

Using Autodesk® Infrastructure Design Suite for Data Collection and Preliminary Design Work

Speaker: Jerry Bartels LEED Green Associate - Autodesk

CI4422-P - As a part of the Infrastructure Design Suite PowerTrack, this class will highlight geospatial, surveying, and other data collection methods as well as design tools using Autodesk® Infrastructure Modeler, AutoCAD® Map 3D, AutoCAD®Civil 3D®, and Autodesk® Storm and Sanitary Analysis software. Attendees will see a real-world project move from a planning concept to more detailed design, including early analysis of project alternatives. Autodesk® Vault Collaboration AEC software and the Autodesk® 360 cloud computing platform will be used throughout the process for collaboration, analysis, and more.

Learning Objectives

At the end of this class, you will be able to:

- Use conceptual designs from Autodesk Infrastructure Modeler as a starting point for more detailed design in AutoCAD Civil 3D.
- Use AutoCAD Map 3D to compile geospatial information for better engineering decision making.
- Use AutoCAD Civil 3D and various analysis tools to move from conceptual design into more detailed preliminary design.
- Use collaboration and data management tools to communicate and share data throughout the design process.

About the Speaker

Jerry is a civil technical specialist with Autodesk. For more than 20 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. At Autodesk, Jerry specializes in civil engineering, surveying, and mapping solutions, and currently provides pre-sales, training, and support services throughout the country. He has received several awards from Autodesk for his presentations.

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Introduction...

During this 90 minute session, we will discuss as well as demonstrate numerous workflows and features Autodesk's Infrastructure solutions. These solutions include Autodesk Infrastructure Design Suite Ultimate, Autodesk Cloud 360, Autodesk Vault Collaboration AEC and Autodesk Labs. We will accomplish this by walking through a real world project scenario that involves a proposed road project that includes a new bridge crossing the Indian River in Greater Millsboro Delaware.

This session is Part two in a four part series. During session one, a new road / river crossing centerline was determined and made available to us as a polyline in a .DWG. This file was delivered to us on our Autodesk 360 cloud account. We will begin with this file.

During this session, we will move from this very conceptual state into a more detailed design. Our objective is to deliver a preliminary corridor model to the project engineer. Having said this, as this project evolves; it will grow to a point where multiple people will become involved in the design process. (i.e. Everything can't remain in the same model.) As a result, our strategy will be to break the model up into multiple pieces to facilitate a collaborative design process by a larger design team.

I'm sure you are wondering how we are going to possibly cover all of this in the next 90 min. My goal is to cover the material from a user's perspective focusing primarily on collaboration and interaction between products. In other words, for example, we will use Vault as part of the process but we will not be walking through the installation and configuration of Vault. We will also be using Civil 3D and Map throughout the demonstration but more from the context of how they work together rather than specifically what each product does. There are numerous classes available this week at Autodesk University that will focus specifically on various parts of the design and collaboration process. What this class is intended to do is teach you how to leverage these products together to accomplish your design project. (Kind of like the glue that holds the other classes together 😊)

At the end of this class, participants will be able to:

- Use conceptual designs from Autodesk Infrastructure Modeler as a starting point for more detailed design in AutoCAD Civil 3D.
- Use AutoCAD Map 3D to compile geospatial information for better engineering decision making.
- Use AutoCAD Civil 3D and various analysis tools to move from conceptual design into more detailed preliminary design.
- Use collaboration and data management tools to communicate and share data throughout the design process

Software...

The software I will be using for today's session is Autodesk Infrastructure Design Suite Ultimate 2013, Autodesk Vault Collaboration AEC 2013, Project BaseJump from Autodesk Labs, Autodesk 360 and a custom tool. In many of the topics we cover the 2012 release of products may also be applicable. If we stray into an area where this may not be the case, I will be sure to note it.

Links providing additional information are below:

Autodesk Infrastructure Design Suite: <http://usa.autodesk.com/autodesk-infrastructure-design-suite/>

Autodesk Vault Collaboration AEC: <http://usa.autodesk.com/adsk/servlet/pc/index?siteID=123112&id=4502718>

Autodesk Labs: <http://labs.autodesk.com/>

Autodesk 360: <https://360.autodesk.com/>

Transpiration Blog: <http://autodesk.typepad.com/transportation/>

Hardware...

I am using an HP Elitebook 8540W laptop with an Intel® Core™ i7 CPU. I have 8Gb of RAM and am running 64Bit Windows 7. Autodesk Vault Server and the Autodesk Network License Manager are installed on my computer and running in the background. I am not using any VMware or Virtual machine configuration. At the end of the day, everything demonstrated during this session can be practiced by installing the applications on a single computer. (i.e. Multiple computers or complex hardware are not required)

Dataset...

We will begin with the conceptual roadway centerline represented by a polyline in a .DWG prepared by the planner. The .DWG will be available to us using Autodesk 360. In addition, we have GIS files for all of the parcels in the area as well as a 750Mb GIS file representing contour data. In both cases, the GIS files represent data for an area significantly larger than our area of interest.

Goal...

At the end of the day, using the tools and data just described, we will deliver a preliminary corridor model to a project engineer for them to complete the final design. At the same time, we will deliver the model in several components using Vault such that numerous people can work on the project at the same time.

Let's get started!!

Preparation

“Before anything else, preparation is the key to success” – Alexander Graham Bell

We will begin by preparing our Civil 3D environment as well as creating a new project in Vault.

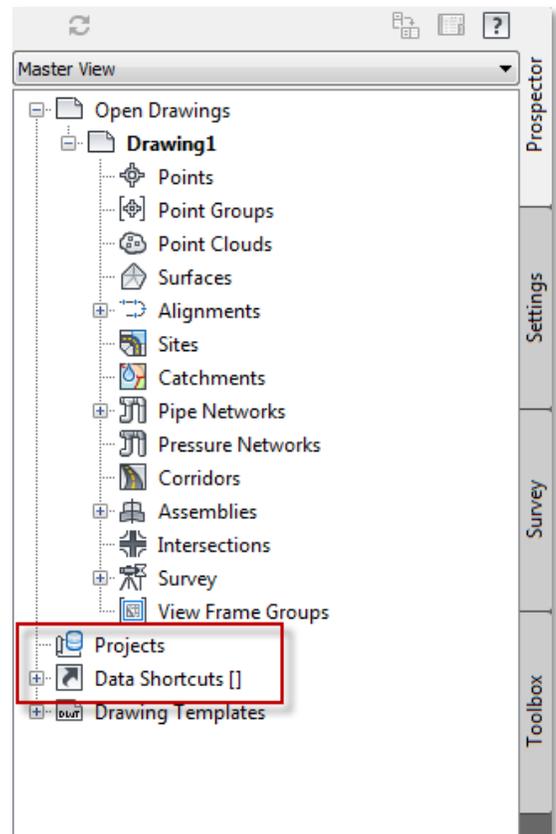
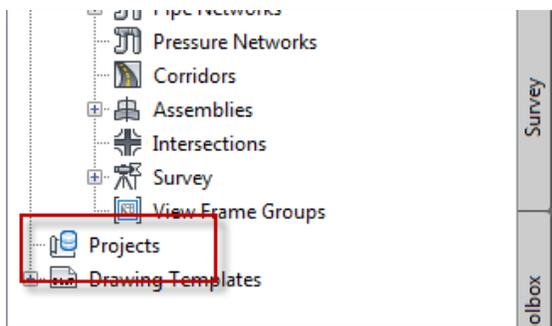
I will start this process by disabling the Data shortcut option in the Civil 3D toolspace. This is not required but I am doing it anyway because we will be leveraging Vault for this project. I want to ensure there can be no confusion between a Vault Data reference and a Data shortcut.

When Vault is installed on your system, Civil 3D will include a new “Projects” entry in the Master View of the Prospector Tab in the Civil 3D Tool Space. Using the “Projects” area is where we will create our Vault Data references. (See Right)

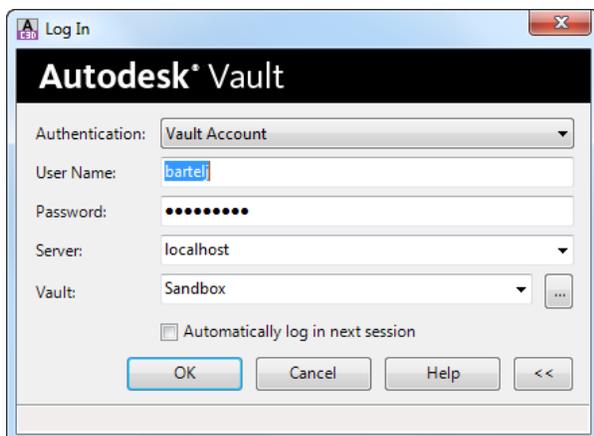
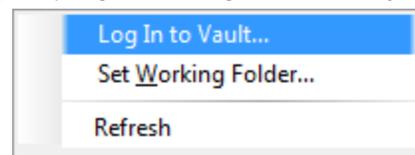
Because there is a potential for confusion between this and traditional Data Shortcuts, the Data Shortcuts entry can be turned off.

