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Collaborate And Create

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Also in this issue:

Meeting Minutes | 3D Typical Sections | Plots & Scripts (The Prequel)

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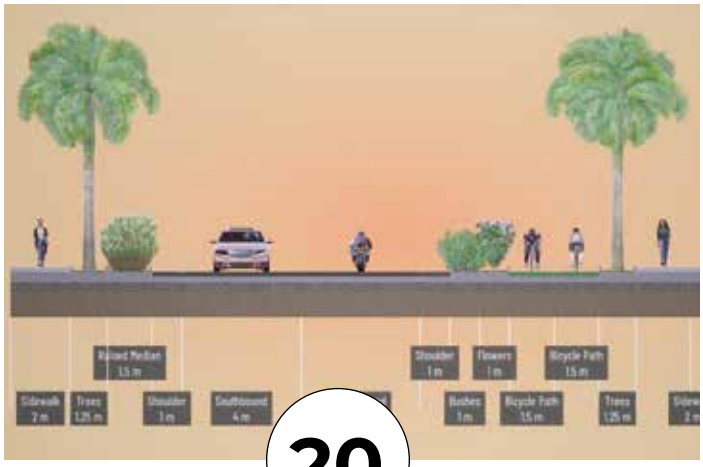

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FEATURES

COLUMNS

AUGI

From the President

I hope you are all enjoying some spring sunshine or showers, whichever your preference is!

This issue of *AUGIWorld* is dedicated to collaboration. Mostly everything we do every day is about collaboration in some way, shape or form. With CAD/BIM products it takes on a whole new meaning because so many of you work on projects where multiple people/companies play different parts in the completion of the work. It's important that you have the right tools/resources to make collaboration something that isn't difficult.

One of my side volunteer gigs is working with a local AYSO Region (American Youth Soccer Organization) as their Regional Commissioner and Registrar. Collaboration is extremely important because we have so many moving parts. From making sure fields are painted and nets setup, to making sure the referees and coaches have what they need, it is all one giant mass of collaboration. We run non-stop for 7 weeks in the fall and again for 7 weeks in the spring. We do it because we believe in our mission. The mission is for kids to have fun, get some exercise and perhaps learn a skill. (The actual AYSO mission statement is to develop and deliver quality youth soccer programs which promote a fun, family environment based on the AYSO Philosophies: Everyone Plays® - Our goal is for kids to play soccer - so we mandate that every player on every team must play at least half of every game).

You all have your own mission, whether that is for work, family, or an organization that you volunteer for. How does collaboration help you in your mission?

The mission of AUGI is to provide an environment for users to help users. We offer benefits and publications that allow the global user community access to one another. Our motto is Users Helping Users. We work very hard to promote our membership as a community working together to strengthen each other and the community in general.

AUGIWorld is a part of our mission to bring information from one CAD/BIM user to another.

Read on for articles on collaboration in CAD/BIM!

Take care,

KaDe

AUGIWorld

www.augiworld. com

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by: Jason Peckovitch

Successful BIM Implementation – Revit for MEP

What does it take?

If you are asking yourself any of the following: What is really needed? Where do we begin? What is done already? You may be contemplating the use of Revit/BIM (Building Information Modeling) or have recently started using it. This article assumes you have some knowledge of what BIM and Revit are. Revit has been around for 20+ years, but whether you are just getting started using Revit or have been using it for several years, this article will break down what is necessary to use Revit effectively for MEP firms. This outline can easily be changed for architectural or structural firms. As a seasoned MEP BIM Manager, I have helped implement BIM and Revit in several companies over the years using what I discuss here. The key to getting this done is having buy-in from everyone.

A BIM Manager

A BIM Manager is responsible for creating and supporting everything listed within this article. It does not have to be a single person but could be a team of BIM professionals with the knowledge, skill, and desire to move forward with utilizing BIM on your company's projects. The title of BIM Manager is irrelevant, and it could be whatever fits into your company structure. What is important is having that specific person or team to accomplish what it takes to be successful using BIM and Revit as outlined below.

A Standard

Unlike countries like the United Kingdom, United States firms are quite a long way away from adopting a national BIM standard as the universal standard for all firms. With that said, your deliverables can look great but to get them to look that way consistently, you will need to adopt and follow your company standard. What that standard is, is completely up to you and your company. Do you have a standard you have been following for another software like AutoCAD? If so, the transition to using Revit will have a clearer path. If you choose to follow a different standard like United States Army Corp of Engineers (USACE), National BIM Standards-US (NBIMS-US), US General Services Administration (GSA), or decide to forge your own path with something your company produces or a combination of several different standards, that transition from your current software might be more challenging. Your standard should include how you want your deliverables to look, as well as how they get developed and everything used to produce that final documentation.

When developing your standards, workflows and processes, I highly recommend using Revit how it is intended to be used. There are a lot of workarounds people use that are successful but if you spend hours, days, or even weeks trying to circumvent

how Revit wants you to do something for a simple task then I feel you are doing something wrong.

A Master Shared Parameter File

Besides having your standard, you should develop a master shared parameter file. This file is the building block of everything you do moving forward. The standards, however, are the glue that holds it all together. Use this file to hold all the parameters that are needed in your families for schedules and tags, as well as for project parameters. I highly suggest starting with the original Autodesk Revit Style Guide Shared Parameters V2.1 that was released in 2009 and building on it with anything more you need to complete your projects. If you do not know what a Shared Parameter is, please visit the Autodesk Knowledge Network.

```
# This is a Revit shared parameter file.
# Do not edit manually.
*META VERSION     MINVERSION
META  2     1
*GROUP      ID    NAME
GROUP 1     Dimensions
GROUP 5     Electrical
GROUP 6     Mechanical
GROUP 8     Identity Data
GROUP 10    Electrical - Loads
GROUP 11    Mechanical - Air Flow
GROUP 12    Energy Analysis
GROUP 14    Mechanical - Loads
GROUP 15    Structural
GROUP 16    Plumbing
GROUP 17    Green Building Properties
GROUP 18    Materials and Finishes
GROUP 19    Other
GROUP 20    Construction
```

Figure 1

A master file is necessary because each parameter has a specific GUID (global unique ID); if these are different between families, then tags and schedules will not work properly. If you would like a copy of the Revit Style Guide, I have included it as a download with this article.

Centralized Content Location

As you start building your companies content, store it in a centralized location. That location can be a company server or a cloud solution. If everyone who needs access has that access, that location is a location that works for you. If that location is on your company's server, it is highly recommended that you have a dedicated network drive where your content lives so that it is easily accessible from Revit. That folder structure would also be whatever makes sense for your company. Below is how our current folder structure is laid out which is quite different than what I used at my previous firm. If you go the cloud route, there are several cloud content management solutions for you to choose from, like Unifi, Family Browser, and Hive. I suggest researching each of them and picking the one that meets your needs.

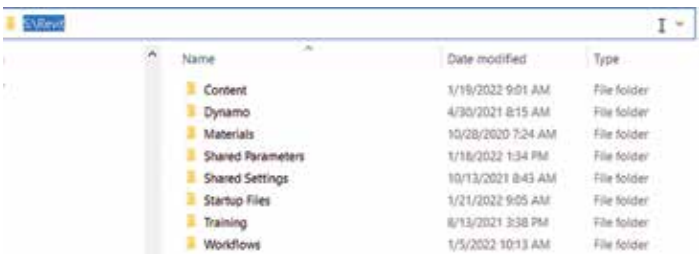

Figure 2

A Startup File or Template

This is a file used to create all your projects' Revit models. A startup file is a project file where work-sharing and work sets are enabled; a template file does not. The two file types are opened using different methods. Below are the methods.

Startup File:

File --> Open --> Project --> Browse to Startup File location --> Detach from Central

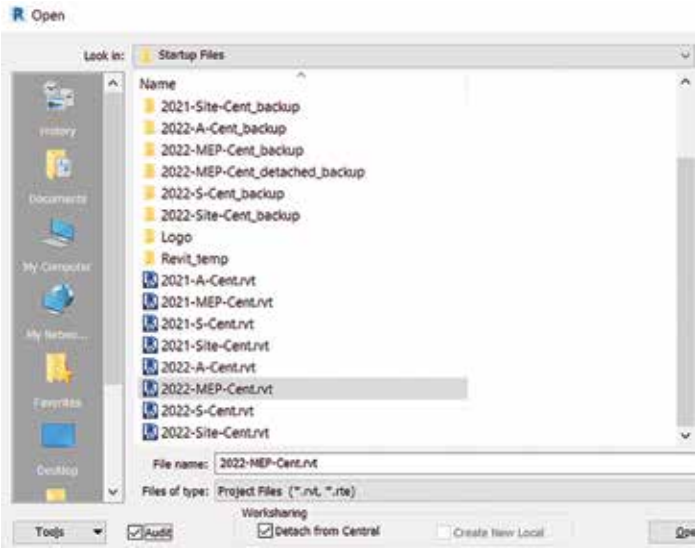

Figure 3

Template:

File --> New --> Project --> Select Template

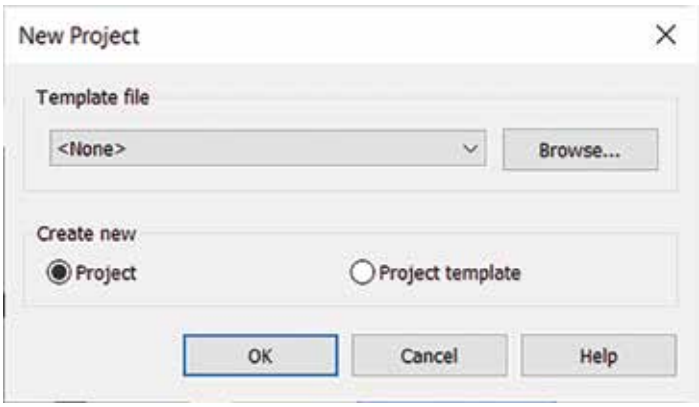

Figure 4

When building your startup file or template, start with the Autodesk-supplied template for Systems. If you are an Architectural or Structural firm (or have them in the same company), use the respective templates from Autodesk. You can expand on

these files to build your company standards and brand. Either of these files would have information matching the standards that were developed for your company or a separate file containing client standards. Things to include, but not limited to, are:

- MEP Settings
- Project Units
- Object Styles
- Levels
- Views / View Templates
- Sheets
- Line Styles / Line Patterns
- Line Weights
- Dimension Styles
- Text Styles
- Duct, Pipe, Conduit and Cable Tray Types and Systems
- Panel Schedule Templates
- Wire Types
- Materials
- Callout / Section Tags
- MEP Category Specific Tags
- Arrowhead Types
- Filled Regions
- Browser Hierarchy Definition
- Annotation Families

Standard Content

Standard content includes standard Revit families, schedules, and details. When it comes to your Revit Families you have several ways to get the content you need. The first method would be to use the families provided by Autodesk. With Revit 2021 and 2022, those families can be inserted directly into your project from the Load Autodesk Family button on the Insert tab. You could also download those families from the Get Autodesk Content and place them on your server in your centralized content location, but that is no longer necessary now. I would use this method if you do not currently have a dedicated BIM Manager or team of BIM professionals to support your company's needs. It is a quick and free approach to getting started in using Revit.

