

CES467175

## Civil 3D: Tips, Tricks, and Unnatural Acts

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### Learning Objectives

- Learn how to automate several tasks
- Learn how to make more use of underutilized features
- Learn how to use several standard functions in new ways
- Discover several useful undocumented commands

### Description

This session is dedicated entirely to productivity techniques that will help improve your daily operations when working with Civil 3D software. These tips include automating regular tasks, using standard functions in new ways, exploring underutilized features, and even exploiting a handful of undocumented commands. We'll present the information using a real-world problem-solving context, rather than simply going feature by feature, so you can fully appreciate the "why" in addition to the "how." Come join us for this 60-minute session as we show you numerous ways to help you get the most from your Civil 3D investment.

### Speaker(s)

[Jerry.Bartels@autodesk.com](mailto:Jerry.Bartels@autodesk.com)

For more than 30 years, Jerry has worked in all areas of civil engineering, surveying, and mapping, providing clients with services in CAD management, implementation, and network administration. He also has more than 10 years of experience teaching Autodesk products, as well as developing curriculum. He has received several awards from Autodesk for his presentations.

[Jeff.Bartels@autodesk.com](mailto:Jeff.Bartels@autodesk.com)

For more than 20 years Jeff Bartels has worked in the civil infrastructure industry. Before coming to Autodesk, Jeff served as the CAD manager for a civil engineering and consulting firm in Illinois. He was one of the early adopters of Civil 3D, migrating his firm to a BIM related workflow in 2008. Since 2008, he has published 25+ titles on AutoCAD and Civil 3D.

[Alan.Gilbert@autodesk.com](mailto:Alan.Gilbert@autodesk.com)

Alan is an Autodesk Technical Specialist supporting the efforts of the AEC sales team. This coverage includes everything from small engineering firms up to large government customers such as departments of transportation. He is registered as a Professional Engineer and Professional Land Surveyor in the state of Alabama.

## WELCOME!

Welcome to the 2020 “Socially Distanced” version of Civil 3D: Tips, Tricks and Unnatural Acts supporting documentation officially referred to as “The Handout”. This documentation will help support what is contained in our presentation. In this year’s edition, we have broken up the presentation into three Acts. Act One includes the content (scenes) covered by Jerry Bartels. Act Two is dedicated to Alan Gilbert’s content and Act Three includes the material presented by Jeff Bartels.

## LEVEL SET:

## PHILOSOPHY

When presenting a topic, especially AU sessions, we go to great lengths to cover the material in as clear and concise manner as possible. During the session we will describe not only what we are picking on but why we are doing it. In all cases, the in-product demo portion is recorded in one take. (i.e. No steps have been skipped or edited out.) In short, the live presentation / recorded is the best resource for learning what we demonstrate. Our philosophy is that a presentation handout “supports” the presentation and is not a “replacement” for the demonstration. As such, this document will contain resource information to help supplement what is covered. It will not contain step by step instructions on executing commands. (Because you will already have that in the recorded session 😊)

## STYLE

Two important things to remember about our sessions. First, during the presentation, we will be using Civil 3D 2021. Having said this, everything we show will be applicable to past versions of Civil 3D. In other words, if you are not using the most recent release of Civil 3D, that will not be a problem. If for some reason we delve into any content that is specific to Civil 3D 2021, we will be certain to point that out.

Second, when working the datasets, we generally rely on examples that are abstract. We do this intentionally because we want to focus on using a particular tool and not on a specific design situation.

## DELIVERABLES

In addition to the presentation recording and this handout, you will also have access to any of the dataset files we created/used during the presentation. This also includes our PowerPoint deck. Note: If you have not attended one of our sessions in the past, we are big fans of a “PowerPoint Free Zone”. As a result, the vast majority of our presentation is in-product demonstration.

Now that we are all on the same page (literally 😊) let’s get started....

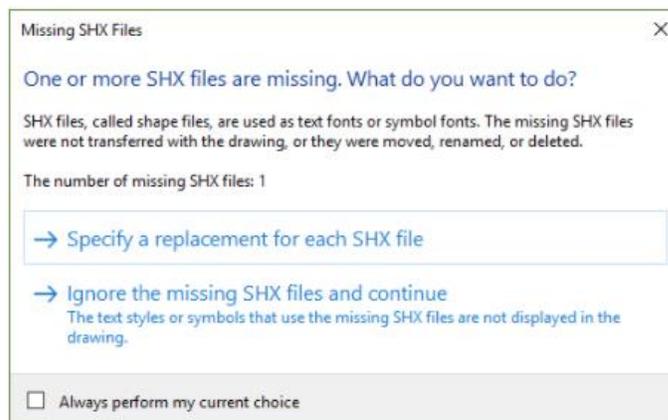
## ACT ONE: Jerry Bartels

### Scene One: Creating custom content.

In this portion, I walk through the process of creating custom linetypes within Civil 3D. This includes linetype definitions including text and symbols.