We will do this by typing SHORTCUTNODE at the command line and setting the value to 0.

Now you see it, now you don't. ☺



Our next step is to create a new project in Vault. We will begin by right clicking on the “Projects” entry in the Civil Tool space and choosing “Log In to Vault...” We are then presented with a login dialog where we can enter our user name, password and desired Vault.



In this example, I will use my login credentials and choose Sandbox as the Vault I would like to use.

(A Vault can hold many projects. In many cases you will see them set up by year)

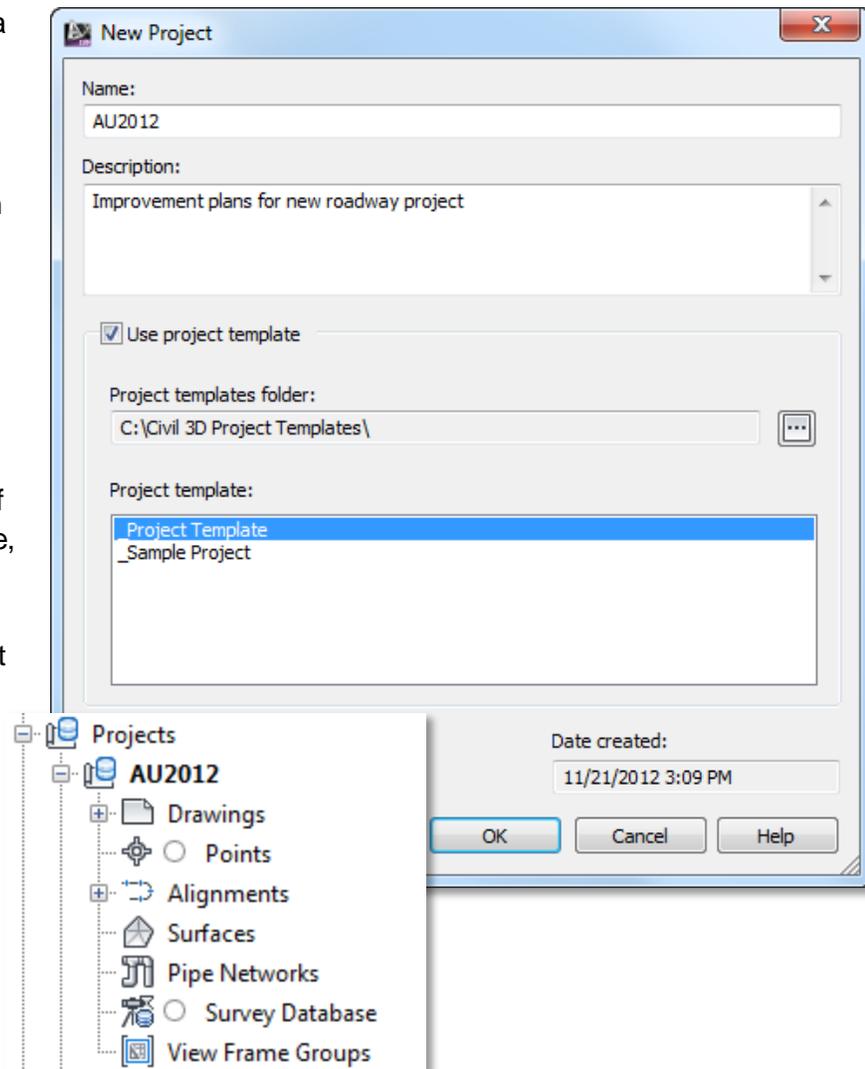
After the login process is complete, we will create a new project in the Sandbox Vault by right clicking on the “Projects” entry in the Civil Tool Space and choosing “New...” We are then presented with a Dialog box to enter our project details.

If you are familiar with Data shortcuts, the process will be pretty intuitive.

Essentially, we give the project a name, description and choose a project template folder structure.

The folder structure of the project template is user definable. In other words, we can set it up to match our organizational needs of our project. In our example, I will add several new folders to organize things like engineering data, client files and project emails.

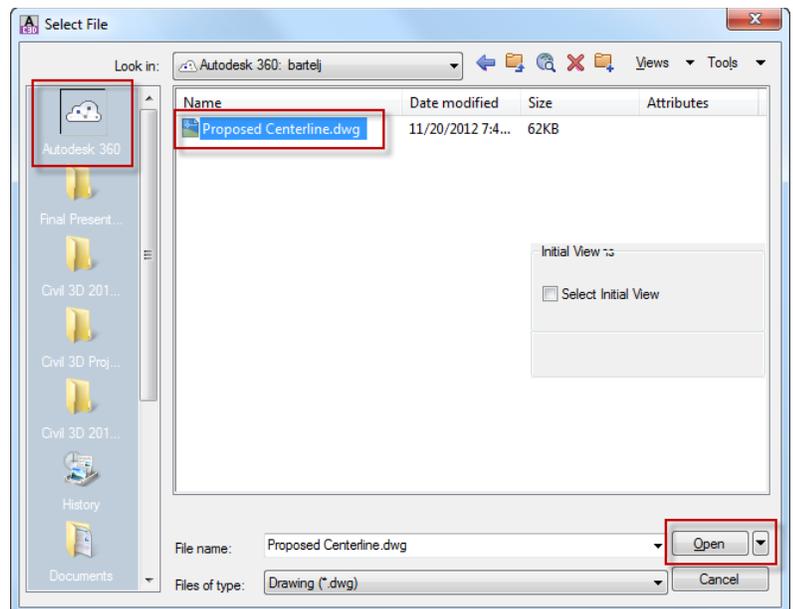
When finished, we will see our new AU2012 project available under the “Projects” entry.

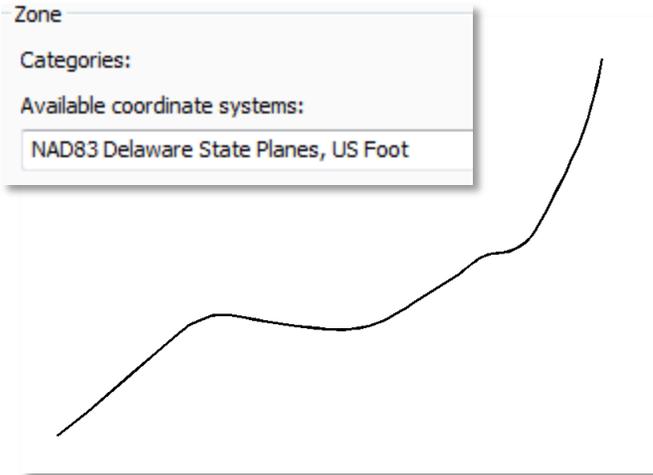


Conceptual Plan

“Productivity is never an accident. It is always the result of a commitment to excellence, intelligent planning, and focused effort” – Paul J. Meyer

Our next step in the process is to retrieve the conceptual roadway centerline left for us on our Autodesk 360 cloud storage account. This step could not be easier. We simply open the file from the cloud.





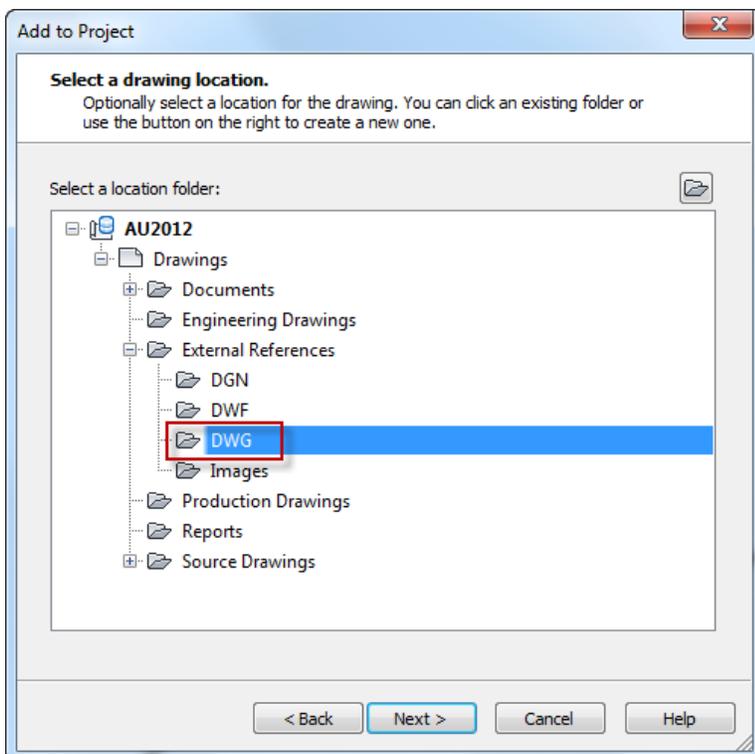
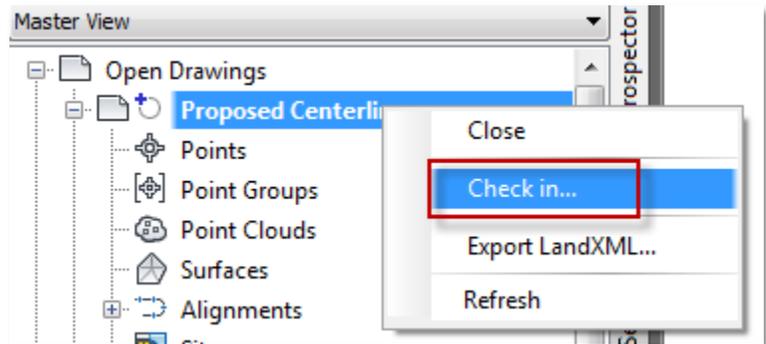
Once open, we have a single polyline that represents the centerline of the proposed roadway and bridge crossing.