Figure 5

Secondly you could download free content from any number of sources like specific manufacturer's websites or BIM content websites. Another option would be to hire someone outside of your company to build content for you or buy content packs from various industry content creators. Lastly, which is the most flexible, would be to use a combination of downloaded Autodesk and manufacturer's content, as well as building your own, so that it can be modified to fit the needs of your project team(s).

When it comes to schedules and details, I would recommend using what is called a Container file. This file can live either on your server or in the cloud. It is a Revit project model where all your schedules and details are developed, stored, and tested with your families. Your schedules would convey all necessary information to the contractor and owner. Your details could be 2D or 3D representations of any aspect of your project that require more detail than what may be modeled. You may want to develop a set of details that convey enough information to be used on any project or later changed to specific project needs (Figure 6).

One other recommendation is to support your standard content in the oldest version of Revit you are using. If you have projects in 2020, support 2020 content. If 2021, support 2021 content. However, I would encourage you to use the latest version of Revit for all your projects when you can, unless dictated by outside sources. The reasoning behind using the oldest version is that if you make any updates to your content, you may have project teams that want to make use of those updates and if their project is in an older version and the update does not support that older version, they cannot use it. That is not to say that with the increased functionality to the newer versions that you may want to make use of that which would require additional content that supports that functionality. In most cases, support the oldest version and all active projects can benefit from any updates.

Documented Standards and Procedures

Everything you create as far as standards go, should be documented. PDF, Word, Excel, OneNote, or an internal intranet site are all good formats. You more than likely have access to one or more of those formats. If your company has a specific way of doing something, whether it is a workflow within the software or the way the project is reviewed for example, this should also be documented. Whenever

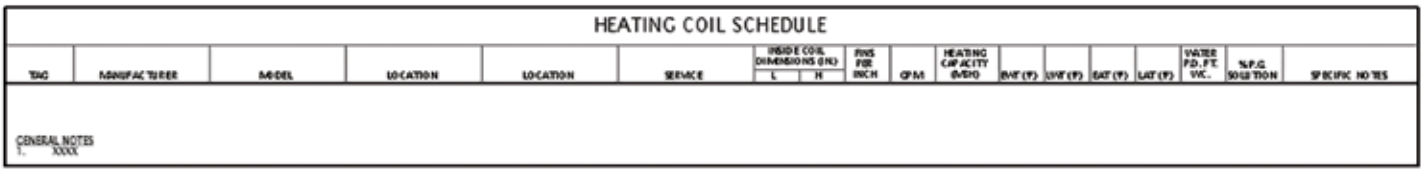

Figure 6

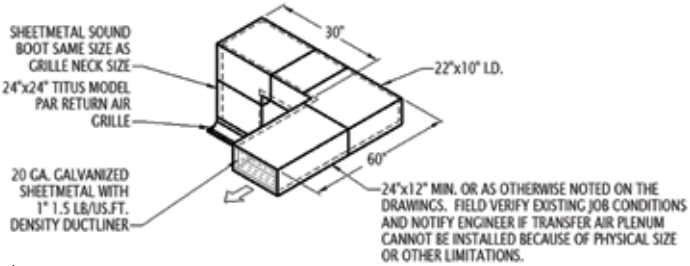

Figure 7

you hire someone new, you can point them to this documentation as part of their on-boarding process to help ensure all project teams are doing things the same way across all your projects (unless directed differently by specific client standards). Treat these as living, ever-changing documents. As software gets updated and new features are added, your standards, workflows, and processes may need to adapt and change with the software being used. Do not be afraid to revisit this documentation as the need arises.

Training Plan

If your company is new to Revit, decide how your team will be trained on how to use the software and have continuous education accessible. Even if you are not new to Revit, what have you done in the past for training and what is your plan moving forward? Will you outsource the training to a local reseller or technical college? Will you use on demand training from various online training sites like LinkedIn, CADLearning, or Global eTraining? Or will you expect someone internal to perform all your training needs? Whatever you decide, research what works best for your team because everyone learns in different ways. Other great resources for learning include:

- Lunch and Learns
- 15-Minute Power Sessions from various BIM staff
- AUGIWORLD
- Subject Matter Webinars/Videos
- Various blogs from Industry leaders like Brian Mackey, Paul Aubin, The Revit Kid, What Revit Wants, Dan Stine, or Revit Pure (There are far too many out there to name them all – I am subscribed to over 50 blogs via Feedly)
- Having staff attend conferences like BiLT, Autodesk University, or Midwest-U

Top-Down Support

Having support from ownership, upper management, and project teams is also crucial to a successful implementation of BIM within your company. Without that, the best laid plans could fall apart quickly and never get off the ground and the individual(s) tasked with that support may not feel they are really needed.

Revit Add-ins

Using Add-ins may be a little overwhelming at first but once you can use Revit to its fullest, they can enhance your company's efficiency and productivity. I can without any doubt recommend that you use Keynote Manager from Revolution Design if you have keynotes or plan notes on your drawings. There are countless add-ins available from the Autodesk App Store. It is up to your BIM Manager and/or company to find those tools that help you. I do highly recommend DiRoots and pyRevit, they are great free tools when you are ready.

Conclusion

The key to being successful at using Revit and BIM on your projects is to first plan out what you want to accomplish and then develop standards, content, and documentation to fit those needs, as well as to have someone or a group of individuals to support and further develop that material. Remember, everything you do in Revit works best when it is all connected.

Jason Peckovitch is an Autodesk Certified Revit Mechanical/ Plumbing and Electrical Certified Professional in SE IOWA. He is the MEP BIM Manager for Shive-Hattery, Inc., with offices across the Midwest. His CAD/BIM career spans over 25 years, but didn't switch to the AEC Industry until 2007 as a Mechanical HVAC Drafter. Jason is also the father of three pre-teen children, a published photographer, gamer, and car/ tech guy.

by: Mark Kiker

Collaborating When Your Path Has Potholes

There are times when you are collaborating with a team, but you do not have enough information to define the best route. There might be missing information, wrong information, speculation, rational and irrational concerns or other perspectives that impact your progress... but you have to predict the future and clearly define a path forward.

When the outcome of any given occurrence, purchase, tech path, policy, procedure, or protocol is fuzzy you may encounter resistance to move forward or enticement to forge ahead without a care. I hinted at this topic in the articles I wrote on speeding up or slowing down a decision. There may come a time when you just have to make a call when risk is involved.

I have been in team meetings where the group struggles with coming to agreement on which way to go. When facing the unknown, people tend to move toward the extremes. Your team may be saying things that are very far apart, from "nothing is going to work", to "what could possibly go wrong". Some think it will be an overwhelming success and others, a colossal failure. The team is split. One side is cautious and it is crippling progress. The other side is gung ho and would move forward even if others are not on board. You need to unify the team. That is done by defining the issues, quantify the risks, alleviate as much risk as you can and getting things back on track.

When the fuzziness of the future does not seem to be clearing, I tend to frame a discussion with the naysayers by stepping through the discussion points below. Talking them out, and coming up with a plan to move forward with caution. By moving through this list, you narrow it down to the ones that really do impact your advancement. You can talk about them quickly, and it can be done over and over for each concern that comes up.

Possible – might it happen? Well, in reality almost anything can happen. If we limit ourselves to eliminating every negative eventuality, we would spend all of our time just prepping for the worst and never getting to the best. Yes – anything is possible - and when someone brings something up, you may need to just say "Yes, that can happen", but just because someone brought up a "possible" negative, does it mean that we cannot move forward until we neutralize the threat? Move to the next item on our list and don't let a "possibility" freeze you in your tracks.

Plausible – is it even in the realm of believable? To move past what is "possible", you have to ask if the pothole is "plausible". Is it really something that might happen? Is it a concern that can derail the effort? Ask questions like "has that ever happened before?" or "Have any of you had to deal with that in prior efforts?" This tends to flesh out some of the items as having slim odds. People will hopefully say "I have never seen that happen". But if they persist in thinking that the worst might unfold, then move to the next step.

Probable – it really might happen? As the objections drop away after the first two discussions above, you come to this one. Does most of the team think it might actually happen? Is it "most likely" to be something that impacts your progress? Yes, others have seen this happen. It is a viable negative issue that could come up. If that is true, then try to eliminate the risk or plan for it. Even if it is probable, you can still work through it.

Next, we move to quantifying and reducing. By this time in the conversation, the risk has been defined and may eliminate quite a few potholes that the team might bring up. If something makes in into the "probable" category, then you need to know a couple more things to face then head on.

Predictable – Is it pothole foreseeable? If we know that something probably will happen, can we anticipate it? Can we identify what has to align to avoid this eventuality becoming a reality? If you can predict when problems may arise, during what portion of the project, then you can watch a little closer, slow thing down or bolster support team's readiness to react.

Persistent – if it happens, is it a one-time event that you can fix and you can continue down the path, or will it be recurring? If it a quick fix, define the approach for dealing with it quickly and stand ready to put it in place. If it will be recurring, then planning on how it is addressed will need more thought. Think about setting up warning alerts that something is starting to go wrong. Or a plan to check on progress from time to time to prevent a derailment.

Percentages – what is the percentage of expected success, failure, or breakage. This is key if the risk has passed through all the above and still exists. Again, you are trying to quantify the risk. So, ask each person what they thing the percentage Or it happening will be. Is there a five percent chance? Is it fifty percent? The average of the group will define how much effort will be needed to alleviate the risk. Striving to totally eliminate a 5% risk may take more time that just fixing something when it goes wrong. Addressing a 50% risk is of greater need and extending the planning phase may bring better overall results.

After asking all of the above, you or the team may have to make the call to move on or change paths. Sometimes you will need to move forward in the face of a little risk, but other times you may need to move to what can be done if the negatives carry the day.

Plan B – do we need to abandon this effort because the rick is too great? The final "P" is when an issue goes through every one of the above discussion points and still exists. The risk percentage it too high and cannot be reduced, planned for or eliminated. This is a deal breaker and time to move in another direction.

