the iterations and keep only the production-approved one. Don't let the wrong component be used in your files. When you find bad ones, get rid of them.

DO SOME MAINTENANCE ON YOUR STANDARD

If you have not reviewed your standard in a while, put it on your to-do list. You need to review it and remove/adjust items that are not used, ones that don't make sense any longer, and those that are outdated. I am not talking about major changes—wholesale changes in the standards require planning and management beyond a quick fix. While you are doing some cleanup, check to see if people are actually using the standard. Open a few random files and look around. See what you find. Don't ignore those little deviations—address them.

MAINTAIN YOUR BACKUPS

Check on the backups. Are they working well? Are they stable? Restore something from backup just to prove that they still work as expected. Upgrade as needed. Catalog data in the backups so you can easily find it. Always keep your backups at the front of your mind.

MAINTAIN YOUR TRAINING EFFORTS

Don't forget to train those who are using your systems. This may be the most important and most neglected area of oversight a Tech Manager has. Train users in new tools, upgrades, and system use. Train new hires in the way your firm does things. Don't let them bring in other methods that might degrade your environment. Tap into new hires for good ideas, but train out the ones you do not approve of. Train management in the reasons for your approach to tech. Keep them on your side by giving updates and reminders about the importance of standards and project methods.

MAINTAIN YOUR CONTRACTS AND AGREEMENTS

Software agreements need to be reviewed from time to time so you are not caught flat when renewal times come up. Check to see if your seat count is correct. Adjust if possible for downturns in project loads and expand as needed for increases in staffing. When renewals come around, seek small additions such as training or extra tools that a vendor might make available free or for lower costs. If your vendor is invoicing you monthly for services, review the billing. There are many ways for errors to get into billing or for you to pay for services you are not receiving.

MAINTAIN YOUR WORK ENVIRONMENT

I am not talking about tech tools now—I am talking about your office and your general office area. Tech staff can generate a lot of mess during a project. It might be hardware, parts, and cables scattered about. It might be project paperwork. It might be empty boxes and packing materials. Whatever it is—clean it up when you are done. When a project is finished, clean up. When new hardware is installed, define what you will do with the old stuff and move it out. When you are leaving for the weekend, straighten things up. I have a flurry of paperwork, cables, hardware, and other items on my desk and floor while I am rolling out new tools. I try to clean it up on a regular basis or it would soon get out of control.

MAINTAIN YOUR RELATIONSHIPS

Finally, do not forget to work on your relationships. People make the biggest impact on the productivity of your firm. Keep them

SUGGESTIONS FROM THE AUTODESK KNOWLEDGE BASE REGARDING AUDITING FILES IN REVIT:

To best execute Revit file maintenance, please use the outlined steps below.

1. Periodically open the file with Audit selected (if the file is work-shared, select Audit and Detach from Central).
2. Purge unused.
3. Review and resolve warnings (as many as possible). Excessive warnings can increase file size and greatly impact performance.
4. Save the file with Compact selected (if saving over the same file). If this is a work-shared file, it's recommended that you archive the original central file and its backup folder before saving in the same location with the same name.
5. Save the file with a new name—Compact will automatically be selected and this will compact the file further than just selecting Compact.

happy and they produce more. Make sure you are talking to others on a regular basis. Walk around and make eye contact. Stop and chat with users and managers. Some key people may get on your calendar by you setting up regular meetings. Fifteen to twenty minutes every week or so can make great progress in your efforts to move technology forward. Make sure you connect with your boss and don't forget the vendors. Keep the conversations going with all of them.



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.

Revit Hunting Season



It is often asked, “How can I learn Revit®?”
 That question freaks me out. Has no one ever gone to school, read a book, or attended lectures?

“But I want ‘hot tips,’ secrets...”

Oh, you want “The Magic Wand” method of learning (LOL).

Well, there are no “secrets”—just undiscovered possibilities. But because this issue of *AUGIWorld* focuses on Tips & Tricks, I will indulge you a tip and offer you a challenge.

Before the challenge, let’s look at a super (IMO) button that since its introduction made me think it would be in 99 percent of Reviteurs’ playbooks after about 10 seconds. Seeing that I keep finding the opposite appears to be true, let me present “Section Box” (Figure 1).

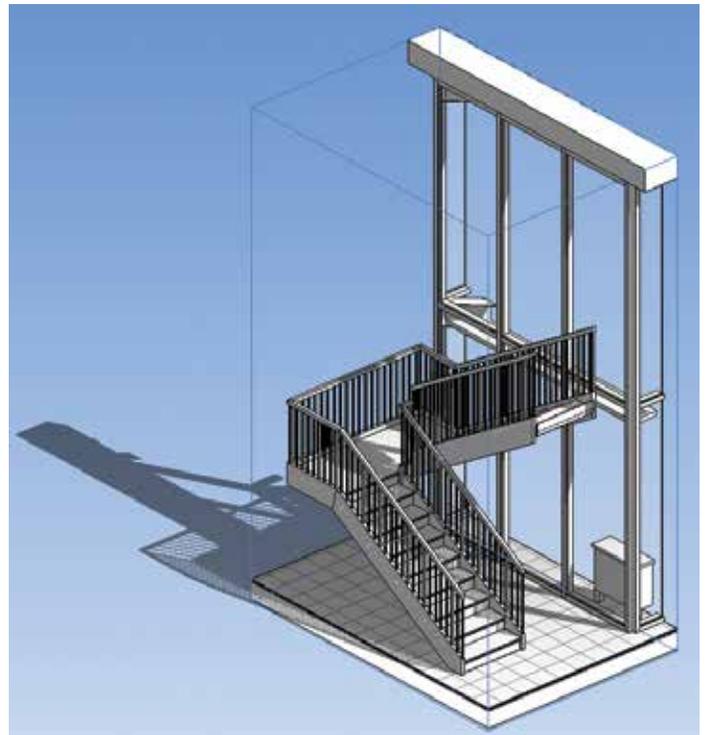


Figure 1: This is an example result. Nothing terribly special until you see the tool in action ;)

Simply select the objects (at least two) that you want to focus on—that you want to create an Isometric View of and look up (see Figure 2).



Figure 2

When you do click the little button, it will turn your default 3D View into a cleanly sectioned Iso, just a bit bigger than your selected objects. Beautiful! Don't forget to immediately rename (etc.) these and all views upon creation: Quality in = Quality out ;).

A year or so ago, for another *AUGIWorld* tips and tricks issue, I wrote about how to find every tip known. That is still in play and I feel holds true, so Google it up.

Rather than force any other tips on you, I will challenge you to find your own. Try to inspire more folks to realize that only those who master their tools can create amazing masterpieces. Are there amazing artists, architects, and engineers who do not keep up with current tools and the expertise in them—both technological and philosophical? If they don't, they have hired others to lead that charge, so by default they do keep up. That said, if you have to get projects executed and you desire to rise above the fold, you have some work to do!

Let's continue with a question:

Do you know every button, flyout, parameter, command, etc. in Revit by heart?

What, what, what? Have you looked? At every one?? If so, you probably don't need to continue with this article. But if you didn't answer, "Yes, every single one," then I say WELCOME! It is an exciting journey you are about to, or perhaps continue to, undertake. Namely, actually learning the tool you spend a predominant part of your day using!

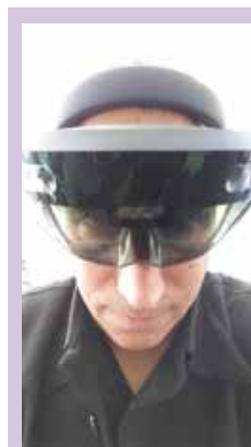
With that in mind, the challenge is that you spend 30 minutes to one hour every work day exploring Revit from the top left to the final item bottom right and everything in between. Open every tiny flyout, whether it points down, to the side, or is buried seven levels deep within a set of dialogs. Start to learn what you don't know you don't know. Don't forget both the standard family, the adaptive family, and massing environments, too. 😊

Do this and then capture and share what you keep learning (yes, all of you!). In a short enough period of time you will find yourself well beyond any currently expected (Revit) greatness.

I guarantee that if, after reading these 500 or so words, you actually take on this advice—as a challenge, a way to learn, a way to teach, or a way to inspire—you will find every command exposed in the Revit environment.

If that isn't enough for you, then you can find there is even more under the hood, exposed using Dynamo and/or the API.

Happy Hunting!

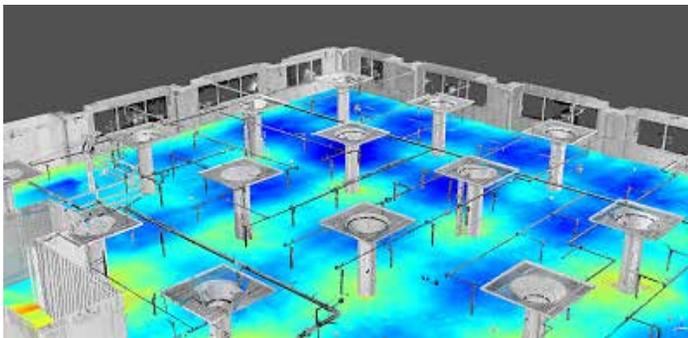


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Cool,
a Point
Cloud...

Now
What?



Let's look at the most basic items to check off the list prior to diving into a point cloud.

CAN THE COMPUTER HANDLE THE DATA?

It may be perplexing to some folks that in 2017, design teams would have insufficient computing horsepower to effectively utilize point cloud data. Unfortunately, project teams are still met with the lack-of-power dilemma. There are many scenarios that can inhibit the use of a 30GB file, including the time and bandwidth needed to transfer large files or improper graphics drivers, which can be troublesome when loading or viewing data.

Municipal employees are usually 2-3 years behind on their computer hardware (and that's being generous). One simply cannot function on a computer with 4GB of RAM and an integrated graphics card when working with point cloud data. All participants loading a point cloud of medium size or larger need some

3D Scanning has become commonplace on many projects, and can save hours of field verification. It can also add layers of complexity, confusion, and frustration if not executed properly on a project. Many people know what 3D scanning is, but not everyone is as versed in working with point clouds downstream. The most basic 3D scanning applications can become counterproductive simply because not everyone understands what the data is, or how to use it for optimal productivity.

horsepower on their desk. Standalone graphics cards are a must. Most use NVIDIA, but if not, the card should support Open Graphics Language (Open GL). Many scanning programs will not open more than one view without an Open GL card on board. Again, this may seem fundamental, but it is a common problem that leads to frustration. Hardware problems can be avoided by checking this item off the list up front.



" I FORESEE TROUBLE AT THE CONSTRUCTION PHASE "

In the event that a hardware upgrade is not feasible, arrangements should be made up-stream for another project participant or consultant to convert the data into an Autodesk model. The use of "Regions" in ReCap will create layers within the point cloud that can then be toggled in Autodesk® Revit®. Less data loaded allows for more fluid movement and far less frustration. Also consider segmenting the project floor by floor to manage file sizes in multi-level projects.