We also see by checking the drawing settings in the Civil 3D tool space that there is a coordinate system applied to the drawing.

The assigned system is NAD83 Delaware State Planes, US Foot. (or DE83F for short)

Our next step is to check this file into our Vault Project. This will make the conceptual layout available to us as well as any other Vault users. (Who have rights to this project of course. ☺)

We will check the file in by right clicking on the file's name (Proposed Centerline.dwg) in the prospector tab and choosing Check in... (Note: The circle icon with the + sign to the left of the file name indicate that it has not been checked into the vault)



We are then presented with a Dialog box where we can choose where to store this file in the Vault. Because this is a file we will likely reference into other drawings, I will store it under the AU2012 project in the External References, DWG folder.

After selecting the folder we click on Next

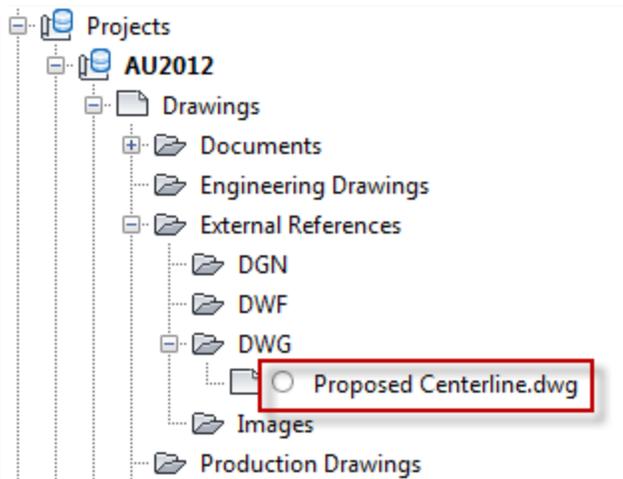
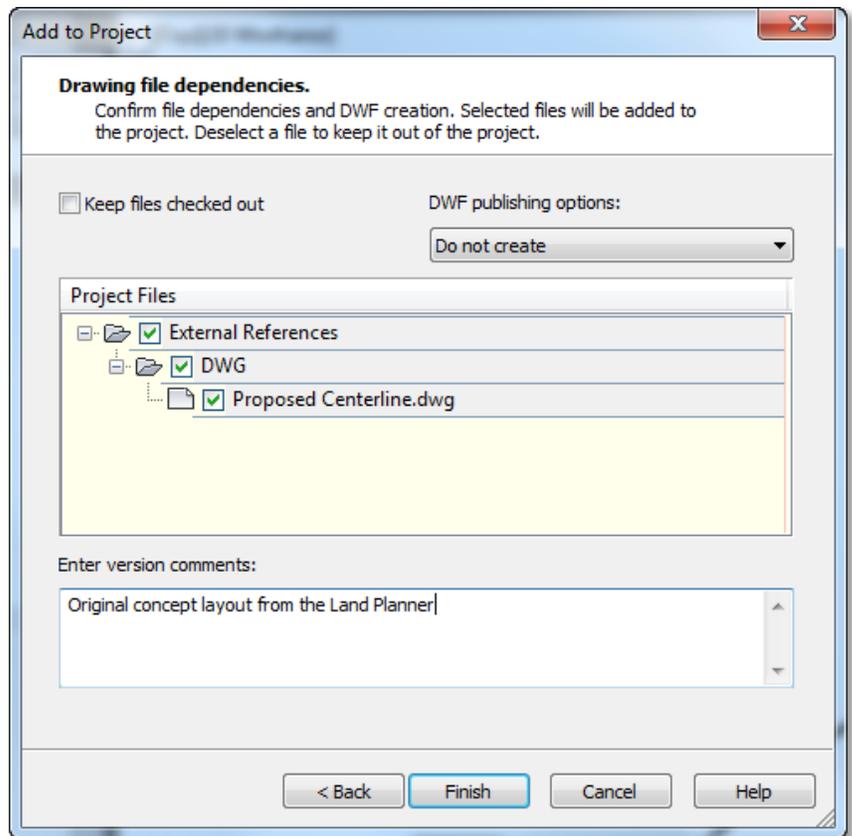
We can then add version comments to create a paper trail of our activities if desired.

In our case I am including comments to indicate where the file came from as well as its purpose.

We complete the process by clicking on Finish.

After clicking on Finish, the file is put into the Vault and closed in Civil 3D.

(Note: If we had clicked the “Keep files checked out” option we would have checked the file into our Vault project while at the same time keeping the file open such that we can continue working on it.)



Once checked into the Vault, it immediately shows up under the AU2012 project folder structure on the Prospector tab of the Civil 3D tool space.

From here, anyone on the project team has quick and easy access to this file.

Note: This is one of several places we can access this file. We could also retrieve it using the Vault Ribbon or through the XREF Attach dialog.

Divide the project model up into smaller pieces

“Nothing is particularly hard if you divide it into small jobs” – Henry Ford

In keeping with our strategy of delivering a project model that support collaborative design, I will create several files which are linked together using Vault Data references. (Similar to the Data shortcut concept)

These files will include the roadway centerline alignment, the existing ground surface and corridor model. In doing so, it will be possible for all three components to be worked on collaboratively.

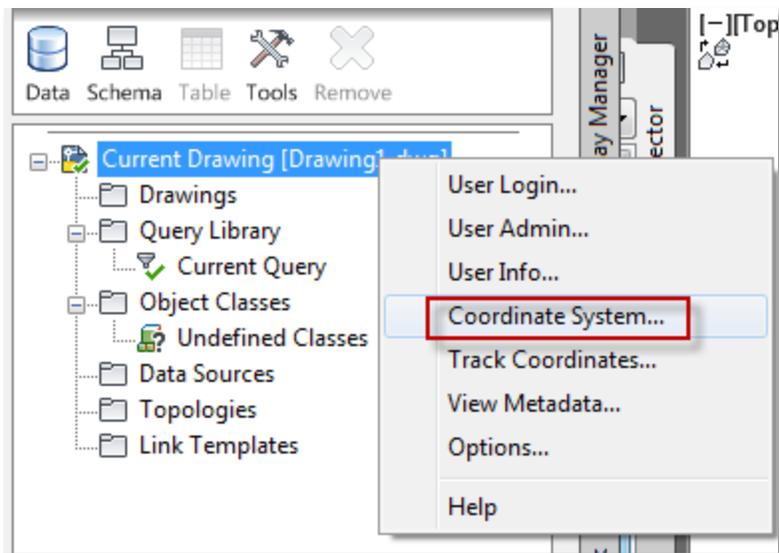
Our first step will be to create the centerline alignment for our new roadway. We will begin by creating a new drawing and setting the coordinate system to NAD83 Delaware State Plane US Foot. I am doing this for a couple of reasons. First, it is the system of the roadway centerline concept file. Second, our GIS data is on a different coordinate system so assigning a system to this drawing will allow Civil 3D to transform the GIS data.

When setting the coordinate system, I am going to use the Map Task pane. I like to set it here because it uses a newer interface for selecting coordinate systems than Civil 3D. (Leveraging the older Civil 3D dialog will produce the same result)

We will begin by opening the Map Task Pane by typing MAPWSPACE at the command prompt and selecting “On”.

Once it is displayed, we will right click on the “Current Drawing” heading on the Map Explorer tab and select Coordinate System...

The “Assign Global coordinate system” dialog is displayed and we will click on the “Select Coordinate System” button.