This whole effort of defining and discussing potholes that you might encounter in your path makes the outcome more predictable (sorry, stuck in a rut of "P" words). If the discussion help eliminates risks and produce a better product then your team can be confident in their collaborative energies. By defining the issues, quantifying the risks, trying to alleviate as much risk as you can you can get things back on track (or go to Plan B).

Mark Kiker has more than 30 years of hands-on experience with technology. He is fully versed in all areas of management from deployment planning, installation, and configuration to training and strategic planning. As an internationally known speaker and writer, he was a returning speaker at Autodesk University for 20 years. He is a former Board member, President and Executive Director of AUGI. Mark is currently serving as Chief Technology Officer for SIATech, a non-profit public charter high school focused on dropout recovery. He maintains two web sites, www.caddmanager.com and www.bimmanager.com.

by: Andrell Laniewicz

Meeting Minutes

Meeting minutes are a chore: required and not fun. Can the new Unified Platform on the Autodesk Construction Cloud® change that? Let's take a look!

ACC? BIM 360? UNIFIED PLATFORM? WHAT?

The Autodesk Construction Cloud (ACC) is the overarching umbrella for all cloud solutions offered by Autodesk. BIM 360®

Next-Gen is one of the platform offerings that has connected project data utilizing the Forge® platform. BIM 360 Classic is also offered on the platform, but the data is not connected to other modules outside of the one the data is on. For example, files cannot be linked from Field to Glue. The Unified Platform is the new cloud platform from Autodesk. When Autodesk acquired PlanGrid, they used the best of its features and brought in the best of BIM 360 to create this new Unified Platform. Just like BIM 360 Next-Gen, all data is connected. The good news is, if you have a license to access any module on BIM 360, it will also work for its counterpart on the Unified Platform! Further, if you have the ABC, ABC Pro, or Build license, then you have access to Meeting Minutes on the Unified Platform! Meetings are found in Model Coordination, Design Collaboration, and Build.

STRUCTURE OF MEETINGS ON THE UNIFIED PLATFORM

The tool is called Meetings and it breaks down into two areas: Meetings and Items.
In the Meetings tab, you can enter information for the meeting, including a Description, Meeting discussion, Meeting summary, and add attachments. If the meeting has not occurred yet, this information is listed as an Agenda. Once the meeting has occurred, you can update this information and then set the status to Minutes. This locks the information and becomes formal documentation of a snapshot in time of the project, transcribing what occurred during the meeting. Minutes are shared with everyone and are a matter of record for management (Figure 1).

The Items tab shows a list of each item across all meetings on the project. These items can be tracked like Tasks or To-Do Items. Every topic brought up in a meeting needs to be resolved for the project to be able to be completed. This is a powerful list and an excellent way to track what needs to be done project-wide at the management level. Reports on Items can be automatically generated and sent to users (Fiugure 2).

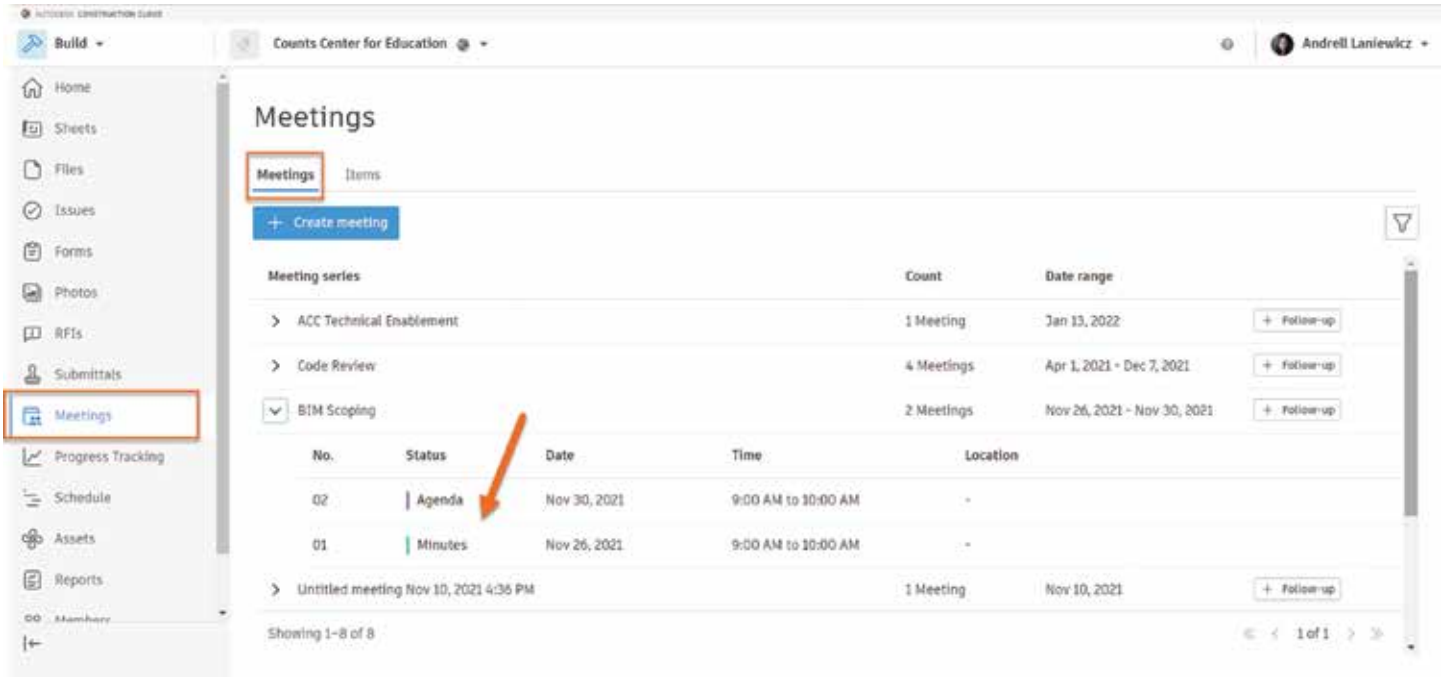

Figure 1

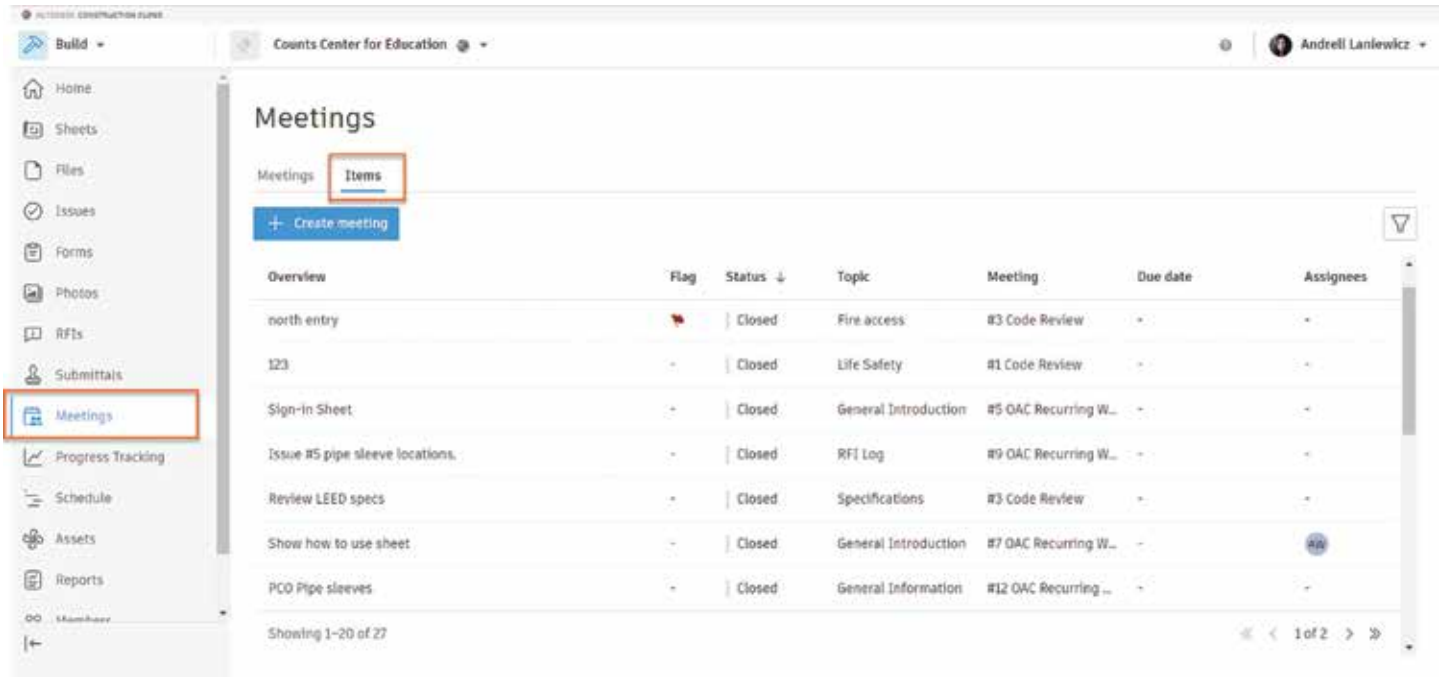

Figure 2

MEETING PROCESS

Meetings have several built-in features to make the process easy. To explain it, let's step through an example.

1. BIM Coordination meetings are starting up. Create a Meeting. Include items such as date and time, description, and video conferencing link. You can "Add to calendar" by clicking the triple-dots in the upper right of the meeting.
2. Invite Attendees. These can be project members or non-members.
3. Prepare for the meeting by entering Items in the meeting discussion. Items are grouped under topics. In this case, topics could be areas of coordination while Items could be individual clashes that need addressing. The Agenda can be sent out ahead of time to invitees.
4. Start the meeting by taking attendance. Mark

who was there on the list with a simple click and add people who attended that were not already on the list.

5. Take notes on each item. Assign them to specific people, give due dates, add references, and even link files or issues to each one. Items are marked as “Open” as in new, “Ongoing” as in something to discuss across multiple meetings, or “Closed” once the item is resolved.
6. End the meeting with a summary and then change the status to Minutes. Disperse the Minutes to the attendees with the click of a button.
7. Easily make follow-up meetings by clicking “+Follow-up”. All items that are Open or Ongoing will be automatically added to the next meeting as Agenda items (Figures 3-8).