SPEED THINGS UP WITH WORKSETS

For additional control, it is helpful to place each point cloud on its own workset. This enables additional visual and project stability support. When opening the model, the user can specify what worksets (point clouds) should be turned off/on when opening a large model. Revit 2017 and updated 2016 now have the "unload for me" option; however it can still be helpful to manipulate linked models including point clouds via worksets. My favorite is the workset option "visible in all views," helpful if turned off for large, sluggish, linked models.

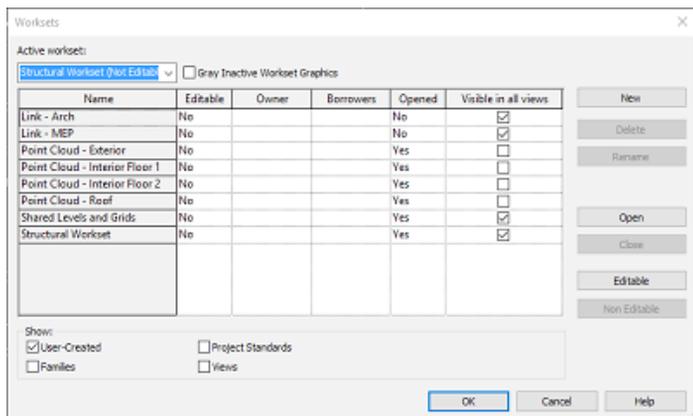


Figure 1: Some of the workset ideas and options available

WHAT COORDINATE SYSTEMS WILL BE USED?

Too often a project is already underway when the need for 3D scanning arises. At this juncture, the point cloud needs to be incorporated into the existing model or vice-versa. This is not a problem if everyone coordinates the scanning effort and has an understanding of what will be delivered. Surveyors and engineers generally dislike the use of 0, 0, 0 coordinate values, which is opposite members of the construction community, who generally prefer a close origin. This task will not be a problem with solid communication across the project team and an agreed-upon solution. Surveyors can use both their coordinate system and the project team's UCS if they know how to utilize and export data on an alternate UCS. Once the model is dragged or rotated into place manually, a valuable benefit of 3D scanning has been lost. Knowing the difference between XYZ and NEZ when communicating with the rest of the team regarding survey control is critical. Again, this may seem basic, but it happens more than one would think. Asking proper questions in this scenario will reduce reworks and ultimately make for a smoother scanning process.

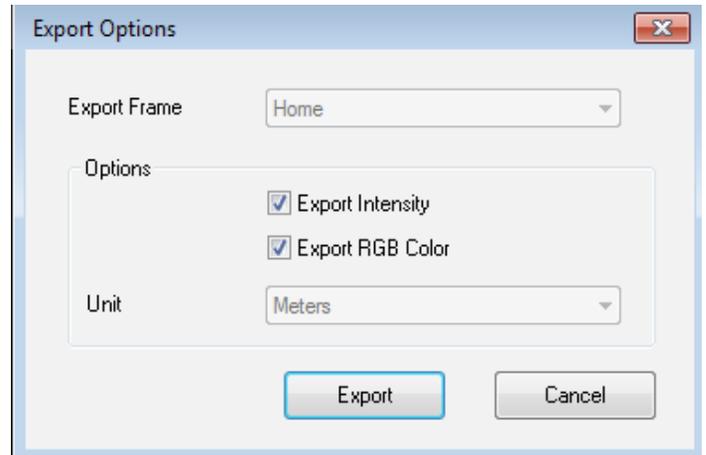


Figure 2: Export image from JB's initial brain dump

WHAT FILE FORMAT WILL BE USED?

Many people may be scratching their heads on this one. It has to be an .rcp or .rcs, correct? The short answer is yes. The data will ultimately need to be in .rcp/.rcs format to be imported / attached in Autodesk products. But where did the data originate? What kind of scanner was used to capture the data? The difference becomes apparent when the ReCap files are created. Point Clouds have properties. These properties include XYZ values, RGB values, intensity values, and last but certainly not least, normal values.

The normal value of a scan point specifies the direction from which that point was captured (this is Adam's favorite view option which often helps differentiate faces of an object). Depending on which file format was converted, some (or multiple) properties may be lost. Different formats may contain some or all of the scan properties. When exporting point cloud data, there is usually an option to include or omit particular properties/attributes. The data is most useful when a point cloud contains all of the properties.

Revit Structure 2017

Often, Autodesk will not snap to a surface without the normal values. Some file formats can be exported both ways. For example, an e57 file can be a single (unified) file of an entire project, or can be individual scan stations. A ReCap project with individual scan stations will provide station-based views in ReCap which are displayed as “Mirror Balls” in the software. Double-click a mirror ball, and a station-based projection opens, which may provide a favorable view of items in that area versus navigating in 3D.

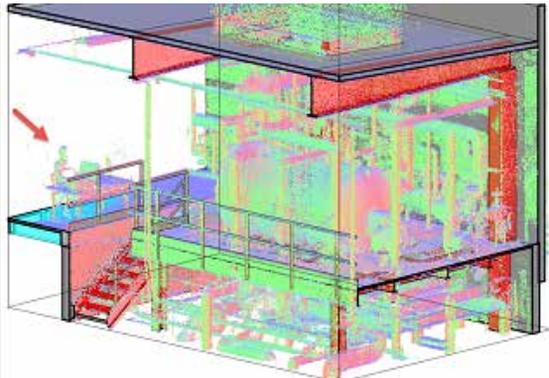


Figure 3: Example of “Normals” point cloud visibility option. Image courtesy of TITAN, AEC

BEFORE YOU START MODELING EXISTING

A few questions to ask: Who will be using this model and what will they be using it for? Can you speak with the folks wanting to use this model or do you have to go through the formal channels? Do you have existing drawings? If existing drawings are not provided, it is highly recommended that they be acquired, preferably as electronic scanned image files. This can save valuable time, especially if you are modeling existing structures (you do not want to be guessing sizes). If other team members are also utilizing the existing drawings, discrepancies and/or findings can be notated on the electronic drawings so that As-Built conditions are documented and shared.

It is highly recommended that trade partners compare “As-Built” / or AutoCAD® DWG / or other Revit Models to the point cloud before AND after modeling for comparison purposes.

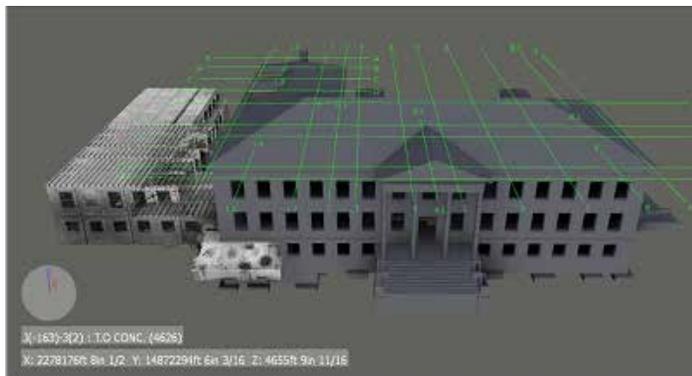


Figure 4: An image of a point cloud that has not been properly coordinated with the model. Don't let this happen to you!

NOW THE POINT CLOUDS, GRIDS AND LEVELS ARE ESTABLISHED IN REVIT

You’ve received signoff from the team... now it is time to rock-n-roll. I was extremely fortunate in that my first experiences with Point Clouds in Revit were with the technical specialists at TITAN AEC <http://www.titanaec.com/>. It is vital to bring on expert consultants early to assure a successful Point Cloud experience.

EXPLORE AND UNDERSTAND VISIBILITY SETTINGS

While working with Point Clouds, it is extremely important to be very conscientious of your view range. Rotating a section 90 degrees in elevation so that it is looking down creates a section that mimics a plan view. The location of a section cut or its view range can now be quickly adjusted.

A view can be set to wireframe and structural elements assigned a solid fill color with a 33 percent transparency. Play with these settings to improve the point clouds visibility as you’re modeling.

Strategically placed and named section views can save tons of time. A view along a beam line may be named with the associated gridline such as: LVL03-GRIDB. A section with a view range extending just shy of one gridline to another may be named: LVL02-GRID3-4 or something of the sort—plan your work and work your plan.

LEARN A LITTLE ABOUT ‘GEOMETRIC DIMENSIONING AND TOLERANCING’ (GD&T)

“There is no such thing as perfection.” “Nothing is built perfect.” “Perfect 90 degree angles do not exist.” Sound familiar? These words of wisdom are passed down from mentors to students all over the world. It helps to learn a little MIL/ASME/ANSI Drafting Standards, such as my favorite: Y14.5 GD&T. As construction becomes more “fab” based, the AEC industry will start to see more metric design drawings and/or callouts. Understanding designs in metric with GD&T can help document and explain these construction tolerances.

FLOORS ARE NOT FLAT, WALLS NOT PARALLEL AND SLIGHTLY LEANING. WHAT DO I DO NOW?

Upon close inspection, Revit levels will look off a smidge from the point clouds in some areas. As you explore the point cloud, you may notice walls are not parallel to each other that should be, or walls not perfectly perpendicular to the floor. Depending on the

material type and age of the building, these anomalies may be better or worse depending on multiple conditions. Building elements expand and contract with temperature variations. While thermal movements will influence the position of building elements, their actual as-built location, including flatness and inclination are more likely a function of construction tolerances.

Serious doubts will be cast on the accuracy of point clouds, including but not limited to the good ol' tape measure check comparison from the field (another reason to understand what the Revit model will be used for and have open communication with team members). If your team decides to go beyond "design intent," some decisions will have to be made to deal with critical construction tolerances. Are we only trying to coordinate new MEP with existing structure? Are we tight for ceiling space and trying to squeeze mechanical ducts below an existing sagging slab and above a future dropped ceiling? Are we scanning the slab to check for floor flatness or level?

The question may come: "Why is it when we compare our dimensions from the field tape measure to your Revit model generated from a point cloud, the dimensions are off 3/4?" Using the dimension tool in ReCap and snapping dimensions in various places along parallel walls will result in many dimensional differences depending on whether measurements are taken on the ground, waist high, or above your head. Is this measurement snapped from the middle of the wall, near one end or the other? All snapped dimensions are going to be off slightly from each other. Nothing is perfect, straight, parallel, or exact.

WHAT DOES YOUR CONTRACT SPECIFY?

If the project you are helping with has a BIM Execution Plan, review and learn the model progression specifications, if necessary. All team members should have access to the point cloud when comparing to the Revit Structural model. All design teams and trade partners should have the same access and ability to turn on those point clouds to check critical field conditions visible from the point cloud that should be addressed and/or reviewed.

HOW DO WE WANT TO ADDRESS DEFLECTION?

Revit does not easily model a sagging beam or a deflecting slab (although that would be a fun adaptive family to make analytically correct with an engineer). Columns may twist and walls may be skewed that are supposed to be parallel. These are all red flags to share with your structural engineer team ASAP. Depending on various circumstances, the team may want to start identifying areas that exceed anticipated deflections.

By creating a search parameter that looks within the "comments" family instances to contain the word "verify" or "deflection," findings can be scheduled, tagged, and quickly shared by also using a

view filter and view template. For example, highlight extreme deflecting beams red and use blue for questions. This can greatly cut down time spent creating 2D Plans with associated 3D views to help tell the story.