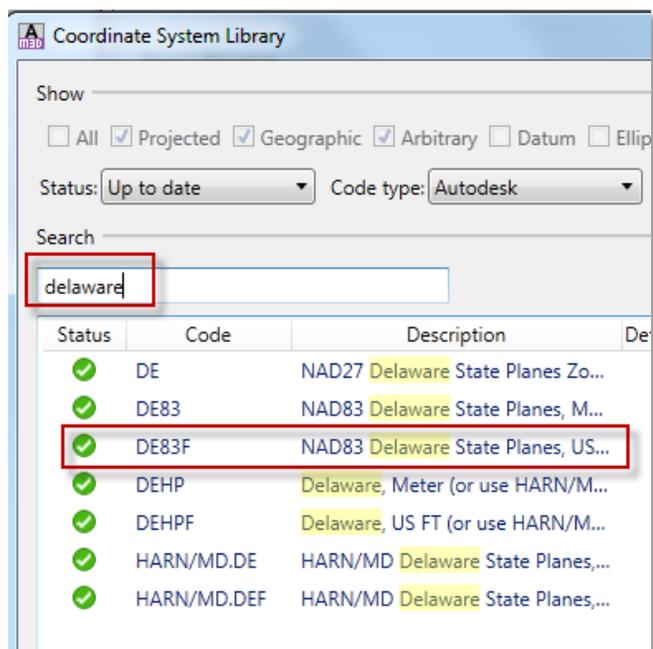


We can then select our desired system from the Coordinate system library.

There are a LOT of available coordinate systems so I entered the word Delaware in the search list to reduce the list to a small handful.

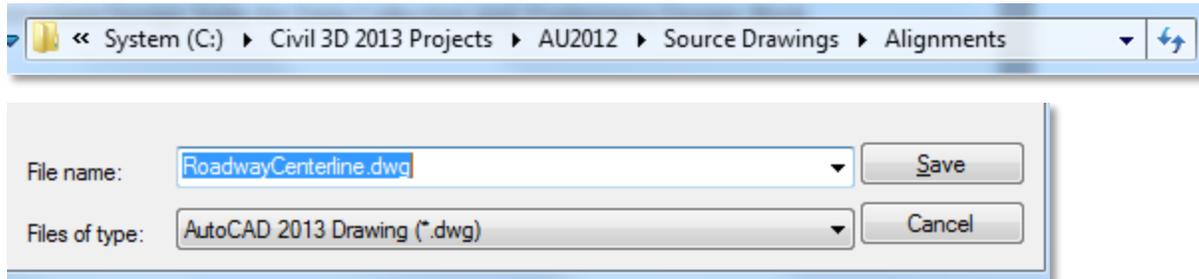
From here we will select the NAD83 Delaware State Planes US Foot system (DE83F)

Note: Setting the system using Map will also set it everywhere necessary for Civil 3D.

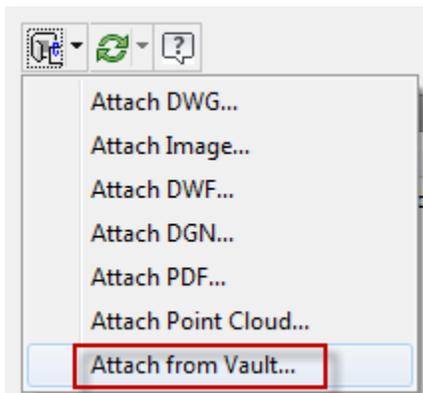


Now that we have established our coordinate system we will save our .DWG and give it a name. Because this file is intended to contain our roadway centerline, I will call it RoadwayCenterline.

Essentially, we can save it anywhere because it is merely a working copy until we check it into Vault. To keep things organized, I will save it into my Working folder (Civil 3D 2013 Projects) under the AU2012 project folder which matches the Vault folder structure. In this case, it is in the Source Drawings folder under Alignments.



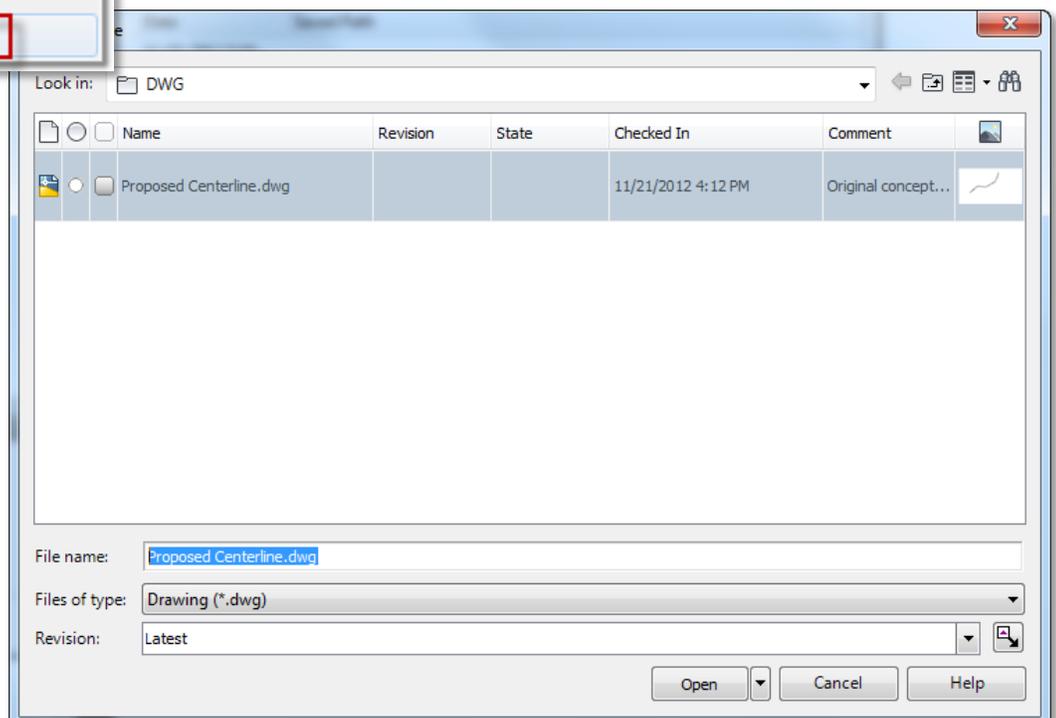
We are now ready to begin building our new roadway centerline alignment. We will start by referencing the concept drawing we put in the Vault earlier. To do this we will perform a simple Xref Attach and use the Vault option in the dialog.



After selecting Attach from Vault, we are presented with a new dialog box where we can peruse the Vault for the file we would like to attach.

We will navigate to the concept file we loaded earlier under the AU2012 project and click Open

We are then presented with the standard Xref attach dialog where we will set the file as an Overlay (as opposed to Attach) and click OK.

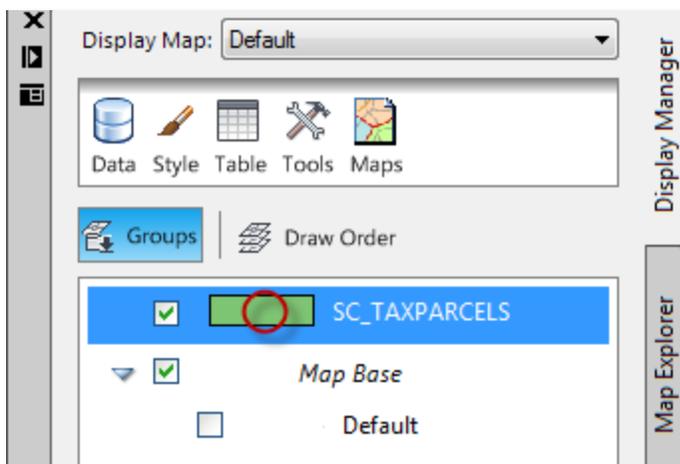


We now know what the conceptual layout geometry looks like but we have no way of knowing much about the surrounding area. Because we will obviously need to know this before we can firm up the geometry and location we will add some supplemental data.

We will begin by adding parcel geometry. Because we established a coordinate system earlier, we can add this data by simply dragging and dropping the parcel .SHP file (SCTAXPARCELS.SHP) from Windows Explorer into Civil 3D.