Since Issues and RFIs can be linked to Items, the history of what happened for each Item is there with the click of a link. ‘Why is this Item still open?’ It has an RFI attached and the RFI is waiting for an official response. Further, the list of Items serves as a task list for what needs to be done after each meeting. In the Reports tool, a scheduled report can be run to automatically send a list of these items to project team members.

The UP is a great place for connected data and communication. Issues connecting to RFIs connect to PCOs and all reference files, sheets, assets, forms, checklists, photos, and more.

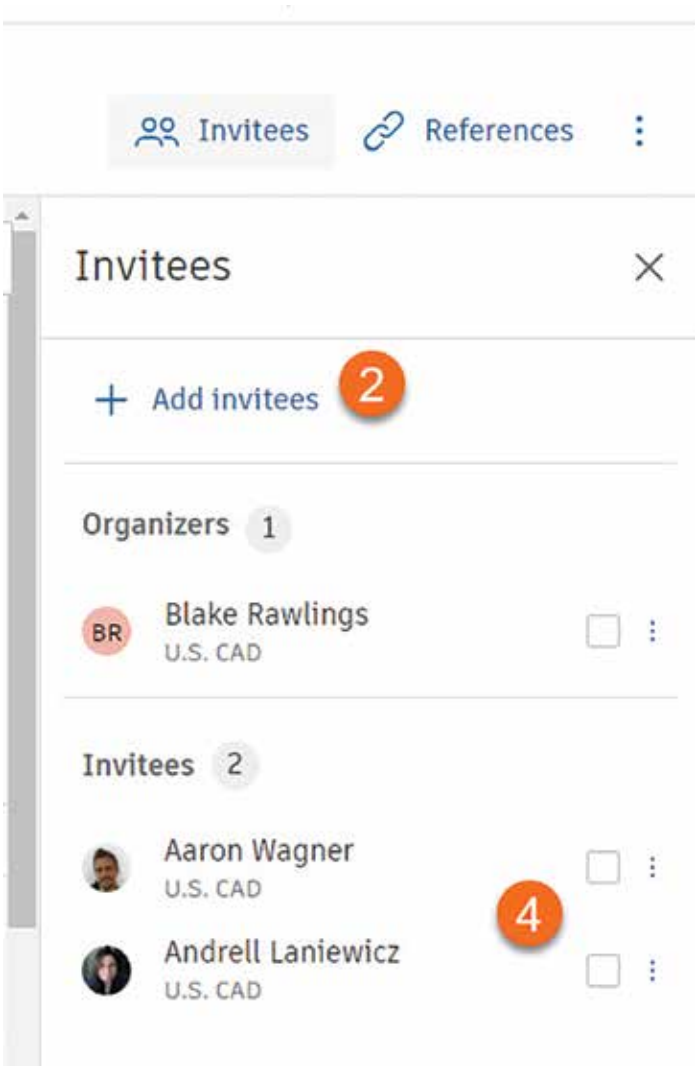

Figure 4

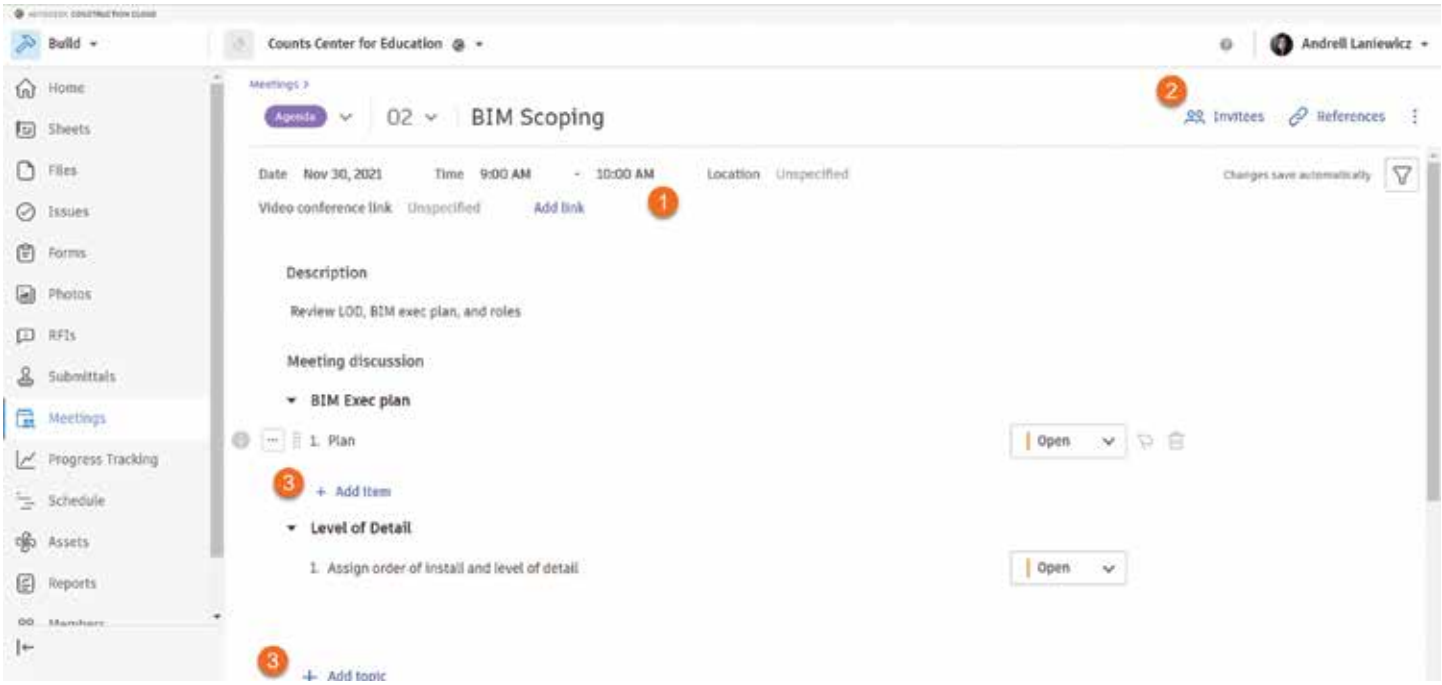

Figure 3

IN CONCLUSION

Ok, so meeting minutes are still not fun; however, with the ability to link existing project data, there is a lot less notetaking, retyping, and potential for lost information. With the capability to report on Items and who they were assigned to and when they were due, accountability is created. With follow-up meetings automatically pulling in only Items that are still open or are ongoing, there is less work for creating Agendas for those meetings.

Meeting minutes are a required staple of any project, but hopefully, the new Unified Platform helps eliminate some rework, creates trackable accountability of meeting items, and ultimately keeps that data connected in one place.

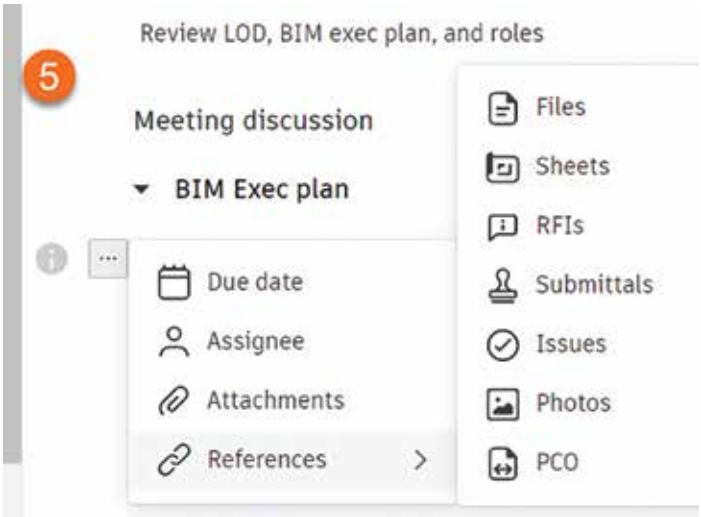

Figure 5

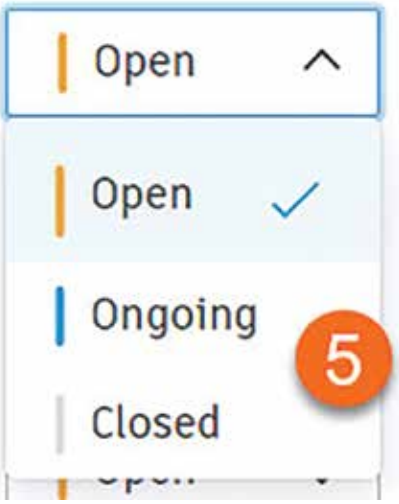

Figure 6

Figure 7

Andrell Laniewicz has been working in the VDC world since 2011. During this time, she has been involved in everything from Model Coordination, 4D, 5D, and Quantification to Proposals, Site Logistics, and more. She has worked for General Contractors and MEP Design to Fabrication firms. She has taught BIM for Construction Management at Universities, presented at Autodesk University and BiLT, and constantly delivers social media content. At U.S. CAD, Andrell works with clients to evaluate their existing workflows, implement solutions and technology, and providing training to get clients to their ultimate end goal. She focuses on Revit, Navisworks, BIM 360/ACC UP, FormIt, and MSUITE within Architecture, Construction, and Fabrication. She has her Certificate of Management in Building Information Modeling from AGC of DC.

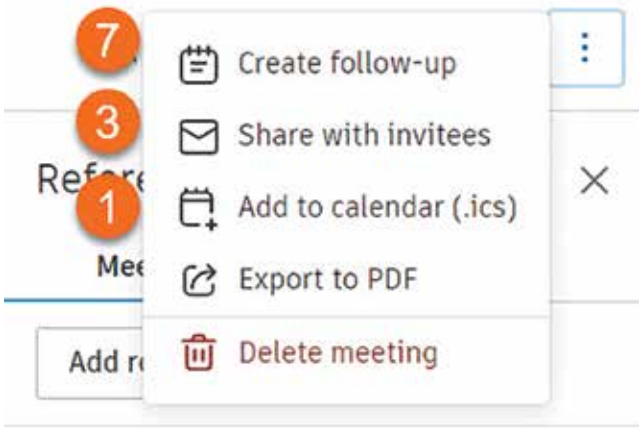

Figure 8

by: Brian Andresen

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Use Rewrite for:
- Views, Sheets, Levels, Grids, Reference Planes
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- Rooms and Areas
- Materials

Functions:
- Add prefix or suffix to names and numbers
- Replace names and numbers
- Modify or renumber multiple text or numeric parameter values
- Modify multiple yes/no type of parameter values
- Modify multiple phases and work set type parameters
- Duplicate multiple Views and Sheets
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- Generate volumes from Rooms or Areas.

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Core functionalities:
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- Create new Rooms and Spaces from a template Excel file.