HOW CAN THE POINT CLOUD SAVE THE MOST TIME AND MONEY?

Most likely, whoever purchased the point cloud already has specific items in mind. This question really depends on whom you're asking, and when the data was captured. The entire design and construction team can benefit from aligned point clouds that are coordinated, delivered early and also at strategic times during construction.



Figure 5: Good example of Point Cloud Integration. Image courtesy of TITAN, AEC

Communication is the key to successful BIM. Don't be too afraid to ask questions!



Jordan Banning is a Principal at CSDS Inc., a California-based Engineering & Construction Supply firm that provides a wide range of technology products and services to the AEC Industry. Jordan has 15 years of experience in the construction and geomatics industry and has consulted on numerous projects ranging from civil to vertical construction and engineering. Jordan has a B.S in Business Management from CSU Sacramento.



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Most Buildings Sit On The Ground



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by Robert Green

Remote Graphics Software (RGS) for CAD Environments



Examples of remote graphics technology surround us every day: But even as these technologies have become more used by the masses they have inherent problems that include: Limited graphics resolutions, sluggish browser based performance and restrictive operating system requirements. If you've ever tried to control a high-resolution Windows/Intel®

CAD workstation via one of these tools I don't have to tell you how annoying these limitations can be.

As the need for remote access to CAD workstations becomes more common it becomes clear that a better remote access solution is required. That solution is available in HP's Remote Graphics Software 7.3. Let's see how this tool can make remote CAD a reality for your organization - even if you don't own HP Workstations.

RGS PERFORMANCE

HP's Remote Graphics Software 7.3 (RGS hereafter) is a software solution – not a browser based tool - that installs a full featured sender application on a host machine (usually a high-power workstation) and a free receiver application that can be installed on a laptop, tablet or Mac device. The RGS receiver then remotely accesses the sending machine using mouse/keyboard or touchscreen gestures native to the remote device.

HP RGS utilizes a custom audio/video driver to compress/decompress the screen pixel and sound data moving between the sender and receiver software modules to an extremely high degree. The proprietary compression in the sending module leverages Intel® Professional Graphics and/or third party graphics processor equipped workstations to make even 4K video streams perform at an "as if you were there" speed. HP's RGS works great over a Local Area Network or WANs to share content both in the office or at remote sites. With RGS enabled, activities like 3D design/visualization in Revit or Inventor track at 4K resolutions without noticeable lag or video degradation – in sharp contrast to most browser based screen sharing tools.

Now that you understand the performance HP RGS brings to remote access, let's move on to discuss how you can use RGS to support a variety of non-standard workflows to get more performance from your Intel® equipped HP Workstations.

SHARING HIGH POWER WORKSTATIONS

One of the greatest uses of RGS in Autodesk environments is to enable sharing of truly high power workstations - like the Intel® Xeon® equipped HP Z840 Workstation – to run high-powered video rendering or stress analysis software far beyond their own workstation's capabilities. Whether the user is at a remote location or just around the corner, they won't have to interrupt their normal workflow to use the shared machine – they simply open RGS and work as if they were there.

Put simply, RGS allows you to place your expensive high performance workstations and software in the highest traffic location for local usage while letting remote workers use RGS to derive the same benefits on their lower power workstation. In short, RGS allows your company to achieve maximum usage on their high-end workstation investments thus giving them the best return on investment possible.

Access HP's most powerful workstation

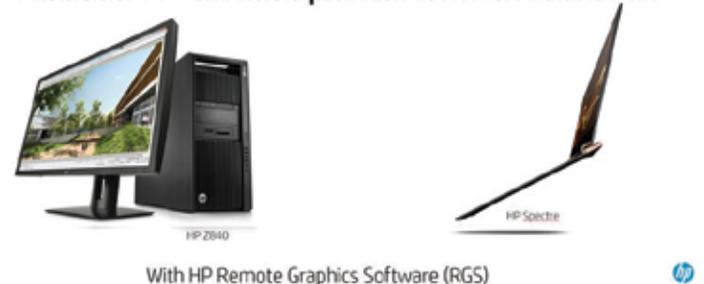


Figure 1 - Ultralight mobile access to high-power Desktop Workstations is a common RGS workflow.

OS/HARDWARE AGNOSTIC

HP RGS software for CAD environments will typically reside on a high-power Intel® Xeon® based sending workstation but what about the receiving system? RGS supports the following diverse device types via the free receiver module:

- Windows 7/8/10 laptops/tablets
- MacOS workstations/MacBooks
- Redhat® and Suse Linux® workstations

Right away you can see that RGS provides the capability for sender/receiver machines to be on different Windows versions, or entirely different operating systems. RGS now allows you to configure touch based devices like a Windows 10 based mobile workstation to map touch screen gestures to drive your Windows 7 based CAD system's zooming, panning and visualization commands as hot keys – thus making you far faster on the remote device than if you were forced to use a CAD applications menus and icons for these functions. Mac users will be able to access Windows based machines without concern for operating system limitations or compatibility issues. The possibilities are nearly limitless.

And since multiple RGS receivers can connect to a single sending machine, this agnostic approach to devices can facilitate collaborative team reviews where everyone has a different operating system. Think of HP RGS as the Swiss Army Knife of remote screen sharing.

RESOLUTION AGNOSTIC

Besides having different operating systems and interfaces there is a distinct possibility that the remote/receiving devices used may have differing screen resolutions or number of displays. In this case the receiving RGS software sends its resolution/display status to the sending RGS machine which then switches resolutions automatically. RGS will even remote both displays of a dual display setup so you can fill an entire screen with the CAD design and use the other screen for the CAD software controls or secondary applications.

So even though your high power sending workstation may be set to 4K (3840x2160) you'll still be able to access it with an HD (1920x1080) laptop or lower resolution laptop in the field. If you've ever fumbled with trying to set your screen resolution on another remote access product, you'll appreciate the productivity of this feature immediately.

The HP Workstation Portfolio

HP RGS delivers true workstation experiences from the data center or the cloud.



Figure 2 - Remote access to high-power workstations from virtual or remote/cloud based workers is facilitated via RGS.

VIRTUAL DESKTOP INFRASTRUCTURE

Virtual desktop infrastructure (VDI) is a concept garnering a lot of attention in the CAD world. The idea is to host virtual desktop within a rack mounted virtual machine inside the company's data center while

the user accesses the desktop from a remote location. HP RGS gives virtual machines faster video frame rates and response time thanks to recent optimizations for Intel® Professional Graphics equipped machines. Alternately, using RGS to access virtual machines equipped with third party graphics and Intel® processors allows multiple users to be supported by a single server. Whether the sending machine is an HP Z840 Workstation on your desktop or a virtual device in your data center, your desktop work experience will be transparent using the RGS receiver software.

LICENSING AND COSTS

If you have an HP Workstation, then you already have an RGS sender/receiver license installed. If you are using hardware from another provider, you'll need to install a sender license (\$255 per machine) on any machine that you wish to remote into. You may then download the free receiver module to use on mobile devices like laptops or tablets from the HP RGS web site: www.hp.com/go/rgs

CONSIDER THE (REMOTE) POSSIBILITIES

How could your company better leverage their workstation investments with HP's RGS? How could you unify different devices, operating systems and workflows to better equip your remote users? How can your company achieve better performance over WAN and Internet connections than otherwise possible? You'll only know if you download a 60-day trial copy of RGS 7.3 and try it for yourself.

ABOUT HP

HP helps you stay ahead of the curve with professional desktop and mobile workstations designed for large and complex datasets, dispersed teams, and tight deadlines. HP Z Workstations deliver the innovation, high performance, expandability, and extreme reliability you need to deliver your 3D CAD projects in less time. To learn how to configure a HP Z Workstation, visit the HP and Autodesk page at www.hp.com/go/autodesk.

ABOUT ROBERT GREEN

Robert Green provides CAD management consulting, programming, speaking, and training services for clients throughout the United States, Canada, and Europe. A mechanical engineer by training and alpha CAD user by choice, Robert is also well known for his insightful articles and book, *Expert CAD Management: The Complete Guide*. Reach Robert at rgreen@greenconsulting.com



1. HP RGS sender license is included with all HP Z Workstations and supports Windows and Linux.
2. HP RGS sender licenses is available for purchase for use on solutions other than HP Z Workstations.
3. HP RGS receiver is a free download for Windows, Linux and MacOS.
4. Some features of HP RGS require a onetime activation. This activation requires internet access at the receiver side.

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Tips, Tricks, & Timesavers



SMOOTH LINE DISPLAY

AutoCAD® Architecture 2017 has added a solution to the jagged diagonal lines that you sometimes see in 2D wireframe drawings. The command is `LINESMOOTHING`. This variable can also be found under the Options dialog box, System tab. Click on Graphics Performance and the Graphics Performance dialog box appears. Checking Smooth Line Display removes the jagged lines. If your hardware supports High Quality Geometry, you can select the new “High Quality Geometry” option in the Graphics Performance dialog on the Status bar. Hardware acceleration must be turned on for this to work. Set `LINEFADING` to 1 to automatically fade geometry as you zoom into super-dense drawings. You can control the amount of fading with `LINEFADINGLEVEL`.

START TAB

When you start the program, open a new tab (+) or close the last drawing; a Start Tab is displayed (see Figure 1). Each Start Tab (formerly the New Tab) contains the Create Page and the Learn Page. The Create Page is a quick launch pad to decide what to do. The following sections are displayed on the Create Page:

- Get Started
- Start New Drawing
- Templates
- Open Files
- Open a Project

- Open a Sheet Set
- Explore Sample Drawings
- Recent Documents
- Connect

The Learn page provides access to learning resources such as videos, tips, and other relevant online content or services. For every new content update, a notification badge is displayed at the bottom of the page. It is important to note that if there is no Internet connection, the Learn page is not displayed.

You can use Ctrl+Home or GOTOSTART to get to the Start tab quickly. If you don't want the Start tab to display, set START-MODE to 0.

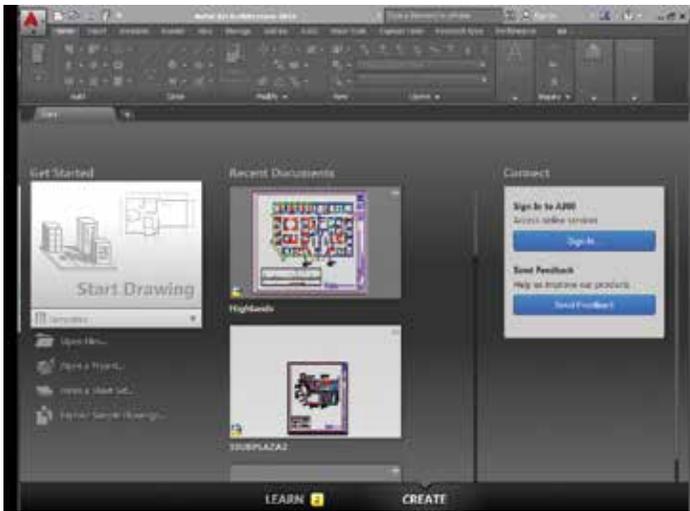


Figure 1: Start tab

STATUS BAR

In AutoCAD Architecture 2017, the status bar can now automatically wrap onto two rows when there are more icons than can fit into a single row. At any given time, the model tab and at least one layout tab is always displayed. You can populate the status bar with the tools you want by clicking on the three stacked lines in the lower-right corner of the editor (see Figure 2). Isolate Objects and Lock UI have been added to the status bar customization menu. The Lock User Interface tool on the status bar enables you to check and uncheck multiple UI elements at one time instead of having to reopen the flyout each time. You can click the icon to enable or disable UI locking. Also, please note that the previous text “Cut Plane:” has been replaced by an icon.