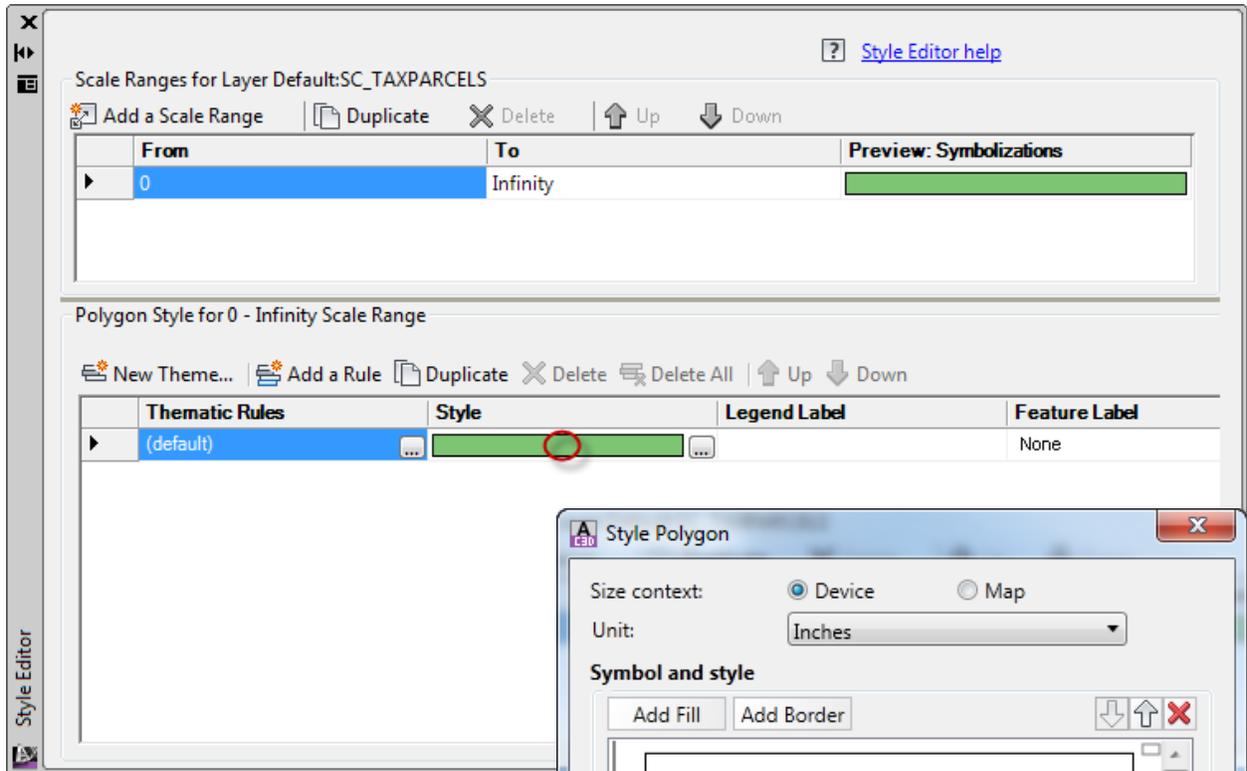
We can now see the proposed improvements in context with the surrounding area. Having said this, the parcels are partially obscuring the roadway such that it is difficult to see. We will correct this by changing the parcel display in the Map Task Pane. (MAPWSPACE command)



We will accomplish this by double clicking on the “swatch” next to the parcel file name on the Display Manager tab.

From there, we will be presented with a dialog box where we can edit the display of the parcel data.

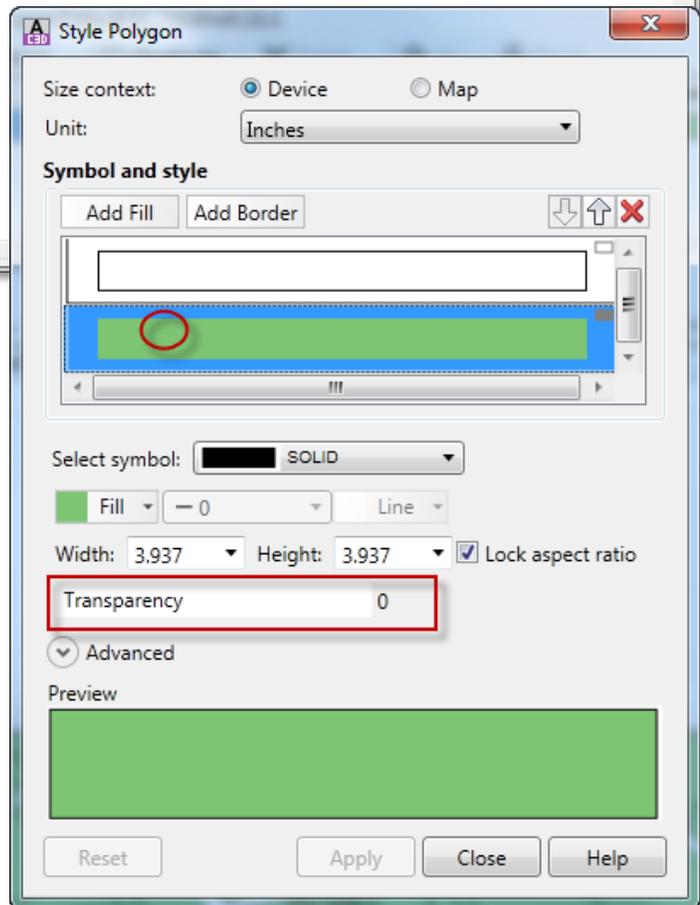
The Style Editor dialog contains a number of options, for now, we are going to keep it simple and only adjust the current display. We will do this by once again, double clicking on the “swatch” under style. (See Below)



The dialog is pretty intuitive. Click on the item in the upper box and then modify its display in the bottom area. A preview is displayed at the bottom to let you know how it will ultimately look.

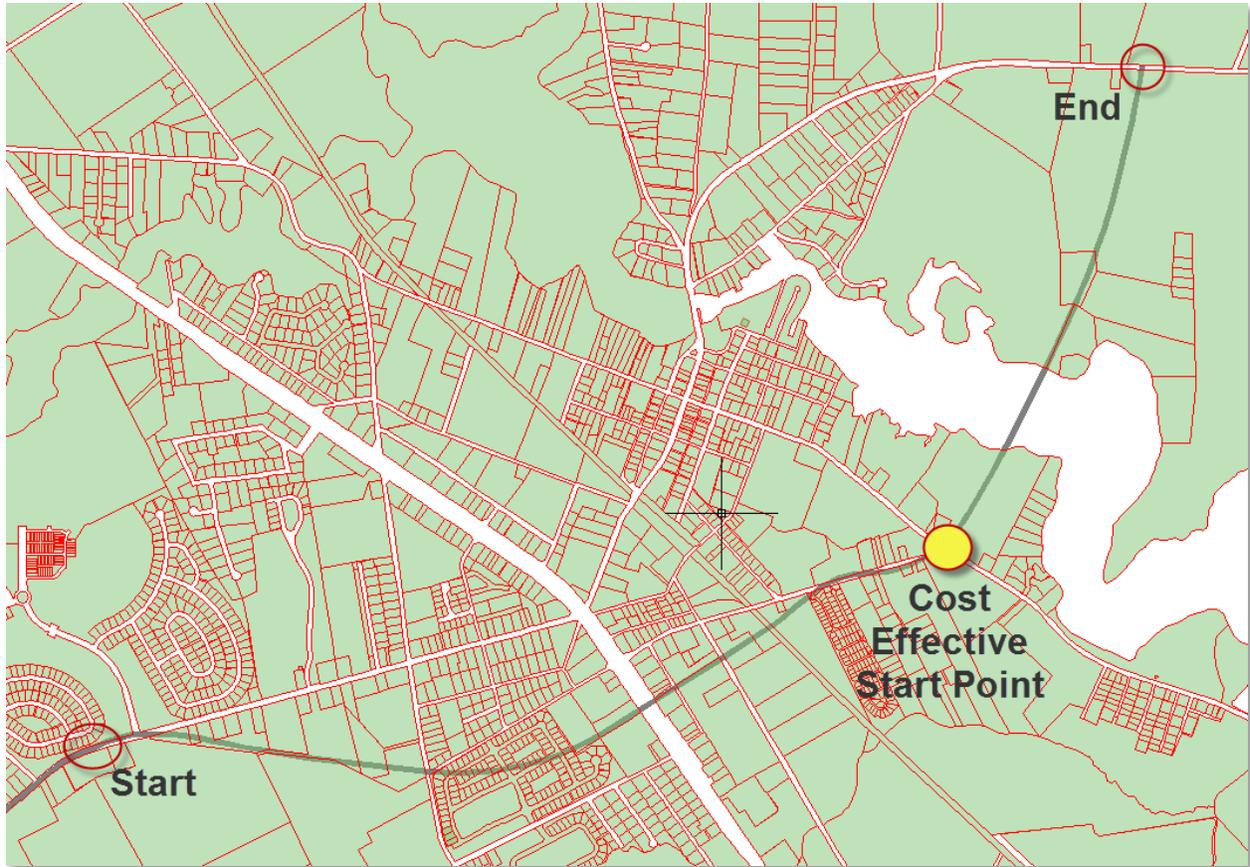
We will select the green fill and change its transparency to 50% (So we can see through it ☺)

We will then select the outline and change its color to red.