Exportable data:
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by: Brian Chapman

Collaboration As a 3ds Max Professional

There are a few essential factors when collaborating with a team as a 3ds Max professional you are responsible for personally. First, no matter how quickly your team is moving, strive to keep your scenes and files organized. A proper hierarchy is essential when passing files around. The hierarchy you build is generally the first line of defense; subsequent software development to substance and game engines rely on it, and not doing it is just lazy. There is not a case where this is not important. Second, check your files before sending or uploading them. A simple FBX Viewer review can expose simple problems. If your team is working in software like Unreal or Unity, drop your files in and be sure they operate and look as intended. Check your file after you upload it to ensure it's the files you intended to share. Sharing the wrong file is just embarrassing, but not fixing it halts the production pipeline.

As a team, you have many responsibilities as well. One often involves leading or participating in check-ins, sometimes called "dallies" or "stand-ups." Depending on the complexity of a project, these can consist of meeting anywhere from a few days a week to every day. While generally short, often limited to a few minutes per person, these allow teams to build rapport, note their ideas or areas blocked, and gain inspiration while providing valuable information to each other to move forward with their work. So let's talk about some essential components for success when collaborating this way.

1. Don't wander into details

There are a few essential components for these check-ins. First, people's time is valuable, and people's knowledge is extensive. Taking over a stand-up to demonstrate to everyone your unique knowledge of light baking procedures and render settings is disrespectful toward everyone's time. It's understood that you can complete the job you were hired for or have the nack to figure out how without a lot of complexity. Take the opportunity of these meetings to explore and contribute ideas while offering yourself to solve noted problems after, but don't worry about whether or not someone finds your skill valuable. You are already at the table, which means they do!

2. Don't get bogged down on problems

Time is a premium, and everyone faces task-specific problems. Daily check-ins aren't meant to solve problems. If someone is blocked, can't proceed, or has difficulty addressing a challenge, then assign the appropriate people to assist them afterward and move on. If a challenge needs addressing sooner, offer a sidebar afterward with those more directly involved. That allows things to move forward while respecting everyone's time.

3. Don't meet more than necessary

Some projects don't require meeting every day of the week. In 3D, and creative industries, management/collaboration software like Jira allows users to input notes, carry conversations, and communicate effectively. In many cases, an email noting progress or simply texting each other is sufficient.

4. Show and tell

Stand-ups are an excellent opportunity to give your team a few minutes to share work. That can be a great tool for inspiration, driving each member to be excited to share a few minutes of their hard work, mention something cool they discovered, or share ideas for improvement. However, the key to this is that a team must drop egos entirely and be open to criticism, sharing content, passing workaround, and more. As the leader of these meetings, you must help people feel safe to share even bad work and ensure they are secure in their ability to improve. Recognize that some of the most incredible work can come less from skill and more from people who are excited to be a part of a project. While skill is a factor, even the most skilled won't produce good work if they aren't excited to be a part of it.

> ***A proper hierarchy is essential when passing files around. The hierarchy you build is generally the first line of defense; subsequent software development to substance and game engines rely on it, and not doing it is just lazy.***

5. Cut off tangents

Time, once again, is an essential factor for everyone involved. Individuals breaking out into tangents monopolizing that time is not constructive. Cut them off and stick to the main point: progress (show and tell), what they are working on the next day, and what is blocking them.

6. Follow through

Last, follow through when presenting and offering ideas for improvement or solutions to problems. When offering ideas for others, be respectful and think about whether or not there is time and their ability to follow through.

Brian Chapman is a 3D Artist located in Las Vegas with an extensive history of building 3D content for AEC, game, film, and software development. In addition to 3D art, Brian has experience with software development, design in the civil engineering field, and graphic arts. Brian can be reached procadman@pro-cad.net.

by: Sam Lytle

Using 3D Typical Sections Beyond Roadway Design for Real-Time Urban Planning and Design

THE POWER OF A SECTION

In a college class more than a decade ago I remember a college profession describing the importance of typical sections in civil engineering- "You can pretty much explain anything in civil engineering, one-foot sections at a time". He referenced how sections in bridge, dam, roads are commonly used to communicate designs that extend much longer than a single foot. I continued to learn the importance of typical sections in my short design career before I ultimately ventured into 3D visualization. The sets of roadway design plans for large projects had several pages of typical sections showing how the road adjusted between existing and proposed along the alignment of the project. To the experienced engineer or contractor these sections (and related striping, plan sheets and other files) explained everything necessary to get the project built.

Communicating these plans- and associated typical sections- to the impacted citizens in public meetings has never been quite as straightforward. Top-down exhibits and the occasional 3D rendering did the heavy lifting communicating the project impacts to the public and other stakeholders.

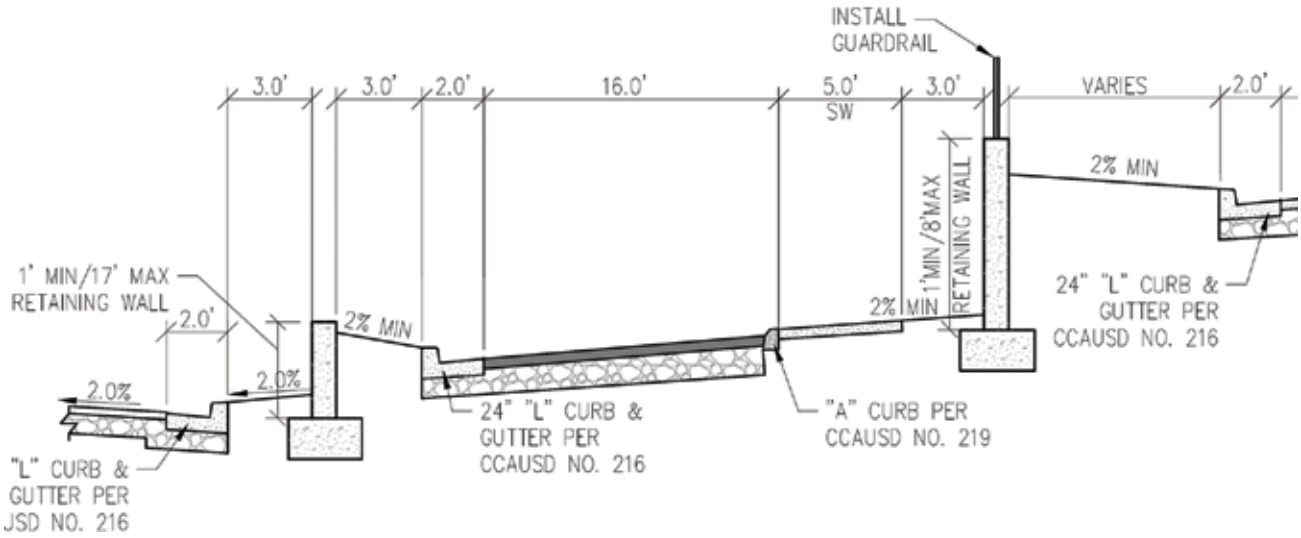


Figure 1

Figure 2

Web applications have become available over the years to quickly produce 2D typical sections using a drag-and-drop interface, but these have inherent limitations. It also seems these online tools are often only used as mock-ups on the journey to fully rendered 3D sections which give more context and need less interpretation (Figure 2).

BUILDING A DIY SECTION CREATOR SOLUTION

A few years ago, when I was running a visualization company, we had several requests to make 3D renderings of typical sections for clients looking to further communicate various road sections. These took considerable effort compared to how simple they were, and we never did enough of them to develop a more efficient workflow. Still, these experiences led me to understand the micro-industry of using 3D typical sections for efficient communication of roadway, downtown and other transportation projects.

Fast forward a few years later and I was trying to make a better 3D visualization engine so engineers could ultimately do their own 3D visualization, later named Beyond CAD. In the early phases of development, I tried to think through every problem faced in 3D visualization in our industry and how many of them could be tackled by this single visualization engine. During this process I thought of the typical sections we had created at Civil FX and how (relatively) easy it would be to make a drag-and-drop section application that could make this process much more efficient. I added it to the list of features I hoped Beyond CAD would offer as we moved longer in development.

We started development of the typical section creator feature early in the process of Beyond CAD planning. While I would discuss this idea or show early prototypes or mockups, this typical section creator largely sat on the shelf for much of 2021. Of all the features I was building and showing progress, the 3D typical section creator seemed to have the most interest and questions and eventually I ramped up development with two full-time developers.

As this 'feature' continued to progress, two things became imminently clear 1) this was more than a feature and could be a stand-alone application and 2) some potential users of this typical section creator application wouldn't be potential Beyond CAD users. We split out the feature into its own application and 'Beyond Typicals' was born (Figure 3).

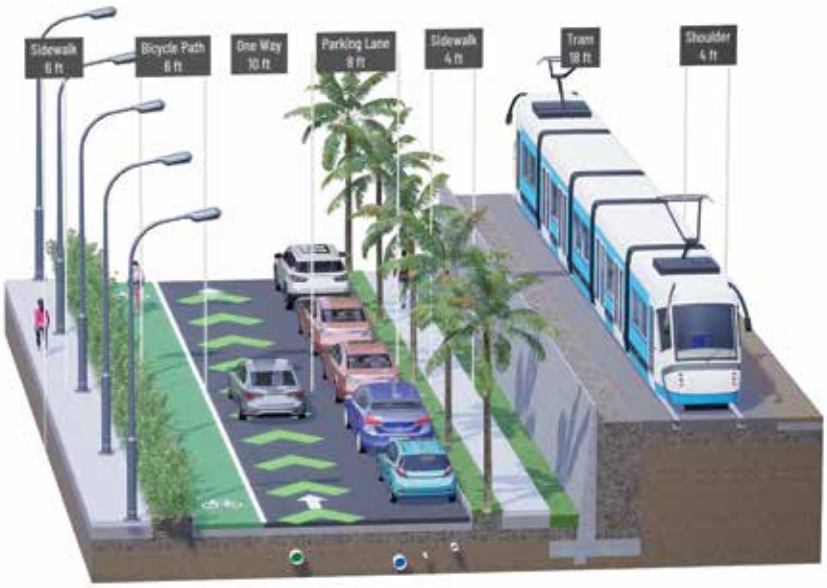


Figure 3

I also started sharing progress on LinkedIn (including a video of my 9 and 7 year old children using it with little effort) and started seeing signs of incredible interest in this product. While there have long been 2D typical street creators, a fully animated 3D typical section creator was something not seen before, and the interest showed.