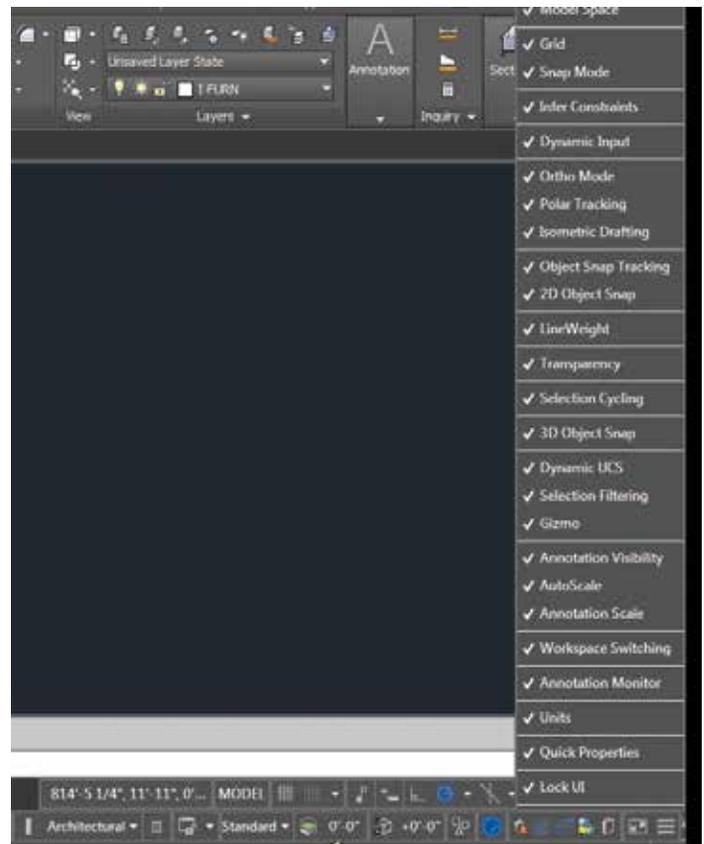


Figure 2: Status bar

ACA REVISION CLOUD

The Revision Cloud tool is enhanced in 2017 to provide more flexibility. It is accessible from the Annotate ribbon panel and includes three methods of creation—Rectangular, Polygonal, and Freehand—in addition to the Command line option to select an object. The last used creation method is remembered the next time the command is run. You can set your own default creation method using the REVCLLOUDCREATEMODE system variable.

Whether you create rectangular, polygonal, freehand, or object revision clouds, editing their size and shape with grips is intuitive and easy. The number of grips displayed for revision clouds has been significantly reduced. The location and behavior of grips is based on the shape of the revision cloud. If you prefer legacy display of grips you can set REVCLLOUDGRIPS to Off. In addition to easier editing with grips, a new Modify option allows you to draw new revision cloud segments and erase selected portions of existing revision clouds (put several revision clouds together).

3D PRINTING

AutoCAD Architecture 2017 has made it easier to send your designs to a 3D printer. Publish, in the Application menu, gives you the option to Send to 3D Print Service. Print, in the Application menu, gives you the option to choose Print Studio. After choosing

AutoCAD Architecture 2017

one of those options, the 3D Print Options dialog box will appear. This dialog box allows you to select objects and control output dimensions. Select OK and you will be asked to save the output file to STL format so that it can be sent to a 3D Print Service. If you choose Print Studio, you will have access to additional tools to aid in prepping your model for printing when sending to your 3D printer. You may be prompted to install Print Studio as it is not installed by default.

LASSO SELECTION FOR OBJECTS

Lasso Selection is a new object selection feature that can be created by clicking, dragging, and releasing the mouse button (see Figure 3). You can now drag from left to right to select all objects that are entirely enclosed in the lasso or drag from right to left to select all objects that are crossed by the lasso. Click Enter. You can deselect objects by pressing shift and then clicking the individual objects or dragging across multiple objects. Press Esc to deselect all objects. It is important to note that when using lasso selection, you can press Spacebar to cycle between the Window, Crossing, and Fence object selection modes.

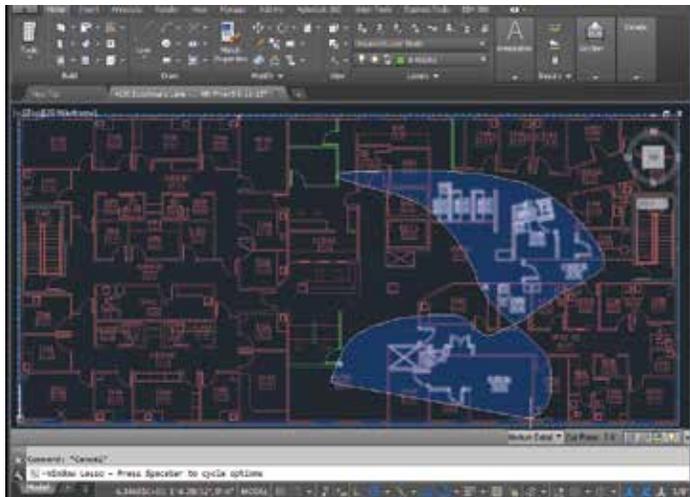


Figure 3: Lasso selection

“SHAPE” KEYWORD

When adding several objects, you will see a new option, “SHape.” The objects this pertains to are walls, curtain walls, railings, slabs, roof slabs, and roof (the option for Roof is “Create Type” because of the existing “Shape” option). With the “SHape” keyword, you can easily create shapes such as Rectangle, Circle, Polygon, and Polyline for these objects. With this enhancement in AutoCAD Architecture 2017 you can draw regular polygon shape boundaries much faster and more accurately. With the Polyline option, you can also add curves in objects that do not support an “Arc” option in the usual Add process. In addition, it is much easier to create tangential curves for objects like walls. When adding a Roof with this option, tracking OSNAP can be used to get precise results.

SHARE DESIGN VIEWS

You can publish design views to a secure, anonymous location within Autodesk A360. You can share views of your design by forwarding a generated link to specified people without releasing the DWG file itself. Access to these views is provided by any supported web browser and does not require recipients to have an Autodesk A360 account or install any additional software. Supported browsers include Chrome, Firefox, and other browsers that support WebGL 3D graphics.

PDF ENHANCEMENTS

AutoCAD Architecture 2017 has improvements for importing geometry, TrueType text, and raster images from a PDF. You can use the PDF Import tool to import geometry from a PDF page into the current drawing as AutoCAD Architecture objects. After selecting a PDF file, you can use the Import PDF dialog box to customize your import. You can choose which page of the PDF file to import and specify scale, rotation, insertion point, type of data to import, etc. If you choose not to apply lineweight properties, AutoCAD Architecture will use the default lineweight.

The PDFIMPORT command offers the option of selecting an attached PDF underlay. This option is found in the contextual PDF underlay ribbon tab. You can specify a polygonal or rectangular boundary around the objects you wish to import or you can choose to import the entire underlay.

When using the Plot tool to create PDF files, you can now choose from four predefined PDF presets, offering a quick way to apply different PDF output options that meet various needs. If you select any PDF pc3 from the Printer/plotter dropdown list, a PDF Options button is displayed, providing convenient access to the PDF Options dialog (see Figure 4). Similar PDF presets and options controls are available when creating PDF files using the Export to PDF and Batch Plot tools.

The Sheet Set Manager has also been updated to support these PDF enhancements. Layout names are automatically displayed as page labels in the PDF file, making it easy to identify sheets when viewing the PDF.

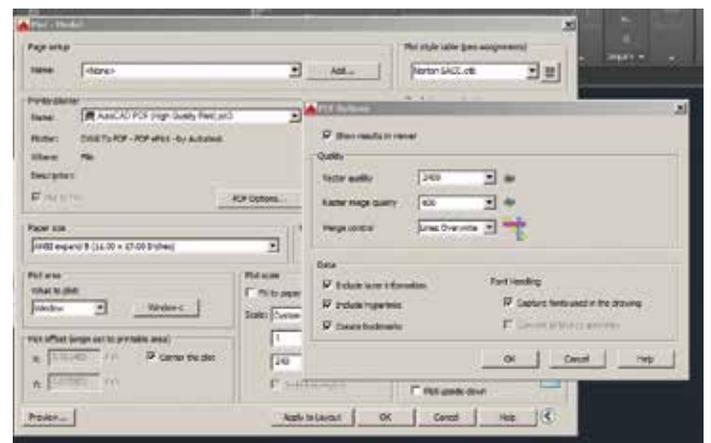


Figure 4: PDF options

TEXT ALIGNMENT AND TEXT EDIT

AutoCAD Architecture 2017 now has a new TEXTALIGN command that allows multiple text objects to be aligned to a base object and provides a preview of the result. After typing TEXTALIGN, the prompt Select text objects to align [alignment Options] is displayed. Select two or more objects to align and press Enter. With this command, you can easily control the spacing or alignment direction.

The TEXTEDIT command has a new “multiple” option that allows you to perform multiple text edits as one time. There is also an Undo option within Multiple mode that allows you to undo Individual text edits. It is important to note that if you leave TEXTEDIT and perform an undo, all of the edits within the TEXTEDIT will be undone.

SMART DIMENSIONS

In AutoCAD Architecture 2017, the updated DIM command is now accessible from the ribbon and is smart enough to detect objects and provide various visual dimension options. The DIMLAYER command can be used to create a new layer for dimensioning. You are given horizontal, vertical, and aligned dimension previews when you select a linear object. From these previews, you can simply place the desired dimension. You can also select another non-parallel linear object to display and place an angular dimension.

You can specify a type of dimension by using the various dimensioning options in the right-click menu. The default values are automatically assumed for the dimension text and angles, but you can still change them from the right-click menu or command line. The DIM command remains active until you exit the command, allowing you to knock out multiple dimensions at one time. You can use the width sizing control to wrap dimension text, which is a great addition!

RENDERING

The new rendering engine in AutoCAD Architecture 2017 is simpler to use and yields better results. The Render ribbon panel on the Render ribbon tab is updated to support the new rendering engine. It includes a size drop-down where you can quickly select from standard pre-defined render sizes (see Figure 5).

The Render Presets list includes additional options enabling you to control the render quality by setting either the number of levels to render or how much time to render. The new Render Presets Manager is much simpler than the previous Render Presets Manager. You can create, modify, and delete custom Render Presets. Specify Render Preset name and description as well as the duration and accuracy. You can render directly from the Render Presets Manager, choosing to render

in the Render Window, the current viewport, or a specified region in the current viewport.