#### Why??

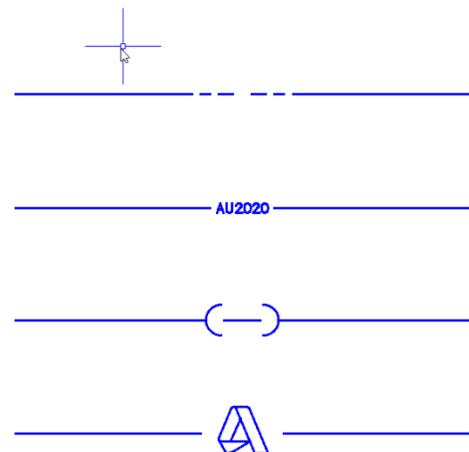
While Civil 3D ships with default content, it may not always include what you need to meet your requirements or match a particular standard out of the box. Additionally, once custom linetypes are being used, we need to make sure that they are portable. Have you ever opened a file and received the missing .SHX error? Me too! It is never fun especially if it is your client who is seeing it when looking at your files. (Missing .SHX files are not always text fonts!!)



#### How??

To create custom linetypes is actually easier than you think. I begin by creating a new drawing and setting the [LTSCALE](#) set variable to 1. I then create a dashed or hidden line to use as a reference. This standard dashed is a visual reference I can use when creating my new linetypes.

From there, I literally draw how my new linetypes should look. In this case, I created a custom skip-dash line, a custom line with text and two custom lines containing symbology.



After I create my geometry, I then use two “Express Tool” commands to convert my geometry into custom linetypes. These tools include “Make Linetype – [MKLTYPE](#)” and “Make Shape – [MKSHAPE](#)”

Using the MKLTYPE command, I can simply select the geometry and text to create new linetypes containing line segments only or line segments containing text. The workflow to accomplish this is shown multiple times in the session recording.

#### **Key takeaways:**

- When you create a custom linetype using the MKLTYPE command, it creates a new .LIN file for each linetype. Unfortunately, it will not append to the end of an existing .LIN file. As a result, if you make 10 custom lines, you will have 10 new .LIN files. (Don’t worry, we will talk about how to merge them later)
- When creating a custom linetype containing text. The text style you use must have a height of 0. If the height is set to something other than 0, the text height will not update properly when changing LTSCALE. (You will end up with microscopic or giant text.)

If my custom linetypes include symbology, I must first convert that symbology into a [SHAPE](#). I accomplish this by using the MKSHAPE command. Once the symbology has been converted and then reinserted as a SHAPE, I can use the MKLTYPE command to create the new custom linetype. The workflow showing how to use the MKSHAPE together with the MKLTYPE command is shown multiple times in the session recording.

#### **Key takeaways:**

- When you create a SHAPE using the MKSHAPE tool, a corresponding .SHP and .SHX file are created. The .SHP file is the code necessary to define the SHAPE. (You can view this in Windows Notepad. The .SHX file is a compiled version of the .SHP and is the file AutoCAD/Civil 3D will refer to in the future when using calling the SHAPE. Note: Because the .SHX file is what the system will use in the future, the .SHP files are no longer required.
- Every time you create a new SHAPE an .SHP and .SHX file are created. In other words, you cannot append them together automatically when created. As a result, if you create 10 custom SHAPES, you will have 10 .SHP files and 10 .SHX files. (Don’t worry, we will talk about how to merge them later)

Now that our custom linetypes are created, we are done. In the future, if we would like to use one of these new custom linetypes, we can access the appropriate .LIN file (and as long as your system can locate any required .SHX files) and choose the custom linetypes we would like to

use. I put the caveat in there because the inability to find the .SHX file will cause the resulting custom linetype containing a SHAPE to fail.

Sooooo, Technically, we are done but we are left with a stack of .LIN, .SHP and .SHX files. We also have the previously mentioned caveat to deal with. Good, but certainly not great.

### Let's make it better!

First, let's simplify things. We will begin by using notepad to merge all of the .LIN files into a single .LIN file. We will do this using Windows Notepad and some Copy and Pasting. The complete workflow is shown in the presentation recording. When finished, we have a single .LIN file that contains all of our new custom linetypes.

```
*AUMaster.lin - Notepad
File Edit Format View Help
*AU-LOGO,Autodesk University
A,4.079849,-.920151,[LOGO,C:\AU2020\AULogo,s=1,r=360],-.920151
*AU-CORP,corp limits
A,4.2,-.8,[CORP,C:\AU2020\AUCORP,s=1],-.8
*AU-TEXT,Desc
A,4.285502,-.152594,["AU2020",Standard,y=-.1,s=.2,u=0],-1.276403
*AU-SKIPDASH,Boundaries
A,3.885453,-.2,.2,-.2,.314547,-.4,.314547,-.2,.2,-.2
```

### Key takeaways:

- Each custom linetype is defined by 2 lines in the .LIN file.
- Make sure that you do not leave any blank lines or extra characters between line definitions when doing your pasting.
- When using this .LIN file in the future. If you receive an error, the system will tell you exactly which line number contains the error. Because you created this file using Cut and Paste, the error will generally be the result of missing or unnecessary characters.