Figure 4

MORE THAN A ROADWAY SECTION CREATOR

As we started making Beyond Typicals available to Beyond CAD subscribers the real feedback started coming in. Many would offer some complaints of bugs and missing features but also attached pages and pages of thoughts and ideas to make this better. The potential, it seemed, was surpassing the frustrations of early software. Not only were beta users surprisingly excited about this 2nd product that was basically an afterthought, but they were also using it in ways we hadn't even imagined. With my background in roadway design and 3D visualization I had been designing Beyond Typicals to be a platform where typical sections could quickly be mocked up and rendered to image or video. What we heard back from our testers, however, was that they were rarely using this for roadway typical sections but most often for real-time urban design and planning.

It seems, quite possibly, that we had accidentally and unknowingly designed an urban planning tool (Figure 4).

We soon started integrating these types of feature requests and feedback and it became even more robust for real-time coordination scenarios. And while Beyond Typicals is currently only available via PC application we are actively working to make it available via the web as well for even more accessibility.

CONCLUSION

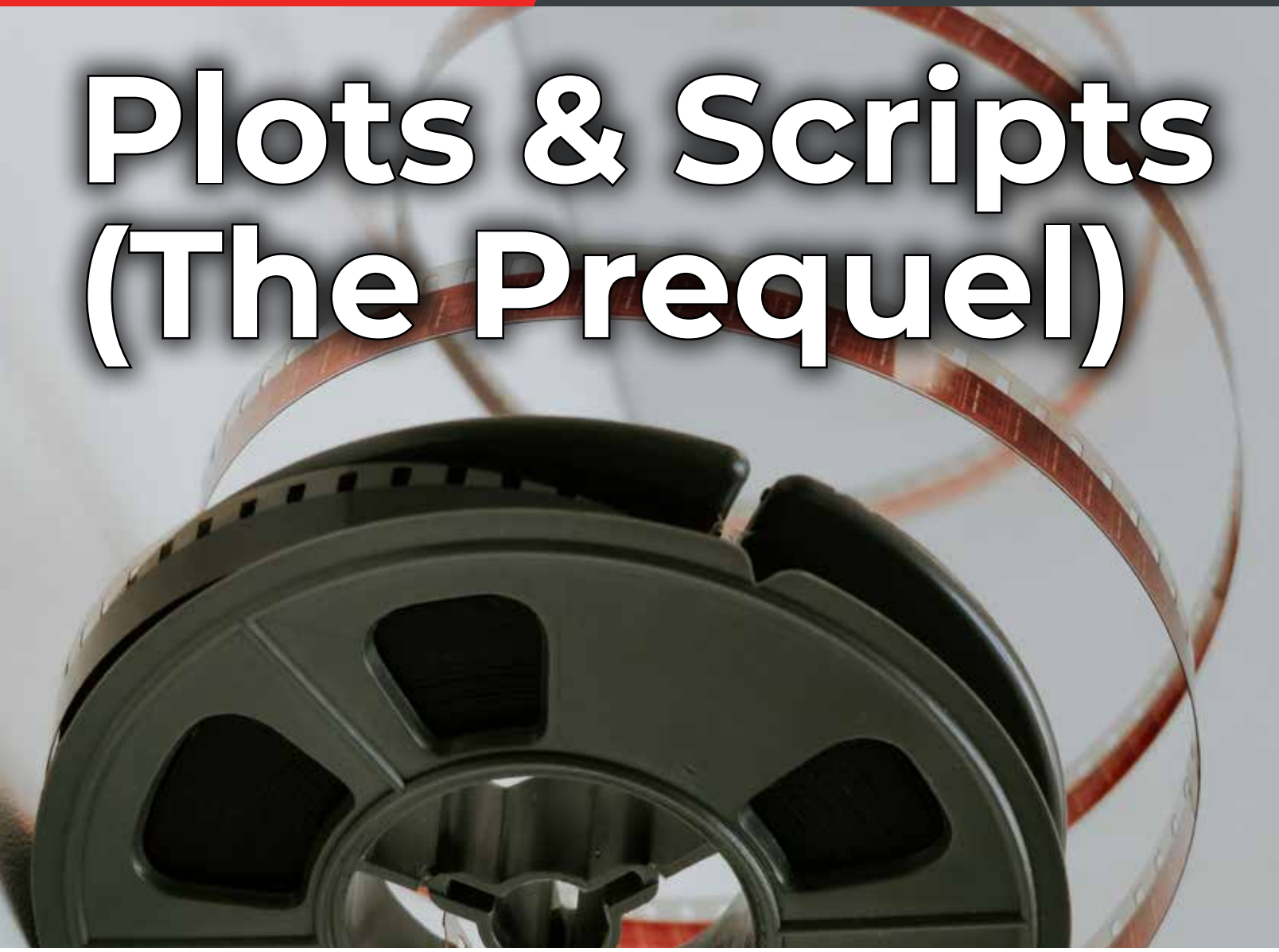
Street projects are easily explained using 3D typical sections, and that is the current focus of Beyond Typicals, but there are so many other elements of civil engineering that can be explained using sections, such as bridges and dams. Hopefully Beyond Typicals (or similar software) will soon be available to tackle these industry-specific visualization problems as well. But, even now, many visualization teams and software solutions stand ready to communicate any kind of typical section design for civil projects.

One- or one hundred- foot sections at a time.

Sam Lytle, PE, is the founder and creator of Beyond CAD, a brand-new better 3D visualization tool for civil engineering projects. Prior to becoming a software publisher, Sam started and later sold Civil FX (now a division of Parametrix) which provided 3D visualization for transportation and other civil projects. Sam has worked in the public and private sector building interactive visualization workflows and teams over the past decade following his graduation from the University of Nevada, Las Vegas with a Bachelor of Science in civil engineering. Sam lives in southern Nevada with his wife and 4 kids and enjoys basketball, golf, and community service.

by: Paul Li

Plots & Scripts (The Prequel)



MOVIEGOERS

Moviegoers are usually thrilled to hear of new "Plots & Scripts" to prequels or sequels of movies they love. Many would die for having the inside scoop on the upcoming plot twists or get their hands on initial rough drafts of scripts, so they know what to expect next. But for AutoCAD users the phrase "Plots & Scripts" not only have a completely different meaning but may even send chills up their spines.

PLOTTING IN THE BLIND

Before I continue, let me provide a bit of historical background to plotting with AutoCAD. Since the initial release of AutoCAD version 1 back in 1982 through version 11 in 1990, the program would launch and land on this dull, text based, numeric command and keyboard driven page called Main Menu (see Figure 1).

```
Copyright (C) 1982,83,84,85  Autodesk, Inc.
Version 2.18 (11/1/85) IBM PC
Advanced Drafting Extensions 3
Serial Number:  01-746204

Main Menu

  0.  Exit AutoCAD
  1.  Begin a NEW drawing
  2.  Edit an EXISTING drawing
  3.  Plot a drawing
  4.  Printer Plot a drawing

  5.  Configure AutoCAD
  6.  File Utilities
  7.  Compile shape/font description file
  8.  Convert old drawing file

Enter selection:
```

Figure 1: AutoCAD 2.1 Main Menu

To plot a drawing, you would have to use your keyboard, hit the number 3 for "Plot a drawing", correctly type in the drawing name and properly respond to a number of plotting parameters. If you mistakenly entered an incorrect parameter at one of these steps, there was no going back. You would have to cancel the plot command and start from number 3 again.

Even after you correctly entered all the plotting parameters, you still have to wait a while for the computer to process the drawing data. Now keep in mind that all these steps were done in the blind without any graphic user interface (GUI) and there was no option to do a preview before output.

But still the plotting procedure is not over. Because now you'll have to wait for the plotter to receive this data and process the information before finally spitting it out onto a sheet of paper. I recall there were many instances when what came out on paper was not what I wanted so I would have to go back to AutoCAD and start the whole process all over again from number 3.

ANCIENT PLOTTER TECHNOLOGIES

The other impediment that slowed the entire plotting process down was the plotter itself. Back in the mid 80's to early 90's there were two major competing types of plotters on the market: Electrostatic and Pen. Electrostatic plotters though fast in output produced very low-quality plots. Pen plotters on the other hand though slower in output produced very high-quality plots. Many offices at the time chose to go with the pen plotter for the higher quality needed to impress their clients.

Figure 2: Plotter Ink Pen Carousel Carriage

I remember the first office I worked at in 1988 had such a pen plotter. There would be a pen carousel carriage holding various ink pen sizes (see Figure 2).

Though it was truly mesmerizing watching the plotter magically spin the carousel and automatically swap out pens at will throughout the plot output process, there would be no warning when the ink would suddenly run out. Amazement would instantly turn into horror as you saw the ink dry up and stop drawing on the sheet of paper. Unless you had purposely saved the plot file beforehand as a PLT file (which took up an enormous amount of space and back in those days hard drive space was a precious commodity) you would then have no choice but start the entire lengthy plotting procedure all over again from the top at number 3.

PLOTTING ENHANCEMENTS

After about a decade from the first release, AutoCAD finally offered some major plotting enhancements. Beginning with Release 12 in 1992 the program at startup would no longer land on the keyboard driven Main Menu text screen. Instead, AutoCAD started up in the graphic drawing area. You now can take full advantage of using your mouse to select commands from the graphic menus, i.e., side screen menus and top dropdown menus (see Figure 3).

Figure 3: AutoCAD R12 Graphic Drawing Screen

Furthermore, AutoCAD developed new commands that would implement the use of dialog boxes as

the GUI. The Open command was one of these new commands. For the first time users can now visually see folder and file structures from within AutoCAD's graphic drawing area. Then with simple mouse clicks users can navigate and easily select a drawing file to open. There was no longer the need to go back to the Main Menu, hit number 2 on the keyboard to "Edit an EXISTING drawing" and tediously type in the entire path and drawing file name (see Figure 4).

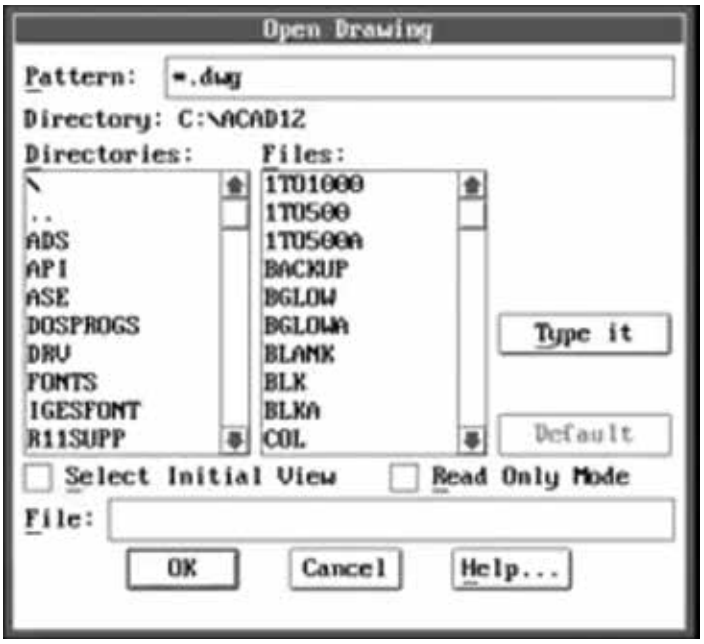


Figure 4: AutoCAD R12 Open Command.