When rendering in the render window, a drop-down list enables you to select from a list of standard render output sizes or choose More Output Settings to access the new Render to Output Settings dialog box. In the Render to Size Output Settings dialog box, you can specify the image size and resolution. You can also choose to automatically save the rendered image to a file including BMP, TGA, TIF, JPEG, and PNG formats.

A new Render Environment & Exposure palette offers powerful new Image Based Lighting (IBL) environments. When the environment control is turned on, you can select from pre-defined, image-based lighting environments, which automatically apply lighting effects. Some of these include 360 background images that emulate a realistic environment as you orbit around the model. The viewport must be in a perspective view and you must render to see the IBL environment.

A control in the Render Environment & Exposure palette enables you to use a custom background image. Custom images are static and do not emulate a realistic 3D environment as you rotate. Additional controls in the Render Environment & Exposure palette enable you to adjust the Exposure and White Balance. The Exposure slides between Bright and Dark. The White Balance slides between Cool and Warm. The new render window displays the current render process and allows you to save a snapshot, zoom in and out while rendering, and print the rendered image. Render history is displayed in the expanded section of the render window.

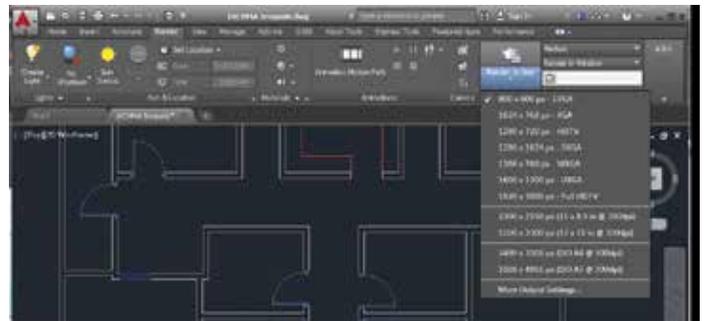


Figure 5: Render to size



Melinda Heavrin is a CAD Coordinator & Facility Planner in Louisville, Kentucky. She has been using AutoCAD Architecture since release 2000. Melinda can be reached for comments and questions at melindaheavrin@windstream.net.

An Approach for Dynamically Linking Erosion and Sediment Control BMPs

Have you ever wanted to automate, or dynamically link, your Erosion and Sediment Control symbology to storm drainage and/or grading design features in AutoCAD® Civil 3D®? By thinking outside the box a little, you will realize that there are quite a few different ways to achieve this. In my experience, I have found that the best approach is to create new label styles that will incorporate specific symbology to these features.

An added benefit to using this approach is that Civil 3D allows you to assign Pay Items to these Labels using Quantity Takeoff (QTO) Manager as well. In this article, I will go over a couple examples of dynamically linking your Erosion and Sediment Control BMPs within your design.

GRAVEL INLET PROTECTION

To avoid massive file sizes and unnecessary downtime, our standard filing practice is to place major design components into separate working files, then data shortcut these components into each file as needed. We set up a separate CAD design model file each for Grading, Drainage, Erosion Control, etc. As we design our storm drainage features in the Drainage model file, we will assign structure styles in that particular file to show up as curb inlets, junction boxes, etc. to depict the structure's true representation. We then data reference these drainage components into our Erosion Control model file and configure a new label style to include a Gravel Inlet Protection 3D block.

Figures 1 and 2 show an example of a simple 3D Gravel Inlet Protection block.

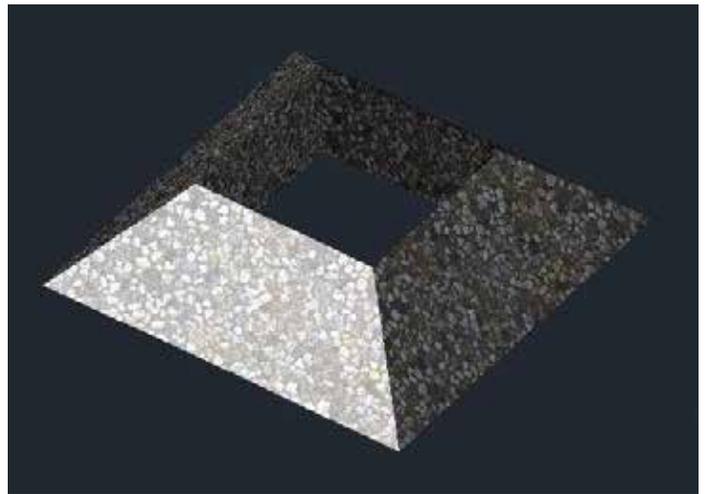


Figure 1

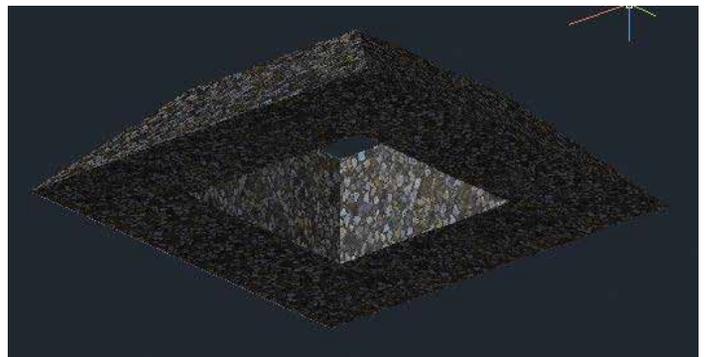


Figure 2

To set up your Civil 3D Structure Label style, you will need to open your Toolspace and go to the Settings tab. Expand the Structure | Label Styles category and create a new Structure Label Style (Figure 3).

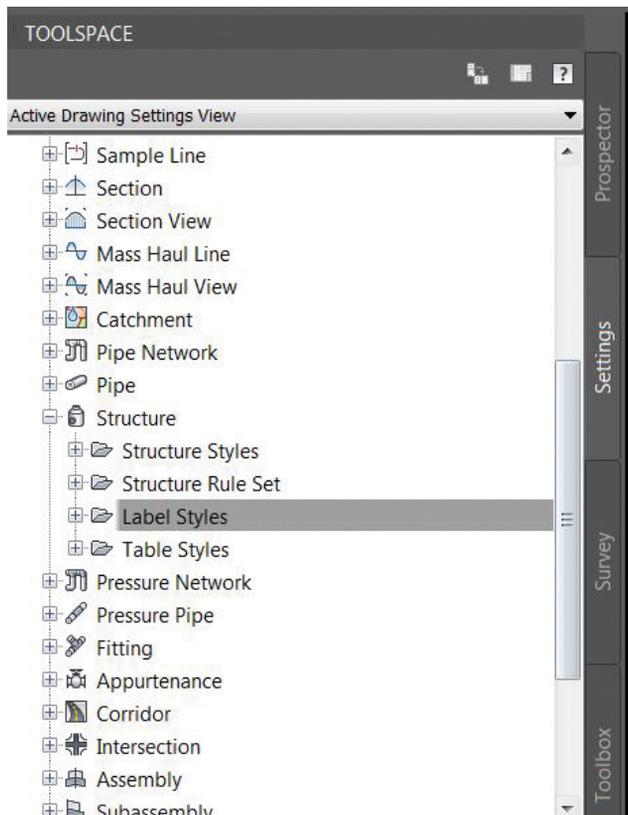


Figure 3

In the Label Style Composer dialog box, go to the General tab and change the Orientation Reference to Object.

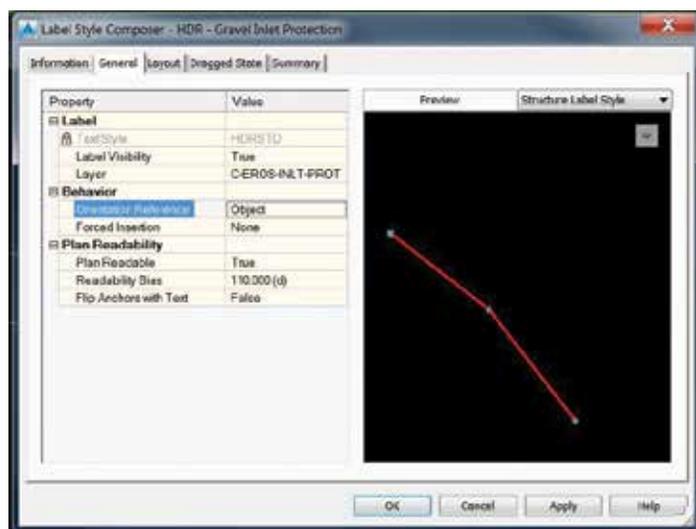


Figure 4

Next, go to the Layout tab and create a Block Component for your Gravel Inlet Protection block.

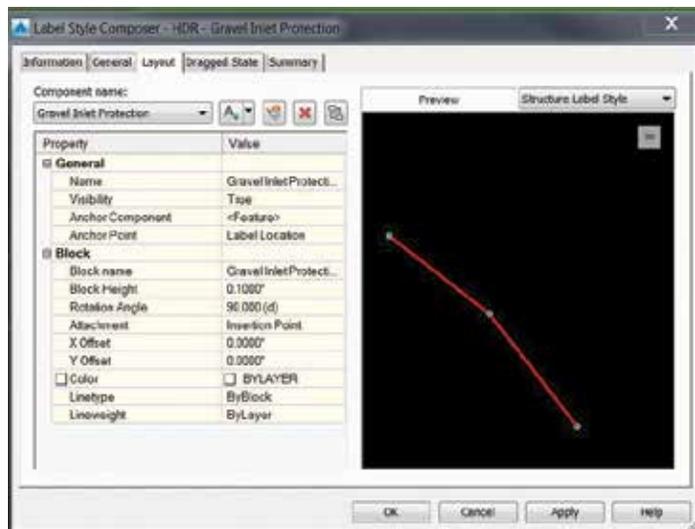


Figure 5

After you have the Structure Label Style set up, go to the Annotate ribbon and Add Label. Change your Feature selection to "Pipe Network," Label Type to "Single Part Plan," and Structure Label Style to your new "Gravel Inlet Protection" label style

The final product should look similar to Figures 6 and 7.

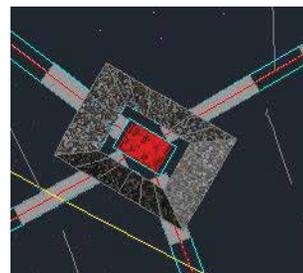


Figure 6

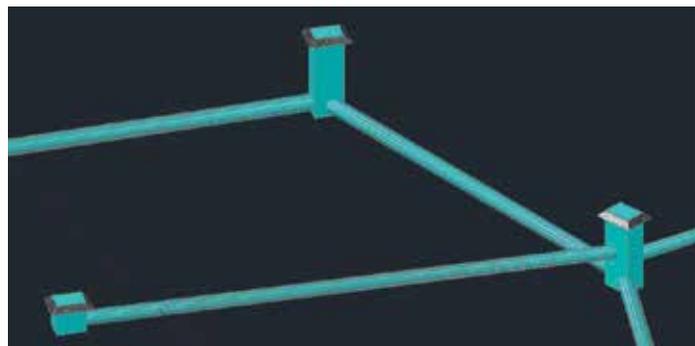


Figure 7

On a side note, you can easily achieve close to similar results by further utilizing the Structure Styles. Once you have your Storm Pipe Network data referenced into your Erosion Control model file, you can set up a new Structure Style where the Gravel Inlet Protection 3D block will appear at each storm drainage structure location in Plan and Profile views. The only drawback to this approach is if you switch to a 3D view, the actual model of the structure will appear in place of the Gravel Inlet Protection 3D block.