Next, we will merge all of our custom .SHP files together into a single .SHP file. We will accomplish this using the same process we did previously. Back to Windows Notepad! When finished, we have a single .SHP file. (In this case called AUMaster.SHP)

```
AUMaster.shp - Notepad
File Edit Format View Help
*1,116,CORP
4,125,4,80,3,125,3,50,3,128,002,9,(37,-27),(0,0),001,9,(4,0),(4,1),(8,4),(6,6),(4,8),(1,4),(0,9),(-1,4),(-2,4),(-2,3)
(-6,6),(-8,4),(-4,1),(-4,0),(0,0),002,9,(-74,0),(0,0),001,9,(-4,0),(-4,-1),(-8,-4),(-6,-6),(-4,-8),(-1,-4),(0,-9),(1,-4)
(2,-4),(2,-3),(6,-6),(8,-4),(4,-1),(4,0),(0,0),002,9,(5,27),(0,0),001,9,(64,0),(0,0),002,9,(-32,0),(0,0),001,4,128,4,50
4,125,3,80,3,125,0
*2,220,LOGO
4,125,4,80,3,31,3,11,3,27,3,128,002,9,(-21,-45),(0,0),001,9,(-13,-6),(0,0),002,9,(-8,3),(0,0),001,9,(1,-2),(2,-1),(5,0)
(0,0),002,9,(-26,35),(0,0),001,9,(18,-32),(0,0),002,9,(21,3),(0,0),001,9,(41,25),(0,0),002,9,(0,0),001,9,(-75,0),(0,0)
002,9,(88,-30),(0,0),001,9,(34,0),(0,0),002,9,(-89,120),(0,0),001,9,(33,0),(0,0),002,9,(-41,-90),(0,0),001,9,(25,59),(0,0)
002,9,(-56,-50),(0,0),001,9,(0,-3),(1,-3),(2,-2),(3,-1),(0,0),002,9,(38,86),(0,0),001,9,(-2,3),(-2,1),(-6,-2),(-1,-2)
(0,0),002,9,(-33,-77),(0,0),001,9,(33,77),(0,0),002,9,(61,-116),(0,0),001,9,(-50,116),(0,0),002,9,(34,0),(0,0),001,9,(-1,2)
(-1,1),(-2,1),(-2,0),(0,0),002,9,(56,-120),(0,0),001,9,(-50,116),(0,0),002,9,(-17,-66),(0,0),001,4,128,4,27,4,11,4,31
3,80,3,125,0
```

### Key takeaways:

- Besides cutting and pasting, you will need to perform one edit. At the beginning of each SHAPE definition, the file contains an index number. Because each .SHP file we created only had a single SHAPE definition, all of your files will have an index number of 1. All you need to do is increment this number by 1 for every additional SHAPE definition you add to the file. (If you look at the graphic above, you will see I changed the index number from \*1 to \*2.)
- Make sure that the last line in the file ends with an Enter.

Once the combined .SHP file is complete, we need to compile it into an .SHX for us to be able to use it. This process is shown in the session recording. It is accomplished using the [COMPILE](#) command in Civil 3D. Essentially, you run the command and then select the file you want to compile. Like before, if you made a mistake, the COMPILE command will tell you exactly which line number it is on.

Finally, we need to perform a small edit to the .LIN file so that it points to our new AUMaster.SHX file anytime it requires a .SHP. This is another simple Windows Notepad task.

```
AUMaster.lin - Notepad
File Edit Format View Help
*AU-LOGO,Autodesk University
A,4.079849,-.920151,[LOGO,AUMaster,s=1,r=360],-.920151
*AU-CORP,corp limits
A,4.2,-.8,[CORP,AUMaster,s=1],-.8
*AU-TEXT,Desc
A,4.285502,-.152594,["AU2020",Standard,y=-.1,s=.2,u=0],-1.276403
*AU-SKIPDASH,Boundaries
A,3.885453,-.2,.2,-.2,.314547,-.4,.314547,-.2,.2,-.2
```

If you compare the graphic above to the previous graphic of the master .LIN file, you will see that I replaced the two “fixed path” locations with our new AUMaster.shx name.

We have now successfully consolidated all of our files such that we have a single .LIN and single .SHX file. From this point forward, when sharing .DWGs with your clients/subs, you need only provide them a single .SHX file. (rather than a folder full) You don’t even need to share the .LIN file unless you would like them to be able to use your custom linetypes in new .DWGs of their own.

FYI-

In the session recording, I show how to add your new files to the AutoCAD/Civil 3D “Support files folders” using the [OPTIONS](#) command to make them even easier to find and use. I’m not going to document that process here as it is in the video and I’m pretty sure most folks already know how to do that. 😊

## What if I don't have the .SHP files anymore!

I can already hear some folks yelling.... "Jerry, where were you 10 years ago when I created all of my custom linetypes!" In the past, some folks may not have been aware that .SHP files could be consolidated into a single .SHX. As a result, when sharing their .DWGs, they need to include a stack of .SHX files. (Certainly not as portable or elegant as only needing a single file)

The quick answer would be for them to just compile them now. However, if you remember from earlier, once the .SHX files are created, the .SHP files are no longer necessary. Over time, "unnecessary" files are often deleted. Is there any way to consolidate a stack of .SHX files into a single .SHX file without the .SHP files? Unfortunately No.

Still, there is hope. There is a relatively unknown Express tool that can help. I believe it is the only external express tool which is why most folks have never seen or heard of it. The tool is called [DUMPSHX](#). The tool's only purpose is to decompile .SHX files back to .SHP files.

Knowing this, if we can convert our existing .SHX files back to .SHP files, we can use the consolidation process we used earlier to create a single all encompassing master .SHX file.