Also, many existing commands were literally given a facelift. The Plot command was one of these existing commands. You finally can see all the plot parameters presented in a single GUI for selection. This eliminated the possibility of mistakenly typing in an incorrect response to one of the many plot prompts forcing you to start all over again. To top it

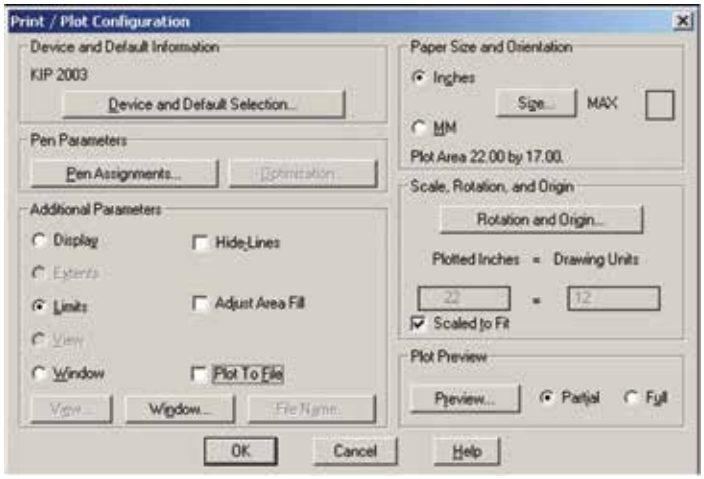


Figure 5: AutoCAD R12 Plot Window

all off, there was even a plot Preview feature. Now you no longer need to guess what might come out of the plotter. Instead, you can actually view the result on the screen before sending the file for plotting. Note: Zoom and Pan features from within the Plot Preview window were later added in AutoCAD R14 (see Figure 5).

But unfortunately, from AutoCAD 2000 to 2006 Autodesk revised the Plot GUI to incorporate tabs on the Plot window. These tabs were labeled as Plot Device and Plot Settings separating various plot parameters into two windowpanes (see Figure 6). This caused quite a bit of confusion since not all the parameters could be seen on a single window. Oftentimes users including myself would forget that selecting the parameters on the Plot Device tab is not enough. But there were actually more parameters that needed to be selected on the Plot Settings tab before sending the file to the plotter. In addition, having to select tabs to switch between panels was quite cumbersome to say the least. When you're on the Plot Device tab you would be thinking: Now what did I select as the paper size? Or when you're on the Plot Settings tab you would forget what pen settings you chose on the Plot Device tab.

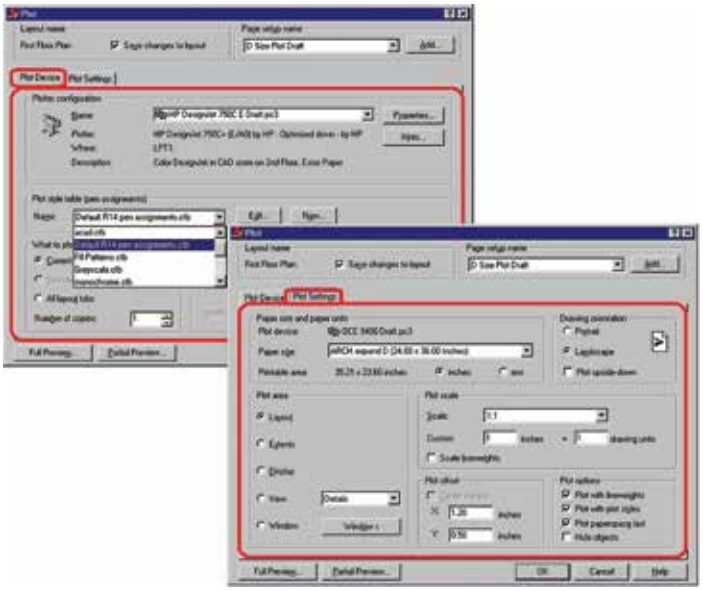


Figure 6: AutoCAD 2000-2006 Plot Window

After more than six years of this Autodesk finally heard the end users outcries and revised the Plot GUI once again. Starting with AutoCAD 2007 to the current version, there would be no more tabs on the Plot window. Instead, a selectable arrow

is positioned in the lower right corner of the Plot GUI providing users with the option to click on the arrow to reduce or expand the window. Expanding the Plot window would reveal on the right the

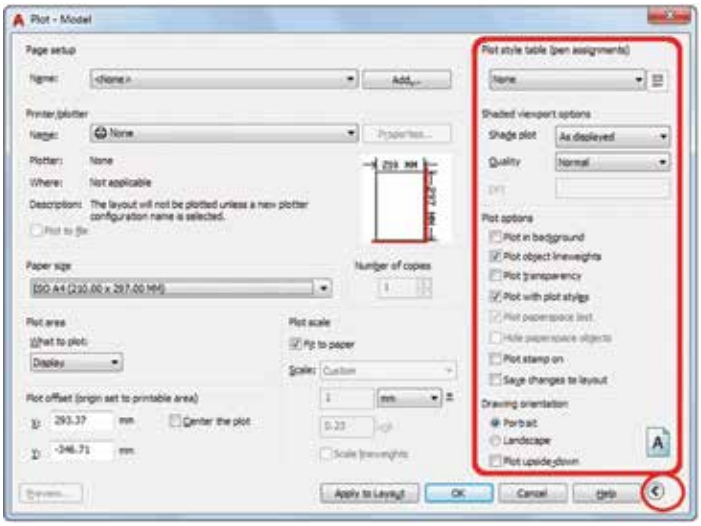


Figure 7: AutoCAD 2007-2022 Plot Window

Plot style table (pen assignments) column (see Figure 7). I would typically leave the plot window fully expanded. I don't see any logic with a smaller Plot window nor a need to hide the parameters under the Plot style table column. (Perhaps Autodesk's programmers wanted to flex their muscles to demonstrate how the window can be easily designed to expand and collapse? FYI: The same unusual expand and collapse feature is also implemented with the Hatch GUI.) Now I can once again see and have the option of selecting all the plot parameters in a single window just like it was back in AutoCAD R12.

Another major plotting enhancement Autodesk implemented started with AutoCAD R14 in 1997. Included in the full install was a little program called Extended Batch Plot Utility. Though Extended Batch Plot Utility can be launched from outside of AutoCAD, it still required AutoCAD to be installed in order for it to function properly. The task it performed was exactly as its name. Extended Batch Plot Utility for the first time gave users the ability to select multiple drawings to send to the plotter all at once without the need to manually open each drawing from the AutoCAD command prompt. But since R14 did not have the ability to save plot settings from within the drawing file, the last plot settings used was the only implementation supported.

Oftentimes users including myself would forget that selecting the parameters on the Plot Device tab is not enough. But there were actually more parameters that needed to be selected on the Plot Settings tab before sending the file to the plotter.

Then when AutoCAD 2000 came out there were several plot setup changes. For example, the new PC3 and CTB+STB files replaced the old PC2 & PCP files and Page Settings were added to save plot settings from within the drawing file. To accommodate for all these changes, Extended Batch Plot Utility was redesigned and given a shorter name of Batch Plot Utility. But like the previous version, Batch Plot Utility can only be launched from outside of AutoCAD as a separate program. As was the case with R14, many users were not aware of this little utility gem in 2000 since it wasn't a command that can be run from inside AutoCAD. They would actually have to go looking for it under AutoCAD's program window (see Figure 8).

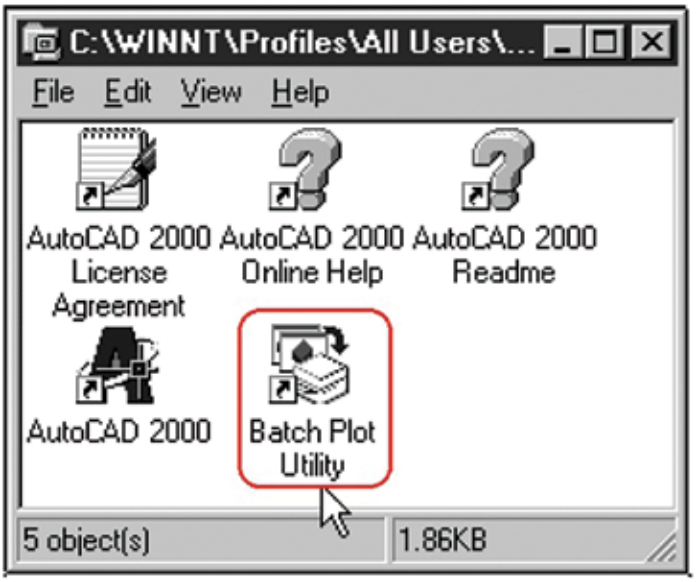


Figure 8: AutoCAD 2000 Batch Plot Utility

Batch Plot Utility's GUI conveniently positioned all the controls making everything accessible starting from the top left corner of the window. In addition to dropdown menus, there were also a number of buttons to add drawings and save the current project to be retrieved for batch printing again at a later date (see Figure 9).

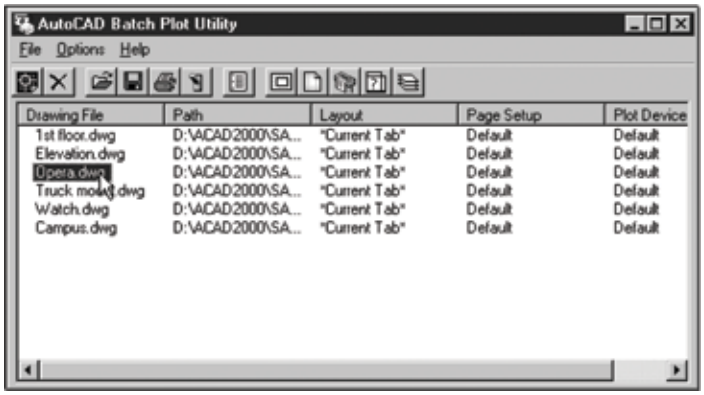


Figure 9: AutoCAD 2000 Batch Plot GUI

But one very important feature offered in R14's Extended Batch Plot Utility that 2000's Batch Plot Utility dropped was Plot Stamping. I found the ability to label a plotted sheet with the Plot Stamping information to be very helpful. I can trace back to the user who logged in to create the print job as well as reference the drawing file name where the print job came from. I wonder why Autodesk chose to drop this very important feature from this utility in AutoCAD 2000 (see Figure 10).