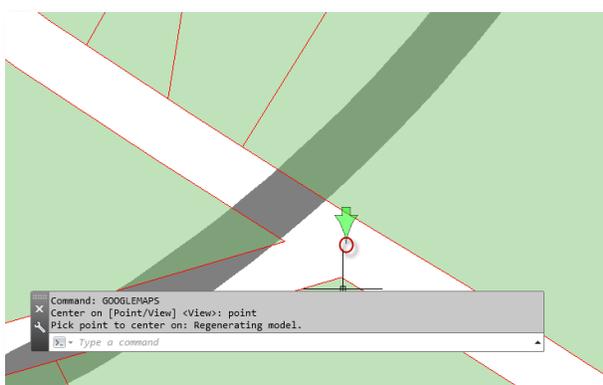
We will click on Apply when finished.

Our conceptual roadway is now MUCH easier to see!



Looking at the conceptual layout, it does provide a new bridge crossing which connects two major arterial roads. Having said this, the property acquisition costs and disruption of the existing area is extensive which makes the solution pretty unrealistic. As a result, by adjusting the start point East to the yellow circle, we can make the project much more cost effective.

Our next goal is to perform some initial analysis of the existing area. Using some aerial photography is a quick way to do this. To accomplish this, we zoom to the intersection at our “cost effective” start point and type the GOOGLMAPS command. After executing the command, we can pick a point on the screen and our internet browser will immediately open showing us the same location using Google Maps.



Using Autodesk® Infrastructure Design Suite for Data Collection and Preliminary Design Work

I know what you are thinking. Wow!!! I had no idea this command is in Civil 3D 2013! The truth is that it is not. You can get it (from the same place I did ☺) on the Transportation Blog.

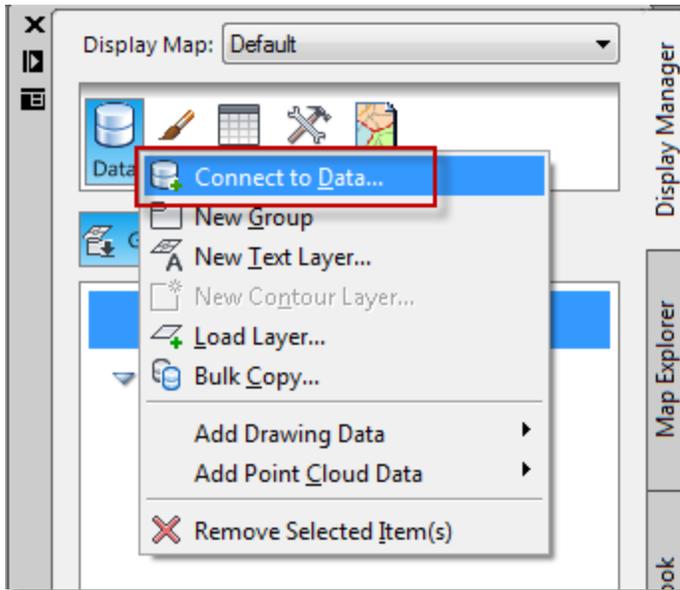
<http://autodesk.typepad.com/transportation/> (I will also post a copy with the downloads for this session) Simply run the installer and you are good to go.

What I REALLY like about this tool is I can peruse the area both from an overhead as well as (if it is available) the street view. From here I can really get a feel for the the area surrounding my project. (i.e. Terrain, vegetation, number of lanes, sight lines, overhead wires...)

Below are street views of the locations of where we will start (above) and end (below)



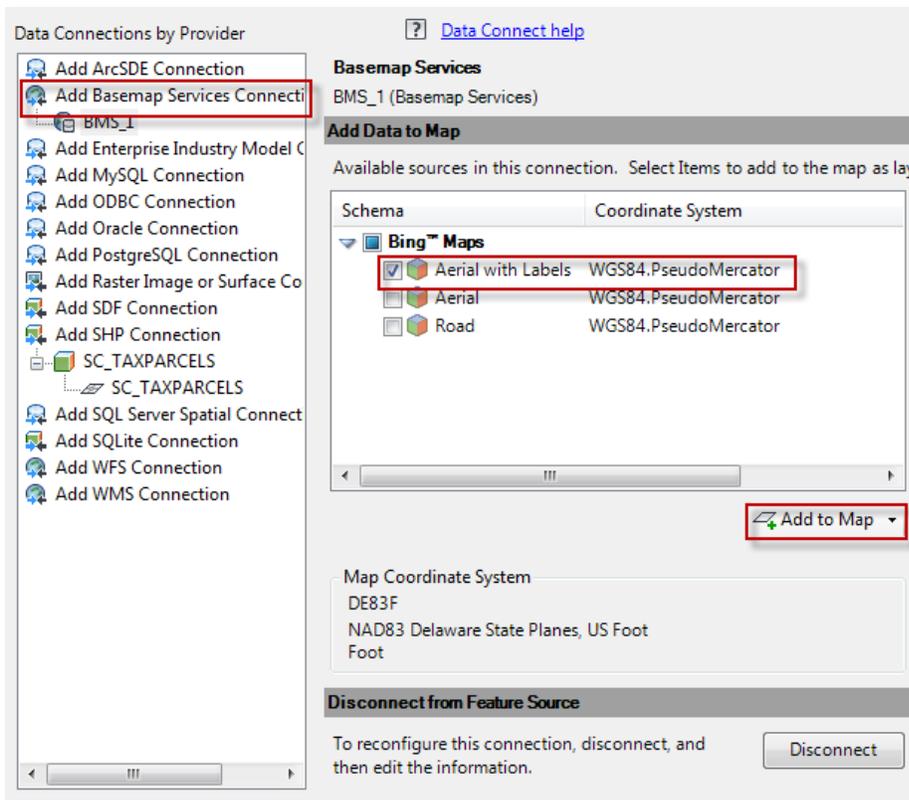
As fantastic as this tool is, sometimes we need the ability to leverage the aerial imagery directly within Civil 3D. This can be accomplished in a number of different ways. For this demonstration, I will use the Autodesk Labs tool called “Project BaseJump”. Once installed from the Autodesk Labs site, (<http://labs.autodesk.com/utilities/basejump>) users can immediately access Microsoft® Bing® web mapping services (WMS) maps.



To load the imagery for our project, (BaseJump already installed) we will right click on the Data icon on the Display Manager tab in the Map Task Pane. (MAPWSPACE) We will then click on the Connect to Data... option.

We then get the Data connection provider dialog box shown below.

Using the dialog, we will select the Basemap Services connection and click on Connect. This will display three Bing Maps options in the right side of the dialog.



From there, we will select Aerial with Labels and then click Add to Map.

The aerial photography is now displayed and we can close the connection dialog.

Note: If the aerial information is displayed “on top” of our other data, we can change the display order using the Map Task Pane. (Drag the parcels above the aerial.)

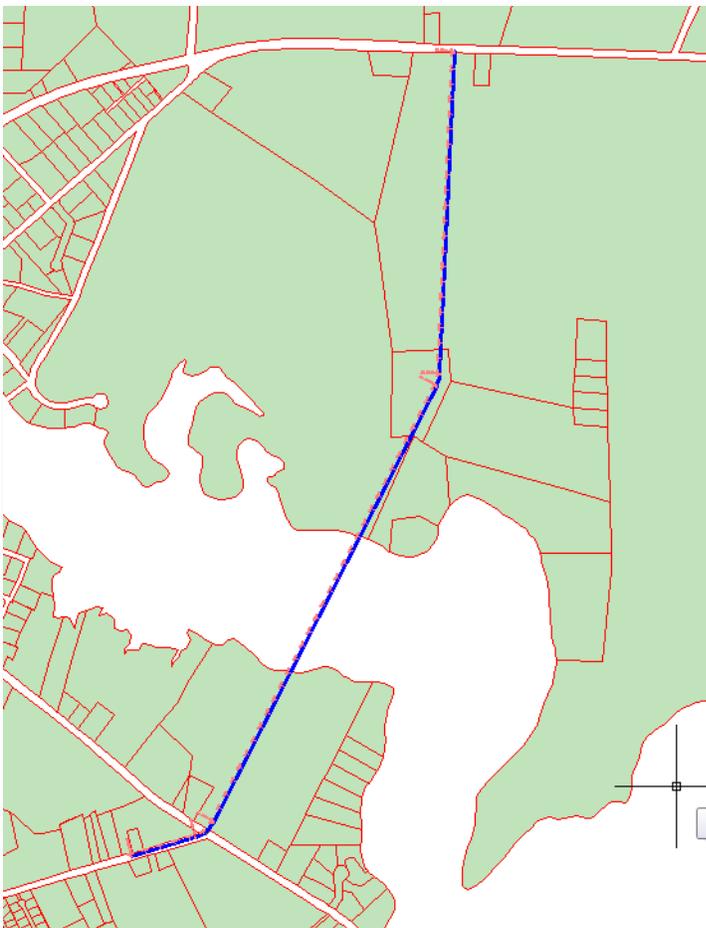


At this point, we will use Civil 3D to create our Alignment geometry.