## Where do we find the DUMPSHX tool?

If you are using Civil 3D 2021, it is under C:\Program Files\Autodesk\AutoCAD 2021\Express

 dim3d.arx	8/3/2020 2:58 AM	AutoCAD runtime...	97 KB
 dumpshx.exe	8/3/2020 2:47 AM	Application	81 KB
 dwglog.arx	8/3/2020 2:58 AM	AutoCAD runtime...	26 KB

## What do we do with the tool?

Copy it to the same folder as your .SHX files

## How do we use it?

The command syntax is as follows.... Dumpshx -o output filename input filename  
So to decompile Custom.SHX, you would run Dumpshx -o Custom.shp Custom.shx

## How do I do that using Windows?

Unfortunately, you can't. Because of the tool's "vintage", it must be run in DOS. To accomplish this, you must run CMD in Windows to launch the Command Prompt Window. From there you will need to navigate to the folder that contains your .SHX files and DUMPSHX tool. Once there, you will run the tool for every .SHX file you need to decompile. After writing it down, it seems both simple and complex. (Because of the DOS) Don't worry, I walk through the entire process in the session recording.

## ACT ONE: Jerry Bartels

### Scene Two: Searching Contents of Multiple DWGs

In this portion, I walk through the process of searching a folder full of .DWGs for a .DWG containing a specific Text String.

#### Why??

Sometimes we need to locate (usually older) drawings based on limited information. In some cases just a vague memory. 😊 This information can include a street name, client name, sub consultant name, project name.... In short, "I remember the model was adjacent to Roosevelt Rd." but I don't know which one it is.

Wouldn't it be great if we could just point AutoCAD/Civil 3D at a folder of files and have it quickly search the contents of every file for any containing Text or Mtext using the keyword Roosevelt? We can!

#### How??

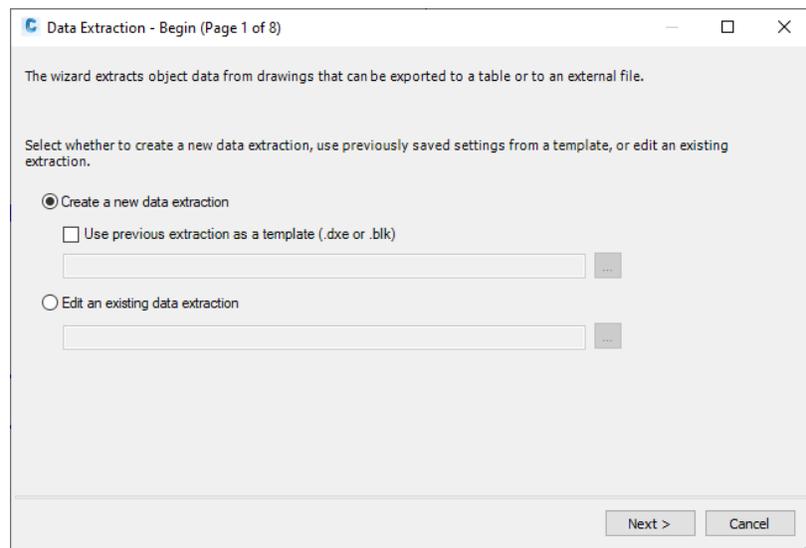
We will accomplish this by exploiting the [DATAEXTRACTION](#) tool. If you have used DATAEXTRACTION tool in the past, it is truly an incredible tool. It allows you to quickly search the contents of .DWGs for many things including Drawing Properties, Blocks, Geometry, Text, Attributes, Xrefs and more. You can even limit/filter a search to include only Model Space entities or All Entities. Once all objects are identified, you can select exactly what you would like to extract and save that to a Table or an external Excel (.XLS) file.

A complete discussion of the DATAEXTRACTION command is outside of the scope of this session. Having said this, if you have not used it in the past, I would strongly encourage you to invest some time researching the tool so you can have a more complete picture of everything it can accomplish.

For our purposes today, we will extract all of the MTEXT and TEXT from within a folder of files. We will then save those contents in an Excel file and then search the Excel file for the word Roosevelt.

We begin by launching the DATAEXTRACTION Command.

From there we just walk through the Wizard.



### DE Wizard - Page 1:

First order of business is to create a new data extraction and give it a name.

### DE Wizard - Page 2:

We will identify the drawings or folders of drawings we would like to search.

### DE Wizard - Page 3:

We select both Text and MText as objects we would like to extract information from the drawings we identified.

### DE Wizard - Page 4:

We then look at the list of information extracted and filter it down to include the contents of Text and MText as well as the drawing file name. (We need all the text string contents to search for Roosevelt. We need the drawing file name to identify which drawing we find it.)

### DE Wizard - Page 5:

We can quickly review our results.