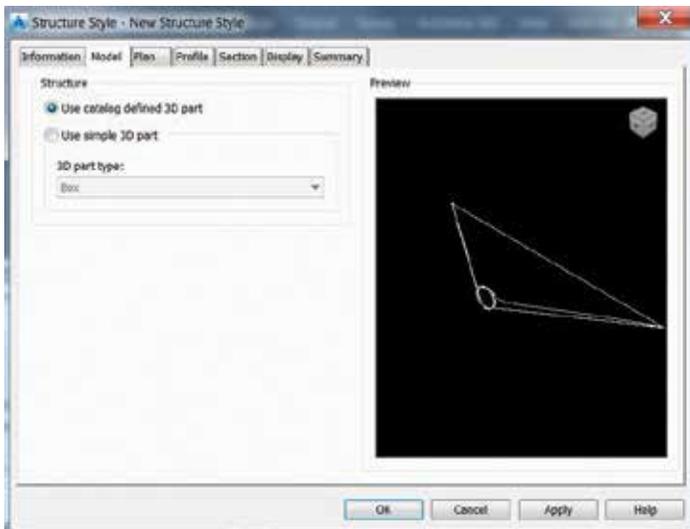


Figure 8

CHECK DAM

This same concept can be applied to grading objects and feature lines as well. Figures 9 and 10 are a 3D view of a Check Dam block.

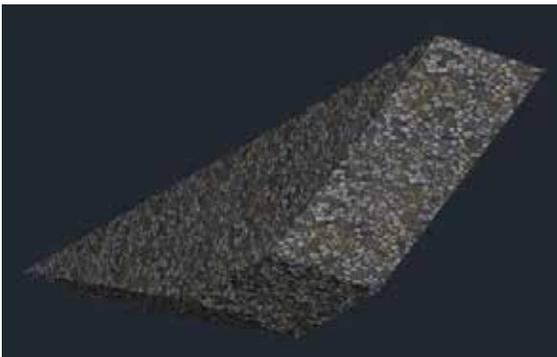


Figure 9

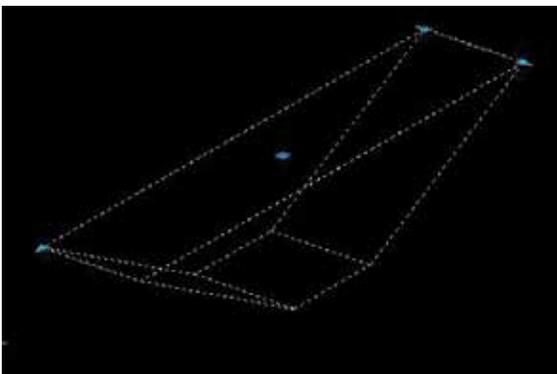


Figure 10

In this example, I will outline the process of applying a 3D Check Dam symbol along a diversion ditch centerline at a specified interval. Once your block is configured to match the top and bottom widths and side slopes of your ditch, the next step is to configure a Civil 3D Style that will incorporate the Check Dam block. In

almost all cases, diversion ditches are being modeled using feature lines to generate the proposed grading surfaces for each phase of Erosion Control needed for your project. We want to use Civil 3D's Feature Line Labels to apply our check dams along the ditch.

To set up your Civil 3D Feature Line Label style, you'll need to open your Toolspace and go to the Settings tab. Expand the General | Label Styles category and create a new Line and Curve label style separately. In the Label Style Composer dialog box, go to the Layout tab and create a block component for your Check Dam 3D element. See Figures 11 and 12.

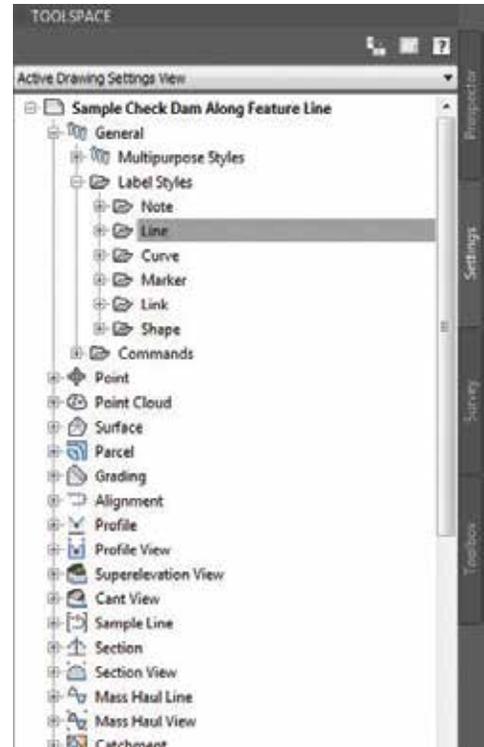


Figure 11

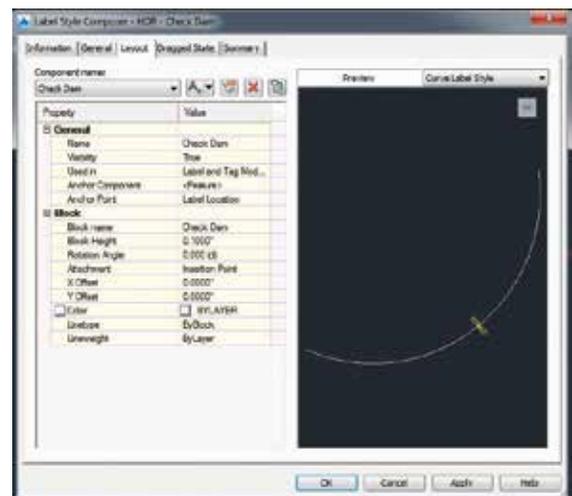


Figure 12

After you have them set up, go to the Annotate ribbon and Add Labels. Change the Feature selection to "Line and Curve" and update the Style selections to your new "Check Dam" label styles.

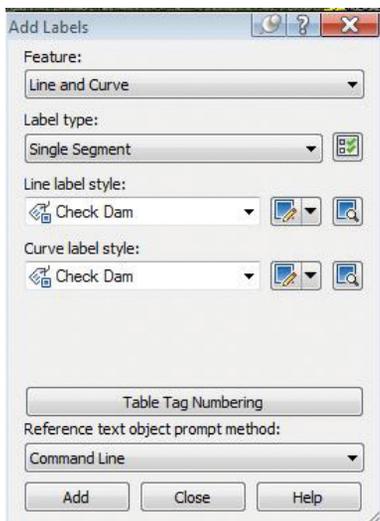


Figure 13

To ensure that you are placing your check dam symbols (labels) at specific intervals, you can use AutoCAD’s Measure command to place points at the required spacing. Once the points are placed, create multiple “Single Segment” labels and adjust the location using grips to be at the same location as the “measured” point.

Theoretically, you can use the same Measure command to place your Check Dam block (instead of points) and it will space it accordingly and locate it vertically as well along your Grading Feature Line. The only downside is that it’s a one-shot deal, so if you modify the Grading Feature Line down the road, the Check Dam symbol will not update its location automatically. You would ultimately have to select all of your symbols, then delete and reinsert.

By using the Label approach, if you modify your diversion ditch centerline in any direction, the Check Dam locations will update automatically, but you will need to re-space your labels as needed. Ultimately, there are benefits and drawbacks to whichever route you choose to go, so you’ll have to make sure that the path you choose obviously has more upside to it. Either approach will ultimately give a final product looking similar to Figures 14 and 15.

By using the Label approach, if you modify your diversion ditch centerline in any direction, the Check Dam locations will update automatically, but you will need to re-space your labels as needed. Ultimately, there are benefits and drawbacks to whichever route you choose to go, so you’ll have to make sure that the path you choose obviously has more upside to it. Either approach will ultimately give a final product looking similar to Figures 14 and 15.

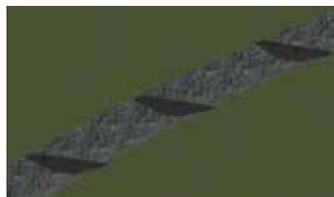


Figure 14



Figure 15

QUANTITY TAKE-OFF (QTO) MANAGER

After you have all your Erosion and Sediment Control BMPs laid out, you can assign pay items to the various labels using QTO Manager. Unfortunately, Civil 3D doesn’t allow you to assign pay items to labels during setup or in your template for automatic and dynamic quantification. However, you can assign them after all your labels are in there fairly easily by isolating your labels using groups, selecting structures through the pipe network vista if you go this route, or even using the SELECTSIMILAR command in Civil 3D.



Figure 16

CONCLUSION

The Label Styles approach of dynamically linking Erosion and Sediment Control BMPs is just one of many that can be applied within Civil 3D. What it all really comes down to is personal preferences and what the final product needs to be. For example, I prefer to go with the Structure and Feature Line Labels approach as the location of the block will always be linked to these components both horizontally and vertically. Furthermore, if I’m already making an effort to set up label styles to be applied to my drainage structures, I might as well do the same for feature lines for consistency purposes.

As we continue to move forward into a complete 3D Dynamic Model world of Civil Design where everything is linked to each other, we can continue to chip away, and toss out, some of those old static 2D ways of drafting and designing.

To learn more and post your thoughts about these topics, please visit (and join!) the Civil Information Modeling (CIM) LinkedIn group: <https://www.linkedin.com/groups/8473326>. Through this forum, members can share pertinent information with regard to CIM processes; provide updates on industry-leading design standards, practices, and techniques; have open discussions; provide tips and tricks; and most importantly, improve our overall quality, efficiency, and consistency across the board.

Post away!

As always, feel free to contact me directly if there’s anything you would like to discuss.



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Tips for Increasing Efficiency



One of the most common questions I get when talking about InfraWorks® 360 is, “How can I do [blank] easier/faster/more efficiently?” I’m going to share a few tips and tricks I’ve learned through trial and error, brainstorming with other users, or after getting fed up with doing the same repetitive task over and over.

ADJUST BUILDING HEIGHTS USING IMAGE DATE

InfraWorks 360’s Model Builder is great for giving you a starting point for your model, but the building heights aren’t always accurate when the data is imported. Sometimes the building heights aren’t even close to what they are in the real world. There’s a relatively easy way of adjusting them so they’re shown closer to their actual height. The key is to use the shadows of the satellite imagery along with the approximate date of the image to set the building height.