We will call the new road “Mandalay Ln” and set a design speed to 40mph to automate the curve radii.

We will then trace over the conceptual centerline.

Note: Step by step will not be documented for this as it is standard Civil 3D functionality and will be available in a number of other sessions this week.



Now that we are comfortable with our proposed roadway location, we will need to do some survey work.

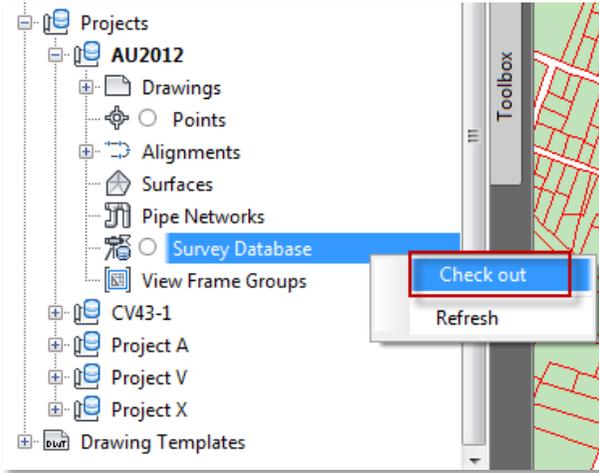
This will include capturing the existing conditions as well as preparing exhibits and legal descriptions for all of the parcels affected.

To accomplish this, one of the tasks for the survey crew(s) will be locating all existing property corners in the field.

Because we have parcel data in our drawing, we can leverage this information to help the field crew locate the actual property corners.

This survey information will be stored in a Survey Database.

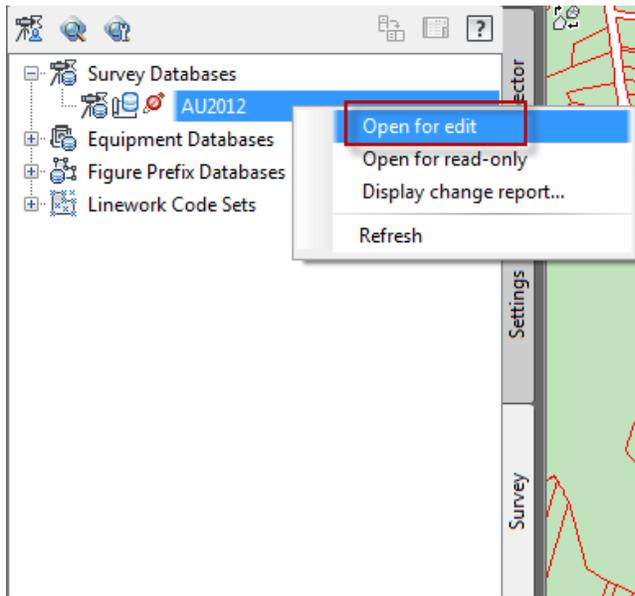
We will begin by checking the Survey Database out of the Vault.



To accomplish this, we will navigate to the Survey Database under the Projects Entry on the Prospector Tab of the Civil 3D Tool Space and right click.

We will then select “Check Out...”

Note: One (of many) advantages of Vault over Data shortcuts are that the Survey Database and Points can be shared.



From there, we will right click on the AU2012 survey database on the Survey tab of the Civil 3D Tool Space and select “Open for Edit.”

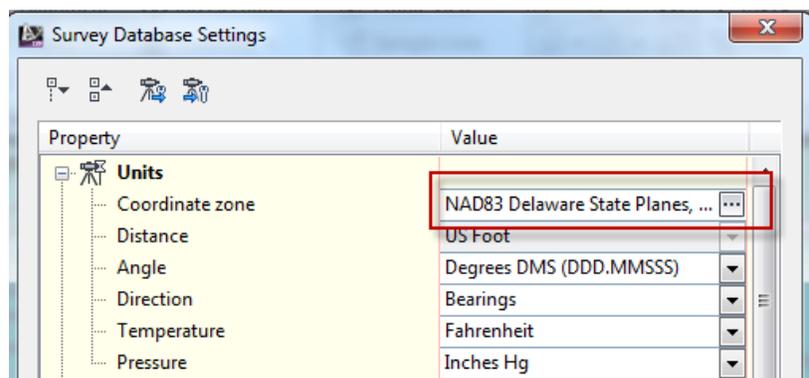
Once it is open, we will once again right click on the AU2012 survey database and choose “Edit Survey Database Settings”.

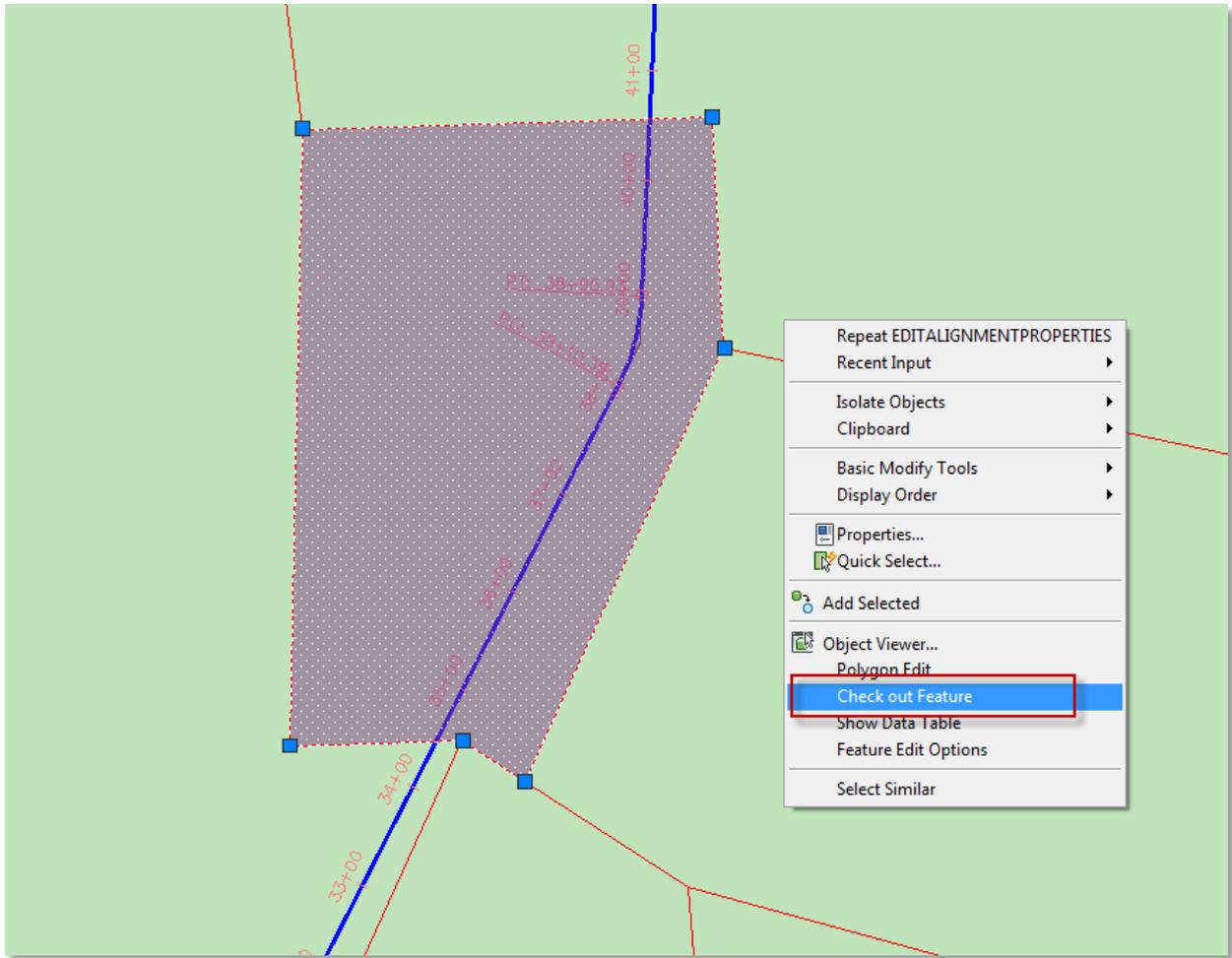
We will then assign a coordinate system to the Survey database consistent with what we are using for the project. (DE83F)

Like GIS data, by setting a coordinate system in the Survey Database, Civil 3D can transform data automatically as required.

Our survey database is now ready to receive data so let's add some data.

We will begin by selecting a GIS parcel that contains property corners we would like to identify in the field and checking it out of the GIS data file.