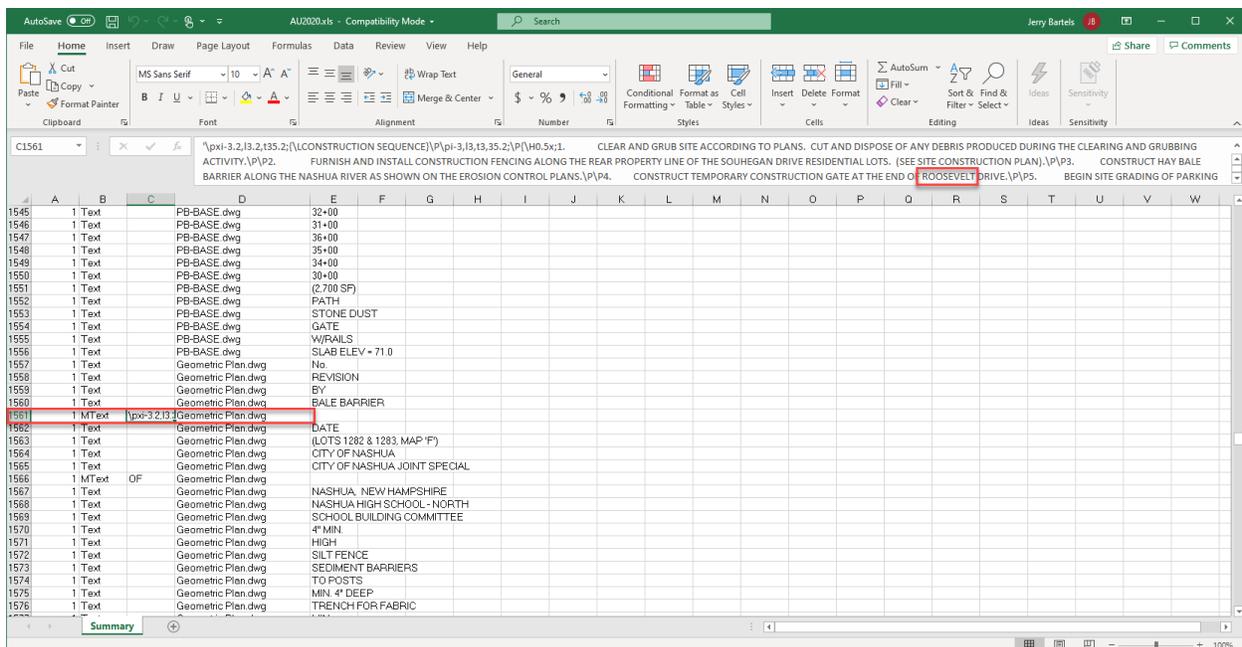
### DE Wizard - Page 6:

We then prepare to output the final results into a .CSV file we can view in Excel.

### DE Wizard - Page 8:

Yes, it jumps from 6 to 8. 😊 We complete the process and create the Excel file.

**Note:** The session recording goes through this in much more detail. In the handout, I want to provide an overview of what we are trying to accomplish so you can better understand the bigger picture.



Row	Object Type	File Name	Extracted Text
1545	1 Text	PB-BASE.dwg	32+00
1546	1 Text	PB-BASE.dwg	31+00
1547	1 Text	PB-BASE.dwg	36+00
1548	1 Text	PB-BASE.dwg	35+00
1549	1 Text	PB-BASE.dwg	34+00
1550	1 Text	PB-BASE.dwg	30+00
1551	1 Text	PB-BASE.dwg	(2,700 SP)
1552	1 Text	PB-BASE.dwg	PAITH
1553	1 Text	PB-BASE.dwg	STONE DUST
1554	1 Text	PB-BASE.dwg	GATE
1555	1 Text	PB-BASE.dwg	W/RAILS
1556	1 Text	PB-BASE.dwg	SLAB ELEV = 71.0
1557	1 Text	Geometric Plan.dwg	No
1558	1 Text	Geometric Plan.dwg	REVISION
1559	1 Text	Geometric Plan.dwg	BY
1560	1 Text	Geometric Plan.dwg	BALE BARRIER
1561	1 MText	pxi-3.2.13.Gaometric Plan.dwg	
1562	1 Text	Geometric Plan.dwg	DATE
1563	1 Text	Geometric Plan.dwg	(LOTS 1282 & 1283, MAP 'F')
1564	1 Text	Geometric Plan.dwg	CITY OF NASHUA
1565	1 Text	Geometric Plan.dwg	CITY OF NASHUA JOINT SPECIAL
1566	1 MText	OF	Geometric Plan.dwg
1567	1 Text	Geometric Plan.dwg	NASHUA, NEW HAMPSHIRE
1568	1 Text	Geometric Plan.dwg	NASHUA HIGH SCHOOL - NORTH
1569	1 Text	Geometric Plan.dwg	SCHOOL BUILDING COMMITTEE
1570	1 Text	Geometric Plan.dwg	4" MIN.
1571	1 Text	Geometric Plan.dwg	HIGH
1572	1 Text	Geometric Plan.dwg	SILT FENCE
1573	1 Text	Geometric Plan.dwg	SEDIMENT BARRIERS
1574	1 Text	Geometric Plan.dwg	TO POSTS
1575	1 Text	Geometric Plan.dwg	MIN. 4" DEEP
1576	1 Text	Geometric Plan.dwg	TRENCH FOR FABRIC

When the export is complete, we open the output file in Excel and use the FIND command to locate the text string “Roosevelt” in any of the text strings we extracted.

In our case, it found one instance and it is associated with the GEOMETRY.DWG file.

**Key takeaways:**

- While this is a very powerful tool, performance declines as you search for more object types and increase the amount of .DWGs you interrogate. Additionally, the size and complexity of the .DWGs you are searching will also impact performance. In my experience, running this command on a couple hundred .DWGs is doable but may take 10-20 min or more to complete. (Still faster than opening them and reviewing them manually one at a time. 😊)
- The tool does not search Civil 3D annotation or labels. This is unfortunate but not terribly disruptive as generally most of what I would typically search for would be values contained in Blocks, Text or MText.