Figure 1

Start off by creating a model in InfraWorks 360 with Model Builder. We’ll need the help of the OpenStreetMap’s Bing Imagery Analyzer (Figure 1). Zoom into your project area by entering the address of your project site in the search box in the upper-right hand corner. It will then show you a series of tiles with the date the image was taken (month/year). As you zoom in/out there may be more or tiles available and at different dates.

Set the date in your InfraWorks 360 model to be close to the OSM Imagery Analyzer date. You may need to adjust the time as well to get the shadows of the buildings to line up.



Figure 2

BONUS TIP #1: To make the imagery in the InfraWorks model easier to see, turn off the following surface layers: roads, railways, watermultis, waterareas, waterways, and landuse.

Because Bing Maps' Birds Eye view is limited to just four views (North, South, East, and West) you can't always get a good look at a building. And sometimes the stitched images don't come together nicely.

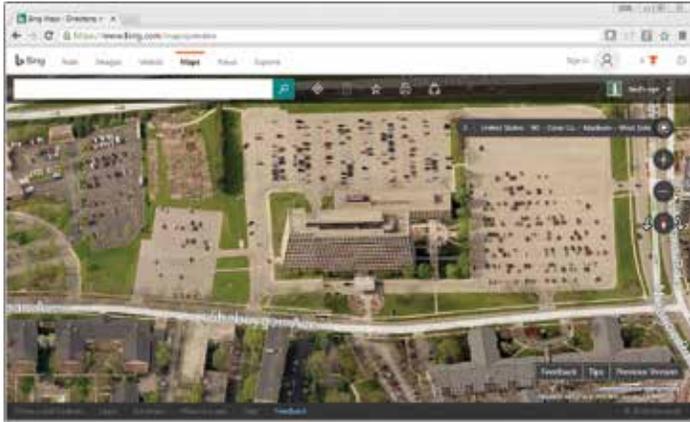


Figure 3

BONUS TIP #2: Use Google Maps' 3D view to verify building shape and roof heights. To view Google Maps in a 3D view, simply switch to the Earth view, hold **SHIFT+LEFT MOUSE BUTTON** and move the mouse. The view will automatically change to a 3D view so you can get a better look at the buildings and surrounding areas.

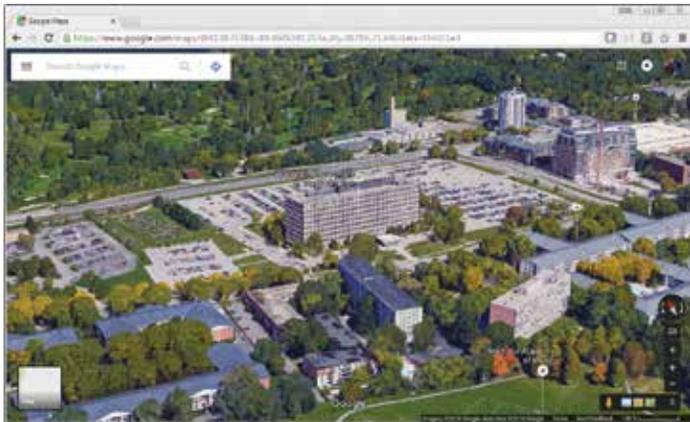


Figure 4

CREATE SNAPSHOTS FROM BOOKMARKS USING JAVASCRIPT

With a few lines of Javascript code you can automate the process of creating snapshots for each bookmark in your model.

To run the code, simply open the **SCRIPTING** editor and copy/paste the code below into the main window, then click the **START SCRIPT** button and the code will iterate through the bookmarks of the current model and create a snapshot for each one. You can modify the length and width of the image and the location of the snapshot to be saved by modifying the variables in the code below. The snapshots that are created have the same name as their corresponding bookmarks.

```
// Some global vars...
// the Active Document
var doc = app.ActiveDocument();
// a variable to hold the list of bookmarks
var bmList = app.ActiveDocument().Bookmarks;
// snapshot width in pixels. change to your preference
var imgWidth = 1920;
// snapshot height in pixels. change to your preference
var imgHeight = 1080;

// Loop through the bookmarks within the model
for (var i=0; i<bmList.length; i++) {
    var bm = bmList[i]; // list of bookmarks
    // Change this path to where you want your snapshots saved
    var strFilePath = "C:\\temp\\";
    //gets the bookmark name
    var bName = (bm.name);
    // appends .JPG to the bookmark name
    var bmName = (bm.name+".jpg");
    // concatenate the string of the path
    // (from above) and the bookmark name with .JPG
    strFilePath = strFilePath + bmName;
    // pass the bookmark's name and concatenated
    // file path/name to the CreateBookmarkSnapshot function
    CreateBookmarkSnapshot (bName, strFilePath);
}

// Create a snapshot of the active bookmark
function CreateBookmarkSnapshot (strBookMarkName, strJPGPath) {
    // activate the bookmark
    doc.MoveToBookmark(strBookMarkName);
    app.CreateSnapshot(strJPGPath, imgWidth, imgHeight);
    // create the snapshot using the defined path and
    // name and width & height variables
}
}
```

And there you have it. A short, simple script to automate the sometimes tedious process of creating snapshots from multiple bookmarks.

CREATE YOUR OWN CUSTOM PROPERTIES

Objects within InfraWorks 360 give you plenty of properties you can use such as **NAME**, **DESCRIPTION**, **CREATION DATE**, **FUNCTION**, **TOOLTIPS**, and more. But what if you wanted to add data for a building such as the year it was renovated, the type of construction, lot numbers, and percent of impervious area? InfraWorks 360 doesn't have properties for that type of data, but using a custom **im.schema.json** file you can create your own properties.

DISCLAIMER: I strongly recommend you create a test model that you can work on to test your **im.schema.json** file before loading it up in a working project, because if you mess up or decide to remove an entry from the json file, your model will contain some leftovers that cannot easily be removed.

InfraWorks 360

The categories within InfraWorks 360 for which you can create custom properties are as follows:

- ✦ BARRIERS
- ✦ BUILDINGS
- ✦ CITY_FURNITURE
- ✦ COVERAGES
- ✦ LAND_AREAS
- ✦ PIPELINES
- ✦ PIPE_CONNECTORS
- ✦ POIS
- ✦ RAILWAYS
- ✦ ROADS
- ✦ TREES
- ✦ WATER_AREAS
- ✦ BRIDGES
- ✦ TRAFFIC_STUDY_AREAS
- ✦ INTERSECTIONS
- ✦ PARCELS (added in the 2017 release)
- ✦ RIGHT_OF_WAYS (added in the 2017 release)
- ✦ EASEMENTS (added in the 2017 release)

The im.schema.json file consists of two main parts: CLASSES (user-defined categories that are based upon the base categories listed above) and DISPLAY (defines how you see the custom attributes in the properties palette). In addition to the CLASSES and DISPLAY, there are four types of data formats available:

- ✦ STRING – can contain numbers, letters, or special characters
- ✦ INTEGER – a whole number that can be positive, negative, or zero
- ✦ BOOLEAN – a Yes/No or True/False value represented by a checkbox
- ✦ DOUBLE – a decimal number

The following example will be based on the COVERAGES category. Let's assume for this example that coverage areas will be used to help identify parcels and they will have the following custom attributes defined:

- ✦ Lot Name (string)
- ✦ Lot Number (integer)
- ✦ Private Lot? (boolean)
- ✦ % Impervious (double)

The Properties palette will look something like Figure 5 with our custom attributes when we're done.

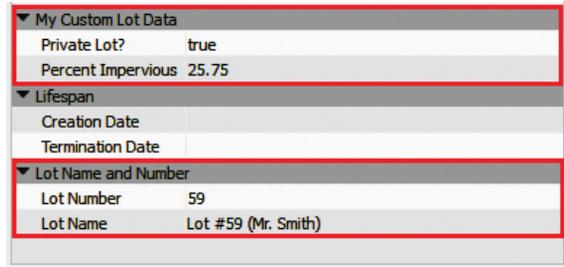


Figure 5

So what does the code look like that creates this? Remember the first part is CLASSES, so we have to tell InfraWorks 360 the class(es) in which we want to add attributes.

```
{
  "Classes": [
    {
      "name": "COVERAGES",
      "base": "COVERAGES",
      "Attributes": [
        {
          "name": "LOT_NAME",
          "type": "String"
        },
        {
          "name": "LOT_NUMBER",
          "type": "Integer"
        },
        {
          "name": "PRIVATE_LOT",
          "type": "Boolean"
        },
        {
          "name": "PERCENT_IMPERVIOUS",
          "type": "Double"
        }
      ]
    }
  ],
}
```

NO COMMA AFTER THE LAST CUSTOM ATTRIBUTE. THE SAME APPLIES FOR EACH CLASS. IN THIS CASE WE ONLY HAVE 1 CLASS SO THERE'S NO COMMA AFTER THIS CLASS

Figure 6

And the second part is DISPLAY.

```
"display": {
  "cat": [
    {
      "name": "LOT_NAME",
      "displayName": "Lot Name",
      "category": "Lot Name and Number",
      "priority": "1001"
    },
    {
      "name": "LOT_NUMBER",
      "displayName": "Lot Number",
      "category": "Lot Name and Number",
      "priority": "1002"
    },
    {
      "name": "PRIVATE_LOT",
      "displayName": "Private Lot?",
      "category": "My Custom Lot Data",
      "priority": "101"
    },
    {
      "name": "PERCENT_IMPERVIOUS",
      "displayName": "Percent Impervious",
      "category": "My Custom Lot Data",
      "priority": "102"
    }
  ]
}
```

NAME is our custom attribute name. DISPLAY NAME is what you see in the properties palette. CATEGORY is the section of the properties palette where it will be displayed. PRIORITY has two parts to it. The higher the base value (hundreds, thousands, etc.) will determine how far up or down the custom section will be displayed in the properties palette. And the tens will determine how far up or down the attribute will be displayed within the section.

So for example, in the LOT NAME AND NUMBER section (which appears lower in the properties palette because it has a higher hundred/thousand value than the MY CUSTOM LOT DATA section), LOT NUMBER will be higher on the list because its tens value is lower than the LOT NAME attribute which appears lower in the section.

It sounds a little backwards so some trial and error may be needed to get things in the order you'd like.

Figure 7

So when you put it all together, it looks like this.