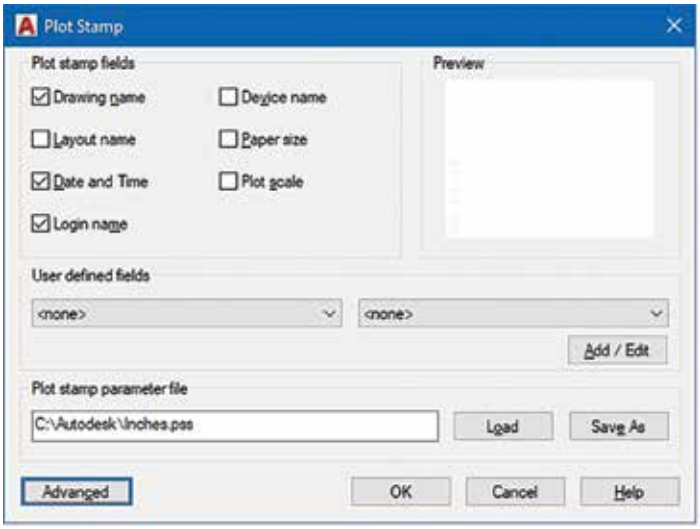


Figure 10: AutoCAD Plot Stamp

Now what I really liked about both Batch Plot utilities was that each offered an option to select certain Layers to not plot before the batch plotting process began. This way I could avoid the laborious task of manually opening each drawing to set the Layers On/Off status first before plotting. But there were two drawbacks to this feature. The first was that you had to select one drawing at a time to review and apply the Layer On/Off controls. The second was there was no option to enter wildcard characters to filter out Layer names to apply the On/Off settings (see Figure 11).

Figure 11: AutoCAD 2000 Batch Plot Layer Option

The Batch Plot Utility was such a welcomed addition that Autodesk decided to include this as a new command called Publish that would run from inside AutoCAD 2004. But the Publish command offered a completely different GUI than Batch Plot. Now all the controls moved from the top of the window to the bottom and all the dropdown menus were eliminated (see Figure 12).

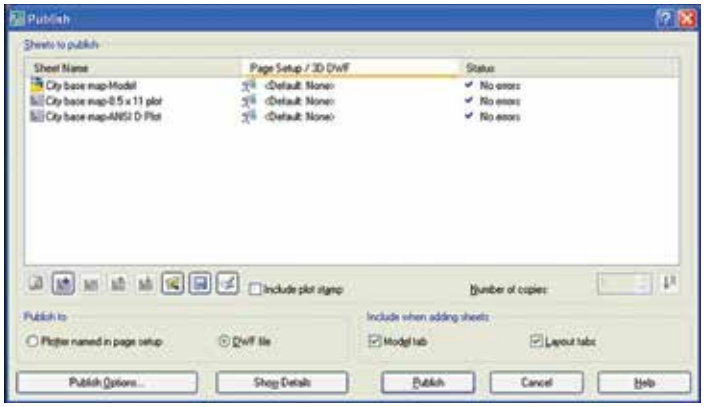


Figure 12: AutoCAD 2004 Publish GUI

Though Publish brought back the Plot Stamping feature, having to learn a whole new GUI was a major setback. But the biggest shock of all was that the Publish command dropped Batch Plot's Layer control option. I had hoped that Autodesk would have added more Layer control features like support for Layer filtering and the ability to select

multiple drawings for Layer On/Off control before plotting. But unfortunately, none of this happened.

Also initially, Autodesk wanted to push their own digital portable document format (PDF) called Design Web Format (DWF) as a standard for distribution of plotted files. So, in addition to sending batch print jobs to the plotter the Publish command was purposely designed to facilitate the creation of DWF files. To try and get everyone to jump on board the DWF bandwagon Autodesk even offered a free viewer called Design Review which you still can download today: Download Design Review | DWF Viewer | Autodesk. But in the end Autodesk's efforts proved ineffective. The popularity of Adobe's PDF had spread rapidly to the design and construction industry. Everyone preferred PDF over DWF. So, Autodesk eventually built into AutoCAD a number of PDF output devices and again reworked the Publish command GUI to support not only DWF, but PDF output as can be seen in the current Publish command in AutoCAD 2022 (see Figure 13).

Figure 14: HP DesignJet 650c Plotter Cartridges

NEW AND IMPROVED PLOTTERS

As the AutoCAD software provided improved plotting enhancements, technological advancements appeared on the plotting equipment as well. Pen plotters were soon replaced with faster and more affordable ink jet plotters that matched the pen plotters' quality. The first ink jet plotters I used were the HP Designjet 600 (monochrome) along with the companion 650c (color). These were not only faster but they offered additional intelligence such as detecting ink cartridge settings. The DesignJet plotter is equipped with the ability to detect when ink is not spraying out properly from an ink cartridge and would prompt you with a Service Pens message. This is especially helpful when ink cartridges approached empty and needed to be replaced (see Figure 14). Now you won't have to deal with ink running out in the middle of a print job.

Also by the late 90's another even faster monochrome plotter began to hit the market. This technology was based on the implementation of Light Emitting Diode (LED) toners which is similar to a copy machine. The Xerox 8825 was such a plotter the office I worked at acquired at the time (see Figure 15). Though the Xerox 8825 footprint was extremely small,

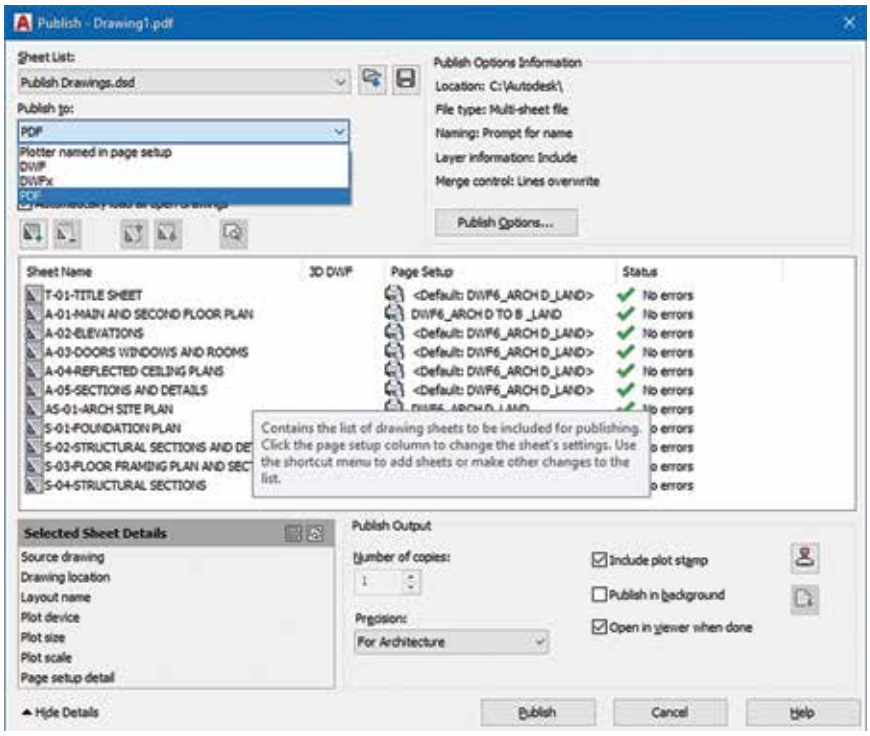


Figure 13: AutoCAD 2022 Publish GUI

Figure 15: Xerox 8825 Printer

it offered two metal drawers that each held a roll of paper up to 36" in width. There was even a model called 8830 that offered three metal drawers. To speed up the plot data processing, this also came with a companion computer which ripped the data received for each print job. The documentation even claimed that it was 5 times faster than the ink jet and I saw this unbelievable plotting speed happen before my eyes. Instead of standing there waiting for the HP DesignJet to spray the ink cartridges back and forth across the width of the sheet till the length of the print job is completed, the Xerox LED plotter would process the print job received in seconds and then the entire sheet would just "ooze" out completely done.

STILL NOT GOOD ENOUGH

Even with all these software enhancements and hardware advancements increasing the speed of the plotting process, generating output from drawing (DWG) to a hardcopy set whether for internal office review or as required by the client is still extremely time consuming. The process always relied heavily on human intervention. I recall many times when there would be a team meeting early Friday morning. The project manager would set a deadline for a plot set for review by 3pm that afternoon. Immediately everyone would scramble and go into panic mode. Because not only would the staff need time to complete the task of many drawing revisions, but now they've been given the extra laborious task of plotting. Since AutoCAD's Publish command lacks the capability of adjusting Layer settings prior to sending drawings to the plotter, the only option was for each AutoCAD user to manually open the drawings they worked on, make sure Layer settings appeared correctly, create the plot file while they're in the drawing and then hope for the best that it'll come out looking perfect – which rarely happens. Usually when the clock struck 3pm there was still not a single sheet successfully printed for review.

SCRIPTS & PLOTS

So you may ask: What do Scripts have anything to do with Plots? Can Scripts help improve the plotting process? Are Scripts the holy grail for today's Plot conundrum? What are Scripts anyways? Well to find out, you'll just have to wait to read "the sequel" that will appear on next month's issue of *AUGIWorld*.

TO BE CONTINUED (I hope) ...

Mr. Paul Li graduated in 1988 from the University of Southern California with a Bachelor of Architecture degree. He worked in the Architectural field for small to midsize global firms for over 33 years. Throughout his tenure in Architecture, he has mastered the use and customization of AutoCAD. Using AutoLISP/ Visual Lisp combined with Dialog Control Language (DCL) programming he has developed a number of Apps that enhance the effectiveness of AutoCAD in his profession. All the Apps actually came out of meeting challenging needs that occurred while he worked in the various offices. He has made all the Apps available for free and can be downloaded from the Autodesk App Store. Though he recently retired from the Architectural profession, Paul continues to write articles depicting his past work experience. Some of these articles can be found in AUGIWorld Magazine where he shares his knowledge learned. Paul can be reached for comments or questions at PaulLi_apa@hotmail.com.

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