FYI-

In the session recording, after identifying GEOMETRY.DWG as the file I was looking for, I navigated to the .DWG to view it’s contents to confirm the results. I did not document that here as it is in the video and I am pretty sure most folks are comfortable completing that task.

## ACT TWO: Alan Gilbert

### Scene One: Bing Me Up Scotty: Bring Bing Imagery to Me

In this section, I walk through the process of aligning imagery from the Civil 3D Bing Maps service to data with local coordinates.

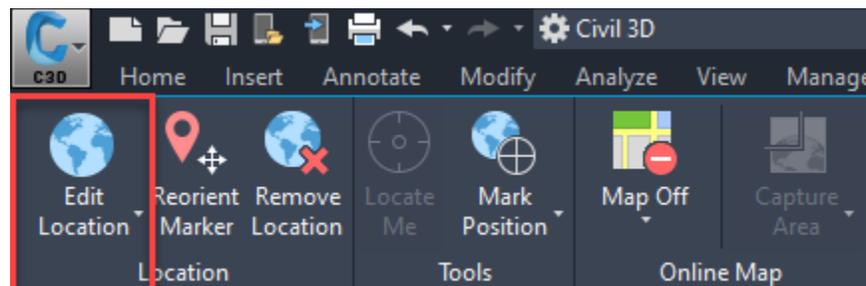
#### Why??

Sometimes you are not yet working in “real world” coordinates and just want to overlay Civil 3D’s Bing Imagery.

Importing existing ortho imagery and adjusting it to your “local coordinates” can be a headache.

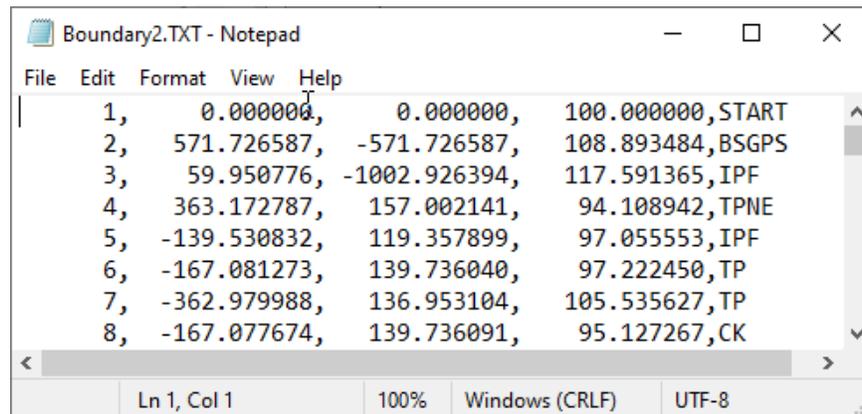
#### How??

We will accomplish this by using the GEOGRAPHICLOCATION tool. This tool, which only presents itself in the Civil 3D ribbon after you’ve set a coordinate system within your drawing, allows you to align Bing map data from either an address or from a location defined in a Google Earth KMZ file. For Scene One, we will focus on the former option (address).



The general workflow for Scene One is:

1. Create new drawing in Civil 3D and assign the property coordinate system for the area of the project.
2. Import the data you have that is located in local/project coordinates. In my case, I have a PNEZD format text from that was exported from a survey data collector. Notice in the image below that the coordinates are near the 0,0 origin.



3. Run the Geolocation>Edit Location>From Map command in Civil 3D. Key in address/city/etc. to find your project location in the preview map. Using the preview image, find a point on the image that exists in your data set, right click at that location in the preview, and select “Move Marker Here”.
4. Click Next and verify you have the correct coordinate system assigned to the drawing.
5. Click Next and now the prompt is asking you for a location. In my case, I snap to the cogo point in my drawing that matches the point in the image I selected in the first step of the wizard.
6. After clicking the cogo point for the location, hit Enter to accept the default “90” degree angle of azimuth to assign the north direction. 90 degree azimuth in Civil 3D/AutoCAD is by default “North” or “Up”. This means that the zero degree azimuth line is at due East. This is important as most real world azimuth values in North America are calculated from a zero degree line of due North.
7. If your data set (in my case cogo points) is based on a real north value, your image may already align well with your data. In my case, my project used an assumed north azimuth. This just means that the surveyors didn’t yet have a basis for north at the time of the data collection. Selecting an assumed north azimuth for a conventional land survey is a very common practice in the surveying profession.
8. For my data, my assumed north azimuth is not good enough to align the image. Luckily, I know that the bearing between two points in my project is almost exactly on a north line. So to align the rotation of the image with my data, I use the “Reorient Marker” command on the Geolocation Ribbon and simply use the north azimuth formed by the two known points.

**Key takeaways:**

- The GEOGRAPHICLOCATION command gives flexibility for when you need to use the Bing Map service, but don’t yet have your data located spatially.
- Additional tip: You can run the GEOGRAPHICLOCATION command via key-in prior to assigning a coordinate system in the drawing (since it will not be in the ribbon yet). Keep in mind, you will still be required to assign a coordinate system during the second step of the GEOGRAPHICLOCATION wizard.