NOTE: You can use a simple text editor such as NOTEPAD to create your file.

```
{
  "Classes": [
    {
      "name": "COVERAGES",
      "base": "COVERAGES",
      "Attributes": [
        {
          "name": "LOT_NAME",
          "type": "String"
        },
        {
          "name": "LOT_NUMBER",
          "type": "Integer"
        },
        {
          "name": "PRIVATE_LOT",
          "type": "Boolean"
        },
        {
          "name": "PERCENT_IMPERVIOUS",
          "type": "Double"
        }
      ]
    },
    {
      "name": "LOT_NAME",
      "display": {
        "en": {
          "name": "LOT_NAME",
          "displayName": "Lot Name",
          "category": "Lot Name and Number",
          "priority": "1007"
        }
      }
    },
    {
      "name": "LOT_NUMBER",
      "display": {
        "en": {
          "name": "LOT_NUMBER",
          "displayName": "Lot Number",
          "category": "Lot Name and Number",
          "priority": "1002"
        }
      }
    },
    {
      "name": "PRIVATE_LOT",
      "display": {
        "en": {
          "name": "PRIVATE_LOT",
          "displayName": "Private Lot?",
          "category": "My Custom Lot Data",
          "priority": "801"
        }
      }
    },
    {
      "name": "PERCENT_IMPERVIOUS",
      "display": {
        "en": {
          "name": "PERCENT_IMPERVIOUS",
          "displayName": "Percent Impervious",
          "category": "My Custom Lot Data",
          "priority": "802"
        }
      }
    }
  ]
}
```

Now that you've got your im.schema.json file created with all of the attributes you want, you'll need to test it out to make sure everything is working correctly. Again, I highly recommend you try this out on a test model—one that you won't mind deleting if things don't work out quite like you expect. With that being said, the file needs a place to reside and that location will be the same subfolder located in each model directory structure. Browse to Documents > Autodesk InfraWorks Models > Autodesk 360 (Figure 8). In this folder will be a series of numbered subfolders. Each of these folders is the root folder of an InfraWorks 360 model. From here it's a matter of opening a folder, checking the contents and moving on to the next folder until you find the one that contains the .sqlite file for the model to which you want to apply your custom properties.

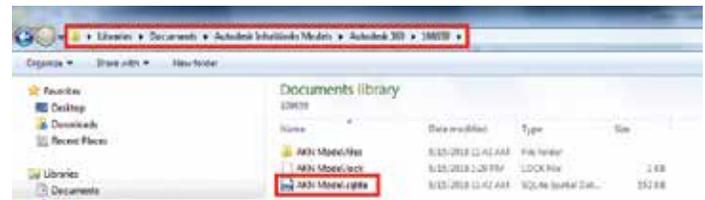


Figure 8

NOTE: The .sqlite file name and the model name you see in the tiles on the InfraWorks 360 Home screen are the same, so a simple search will find the appropriate folder quickly.



Once you find the correct folder you need to dig a little bit deeper. Double-click on the [model name].files folder and then double-click the UNVER folder to open it. This is where the im.schema.json file needs to reside in order to be read by InfraWorks 360 for each project (Figure 9).

After you get your im.schema.json file set up with the categories and attributes you want, copy it to the UNVER folder of each project where you would like these attributes. And that's it.

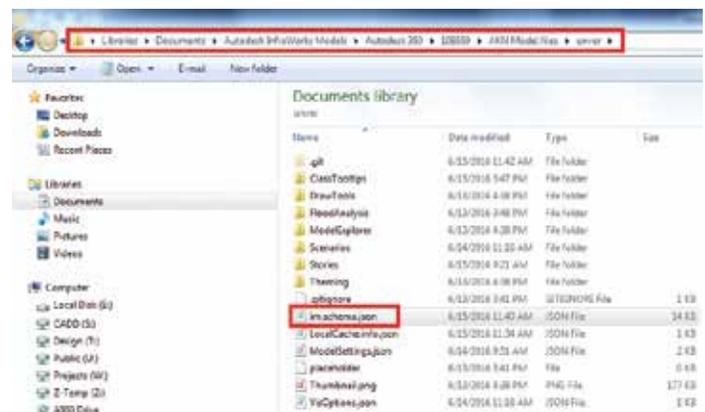


Figure 9

InfraWorks 360

NOTE: You must close then reopen InfraWorks 360 for it to recognize any changes to your .json file.

From here you can create custom themes based on the various custom attributes, so whether it's a broad overview of building usage type, the types or diameter of trees, or the age of certain structures, the possibilities are endless.

For a copy of an im.schema.json file that includes all data types for each of the categories, you can download it from my A360 Drive.

REUSE, RESIZE, REPURPOSE

InfraWorks 360 comes loaded with lots of great 3D content, but sometimes you just can't find what you need. What if you took an existing 3D model and resized it and used it for a different purpose? The following tip will show you how to create a parking lot road style with stalls on either side, pavement striping, and islands with trees.

Reuse, resize, repurpose Tip #1 – Duplicate and resize the Yellow Solid 1M Cube and use it as parking lot striping in a road style.

1. Duplicate the 3D Model > Shapes > Yellow Solid 1M Cube and rename it Striping
2. Modify the following scale factors as indicated below:
 - a. X: 5.48640, Y: 0.15240, Z: 0.0100

Reuse, resize, repurpose Tip #2 – Duplicate and resize the Square Tree Base w_Grass model and use it as a parking lot island.

1. Duplicate the 3D Model > Vegetation > Square Tree Base w_Grass and rename it Parking Island
2. Modify the following scale factors as indicated below:
 - a. X: 1.37160, Y: 2.74320, Z: 1.0000

Now we need to pull it all together into a custom road style. Start by duplicating the Asphalt Road style and renaming it Parking Lot. Next, edit the style and make the following adjustments to the Track Settings (Figure 10).

group/ track name	group height/ transition zone width/ track main category	track width	track inner height/ offset	track outer height/ offset	track top surface category	track inner surface category	track outer surface category
Median Group	0.00000000 ft						
Right Group	0.00000000 ft						
Drive Lane	Asphalt	24.00000000 ft	0.00000000 ft	0.00000000 ft	Asphalt Dark Gray	Asphalt*	Asphalt*
Parking		18.00000000 ft	0.00000000 ft	0.00000000 ft	Asphalt Dark Gray	concr sets	concr sets

Figure 10

We then need to add decorations—the parking lot islands, pavement striping, and trees. To do that, click on the Decorations icon and select Right Bucket > Parking from the Decoration Target drop-down list.

Click the green plus icon and add the Striping model. Make the following changes:

- Spacing: 9.0 ft
- Translation Y: -9.0 ft
- Rotation Z: 90.0°

Click the green plus icon and add the Parking Island model. Make the following changes:

- Spacing: 90.0 ft
- Spacing Offset: 4.5 ft
- Translation Y: -9.0 ft

Click the green plus icon and add any Tree Style you wish. Make the following changes:

- Spacing: 90.0 ft
- Spacing Offset: 4.5 ft
- Translation Y: -9.0 ft

And Figure 11 is what it looks like when it's all done (with a little extra content to make it look more realistic). If you'd like a copy of the Parking Lot road style, you can download it from my A360 Drive by following this link: <http://a360.co/2kuqlbc>

When you import the style, it will create an AUGIWorld catalog in the Road Style palette. You'll then be able to create a parking lot layout with furniture and striping in a fraction of the time it would normally take if you were to place the objects individually.

CONCLUSION



Figure 11

Hopefully these tips and tricks have inspired you and got your creative juices flowing to implement increased efficiencies on your next InfraWorks 360 project, whether it's dabbling in coding to automate some repetitive tasks, creating new road styles to speed up design modeling, or whatever you can imagine.



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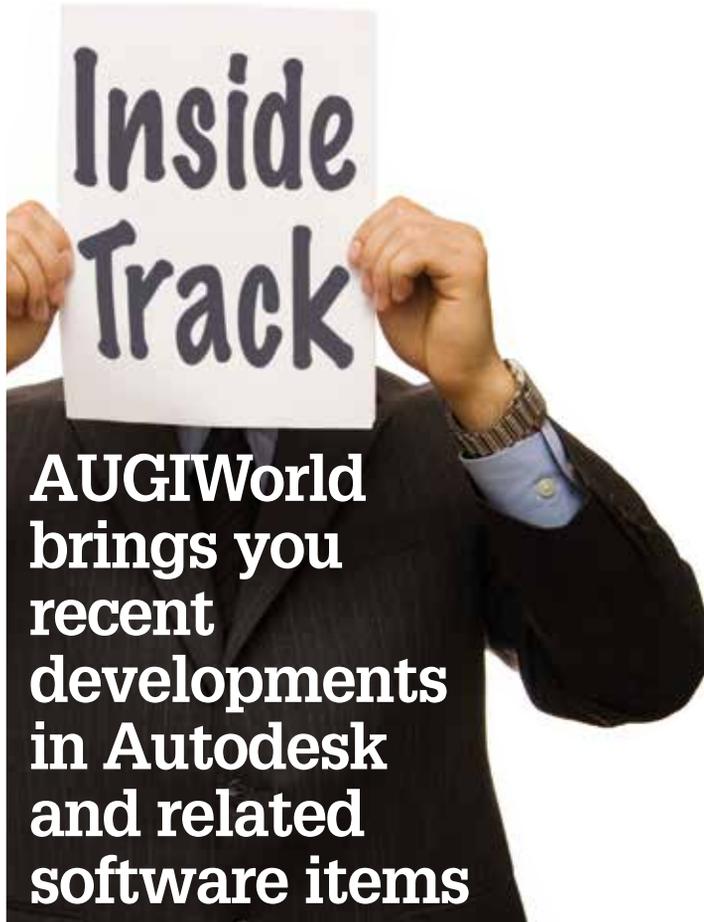


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Matterport's Pro Camera captures 2D photography and 3D data from job sites, and automatically stitches them into a complete, immersive 3D model of a real-world job site that you can share, annotate, and export point clouds to programs such as Autodesk ReCap or Revit®.

It's quicker than 3D laser scanning, and more complete than handheld 3D scanners.

- **1 minute per scan** – each 360° sweep from the 3D camera takes less than a minute, and scans are automatically registered and stitched into a textured mesh in hours.
- **No registration markers required** – the 3D scanning process is push-button simple and requires no registration markers or manual alignment. Everything is automatic.
- **Accurate within %** – the rapid scanning is accurate enough to generate point clouds or polygons for as-builts, and complete, informative construction documentation.



<https://apps.autodesk.com/RVT/en/Detail/Index?id=3536917954730046399&appLang=en&os=Win64>



FAMILY SIZE REPORTER

This is a simple app that reports the file sizes of loadable families in an Autodesk® Revit® Project. The resulting report is grouped by Project Category, by default. You can choose to remove the grouping and sort the list of families by Family Name or File Size on disk (in Kb).

Why do you need this App? If you find that your project is slowing down and suspect that some families may have been over-modeled, you can use this App to identify these families quickly. While file size is not a definite indicator of performance, it is an easily understood metric. In a large project, there may be thousands of components.

How does one find the sizes of the individual families? One solution is to save all the loadable families into a folder and then compare their sizes using Windows Explorer. This App is designed to automate this process and present the information without having to manage the individual family files using Windows Explorer or saving them out, for that matter.

<https://apps.autodesk.com/3DSMAX/en/Detail/Index?id=3330821554784584637&appLang=en&os=Win64>



AUTODESK MATCHMOVER

Autodesk® MatchMover™ is a camera tracking application that automatically captures 3D camera path and camera parameters from 2D video and film image sequences.

After capturing a 3D camera path with MatchMover, you can export the camera data to a number of file formats supported by 3D animation or compositing programs. This allows you to work with the camera data in your favorite animation or compositing application to accurately place 3D objects into a video or film sequence.

Providing a straightforward and cost-effective way to mix 2D live-action footage with 3D animation and special effects, MatchMover allows you to take advantage of the 2D world of film and the 3D world of animation.

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



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