## ACT TWO: Alan Gilbert

### Scene Two: Bing Me Up Scotty: Find Myself in Bing Imagery

In this section, I walk through a workflow where I use Google Earth to define my project location and then align Bing Map imagery to this area. For this example, I'm starting with no existing data, but I would still like to begin a concept drawing and do some planning at the correct geospatial location. This method will allow me to reference published GIS data and have it align spatially correct.

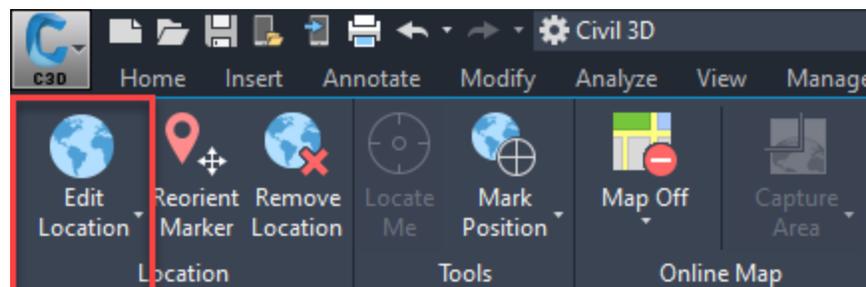
#### Why??

There are times when we need to work in a published coordinate system, but don't yet have data in these locations.

Sometimes we need to create concept designs or perform project work prior to a land survey taking place.

#### How??

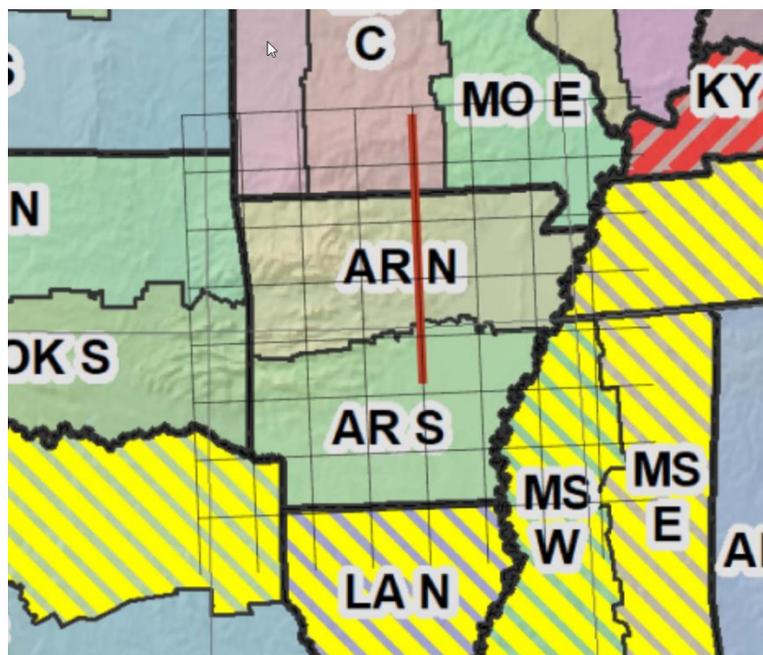
Just as we did in Scene One, we will accomplish this by using the GEOGRAPHICLOCATION tool. This tool, which only presents itself in the Civil 3D ribbon after you've set a coordinate system within your drawing, allows you to align Bing map data from either an address or from a location defined in a Google Earth KMZ file. For Scene Two, we will focus on the latter option (Google Earth KMZ file).



The general workflow for Scene Two is:

1. Use Google Earth to create a placemark at a location known on your project. For higher precision, locate the placemark at a feature visible near the project (pavement marking, drainage structure, etc.). Save this placemark as a KMZ file.
2. Create new drawing in Civil 3D and assign the property coordinate system for the area of the project. Go ahead and turn on the "Map Aerial" within the Online Map section of the Geolocation toolbar.

3. Run the Geolocation>Edit Location>From File command in Civil 3D. Select the KMZ file that was exported from Google Earth. Check to be sure the location on the preview image matches where you placed this in Google Earth.
4. Click Next and verify you have the correct coordinate system assigned to the drawing.
5. Click Next and at the “Select a point for the location” prompt, go over to the Transparent Tools in Civil 3D and select the Latitude/Longitude option. This will allow lat/long to be entered instead of the X,Y,Z default format the command is asking for. Jump back over to Google Earth and right click on your new Placemark in the menu and select “Properties”. Now copy and paste the latitude into the prompt in Civil 3D, hit enter, and then do the same for the longitude. After hitting enter on the longitude prompt, hit ESC one time to jump back into the original command. Finally, click Enter to accept the default “90” degree angle of azimuth to assign the north direction. 90 degree azimuth in Civil 3D/AutoCAD is by default “North” or “Up”. This means that the zero degree azimuth line is at due East. This is important as most real world azimuth values in North America are calculated from a zero degree line of due North.
6. If you connect to various GIS data sources, there’s a good chance, depending on location, the angular direction of the Bing image may not line up correctly. Many times, this is caused by the projection of your planar coordinate system. So in our case, we didn’t account for the convergence angle, which is the difference between grid north and geodetic north. For planar coordinate systems that line grid up with geodetic at a “central meridian”, only locations near the central meridian will **not** need adjusting. This is because on this line, both geodetic north and grid north are the same (see image below). There are many ways to find the convergence angle of a location within your planar coordinate system. I’ll put some additional locations in the Key Takeaways section, but lucky for us, Civil 3D has a command built in for this: **Survey>Geodetic Calculator**.



7. Run the Geodetic Calculator command and select a point within the project to find the convergence angle.
8. For our project in the United States, convergence angles to the west of the central meridian are negative. Civil 3D shows us this sign convention as well. So all we have to do now is subtract this convergence angle from our north azimuth, which was 90 degrees. If our project was located east of the central meridian, the convergence angle would have been positive and we would have added this to our north azimuth (90).
9. Now to align the rotation of the image with my data, I use the “Reorient Marker” command on the Geolocation Ribbon. I enter the Degrees Minutes Seconds north azimuth using the following convention: 88d 20’ 20.3”, but feel free to use Decimal Degrees or whatever your normal convention is.
10. The Bing imagery should now line up close to your GIS data, assuming this data is located correctly in a published coordinate system.

**Additional Info:**

- Here is the NGS Monument integration for Google Earth app (Earth Survey) I used during the presentation: <http://www.earthsurvey.us/ngscs/ngscs.html> - This can be used to find published survey monuments and also find convergence angles in the United States
- Here is the NGS Coordinate Conversion and Transformation Tool: <https://www.ngs.noaa.gov/NCAT/> - This is an only tool that can assist with determining convergence angles for various locations in the United States.

## ACT THREE: Jeff Bartels

I'm a firm believer that we all should strive to learn at least one new thing each day. For this reason, I keep a notebook at my desk to jot down daily discoveries I make using Civil 3D/AutoCAD/Map 3D. Maintaining a log like this is not only a valuable resource for me, it's also a repository I can pull from to share ideas with others.

In my part of our AU session, I'll be using a "rapid fire" approach to present more than twenty Civil 3D tips and tricks. Each of these items was extracted from my notebook in hopes of providing you some real-world nuggets that you may not have seen elsewhere!

### Why??

By definition, "Tips & Tricks" can make us more efficient users of Civil 3D. Likewise, this content represents workflows not covered during typical training sessions. *(Many times, content like is acquired over a career using the application.)* Finally, it's always nice to discover new tools or concepts that you may not have known were there.

### How?

I'm hoping you'll find the following tips and tricks to be easy, quick, and directly to the point. In fact, most of them can be described using a single sentence.

Below, please find a "**Quick Reference List**" of the tips I demonstrate live in Act Three...  
*(NOTE: Some tips include hyperlinks to specific commands for additional research purposes.)*

## Civil 3D Tips & Tricks – Quick Reference List

### Interface

1. Use [ZOOMFACTOR](#) system variable to control zoom "magnitude".
2. Identify valid system variable range using an incorrect entry.
3. Zoom to Feature Line? – Select, and then click TOP "hotspot" on View Cube.
4. An icon for the [Map Task Pane](#) can be found on the Home Ribbon Tab.  
*(Expand the Palettes panel to find it.)*
5. Use [TRAYSETTINGS](#) command to "auto-close" notification bubbles.

### Dimensions & Measurements

6. Use [DIMBREAK](#) to create dynamic breaks where dimensions and annotations intersect.
7. Apply masking to multi-leader text by selecting and enabling Background Masking within the Properties Palette.
8. Apply masking to dimension text by selecting and setting Fill Color to "background" within the Properties Palette.
9. After orbiting a drawing, type **ZP** and press Enter to restore previous view.
10. Expand the Inquiry menu (*Analyze Ribbon Tab*) and select "[Minimum Distance Between Entities](#)" to identify minimum horizontal distance between two objects.

11. Expand the Inquiry menu (*Analyze Ribbon Tab*) and select “[Minimum Vertical Distance Between Entities](#)” to identify minimum vertical distance between intersecting objects.

### Conversions

12. Convert Lines/Arcs to polylines using the “Convert to Polyline” option found in the Rt-Click menu.
13. Double-Click a polyline to access the [PEDIT](#) command.
14. To reverse linetype direction on a single arc segment, convert to polyline, and use [PEDIT](#) to reverse. (*Don’t forget to enable linetype generation*).
15. Convert [2D polylines to 3D polylines](#) and [vice versa](#) using the specialized tools in the Design Panel (*expanded*) on the Modify Ribbon Tab.
16. Use [FLATTEN](#) command to convert planar splines to polylines having minimal grips.

### Points

17. If a point group needs updating, Rt-click on it and choose “Show Changes” to review pending modifications.
18. Rt-Click on a point group and choose “Export Points” to pre-populate a portion of the Export Points dialog box.
19. [LISTAVAILABLEPOINTNUMBERS](#) command will identify unused point numbers in point database
20. [LISTUSEDPOINTNUMBERS](#) command will identify point numbers currently in use.

### Profiles

21. Assign Distance Above/Below settings within Profile Label Set to control positioning of Crest/Sag Curve labels.
22. CTRL+Click to select individual labels that are part of a group
23. Change “Dim Anchor Option” (*found in Properties Palette*) to Above or Below to control position of individual Crest/Sag profile labels.

### Parcels

24. When auto sizing parcels, minimum area defaults to Sq. Ft. – To use Acres, enter Xacre (*Where X=# of acres*)
25. To control [draw order of parcel styles](#), Rt-Click parcel group in Prospector, select “Properties” and then use Composition Tab to adjust stacking order.