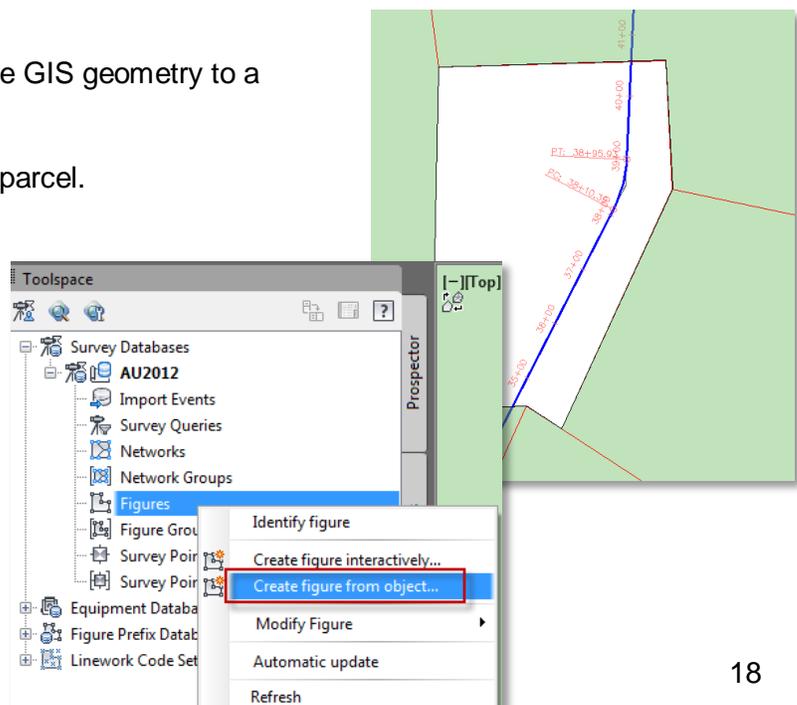


Because Mandalay Ln will run right through this entire parcel, we will definitely need to locate these property corners in the field. To accomplish this, we will right click on the parcel and select “Check Out Feature”.

Once checked out, we will explode the GIS geometry to a standard polyline.

Note: The fill will disappear from the parcel.

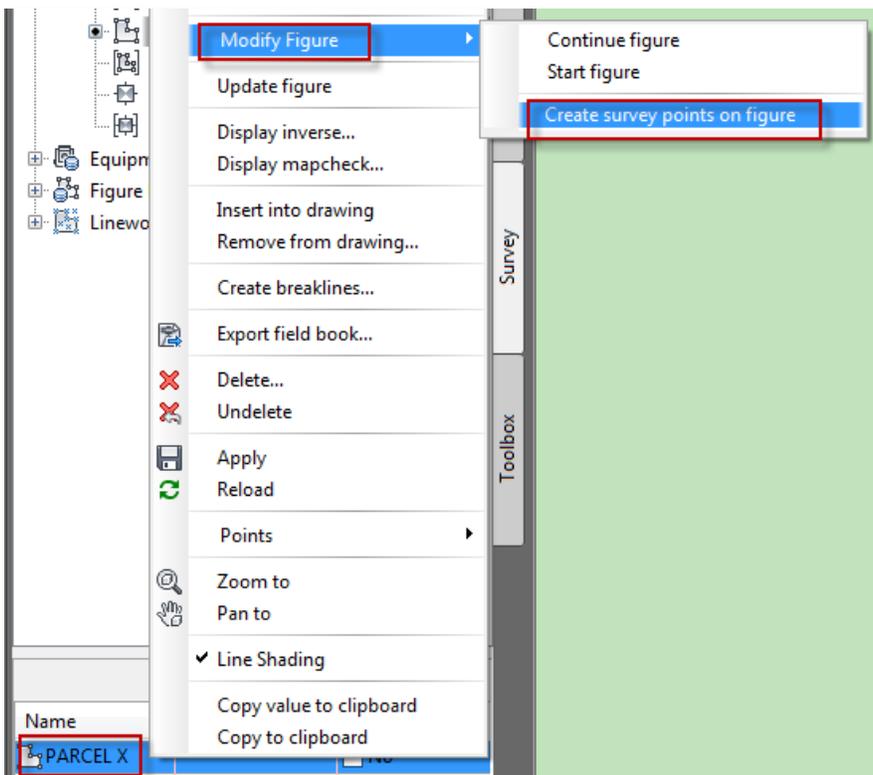
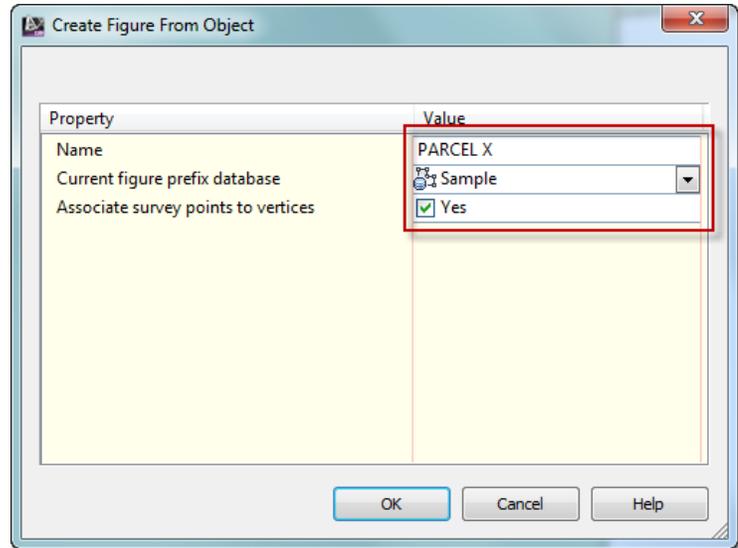
Next, we will right click on Figures under the AU2012 Survey Database on the Survey Tab and choose Create Figure from Object.



We will then select our newly created parcel (polyline) outline and give it a name.

For now we will simply call it Parcel X. We will also check the box to associate survey points to the polyline vertices.

Our new parcel now shows up in the “Item Display” at the bottom of the Civil 3D Tool Space.



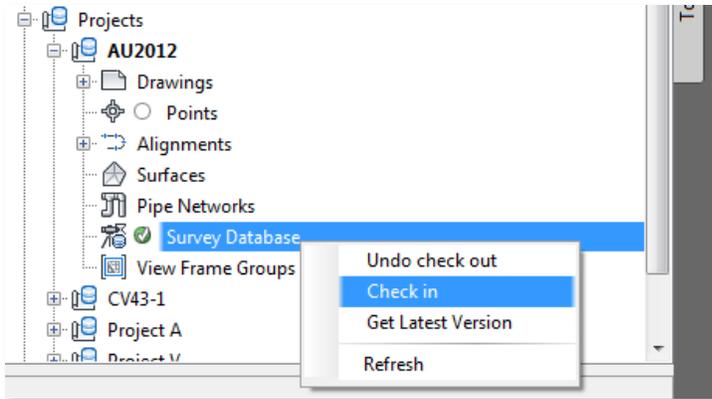
Our next step is to right click on the PARCEL X in the item display, click on Modify Figure and then choose Create Survey Points on Figure.

We are then asked to confirm that we would like to create the points and we will respond with Yes.

After doing so, our newly created survey points are displayed in the item view area of the Civil 3D Tool space.

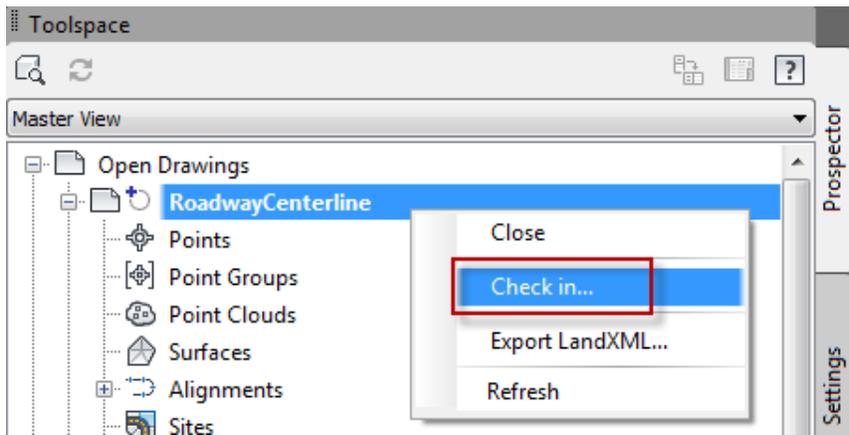
Number	Name	Easting	Northing	Elevation
1		696381.7228	217103.5499	0.000
2		696392.7442	216893.2007	0.000
3		696211.2975	216499.5101	0.000
4		696154.2464	216536.4697	0.000
5		695998.0048	216531.6129	0.000
6		696009.4656	217092.6104	0.000

The survey crew can now easily leverage these coordinates to assist in locating these property corners in the field.



We will give the survey crew access to this data by checking the Survey Database (with our changes) into the Vault.

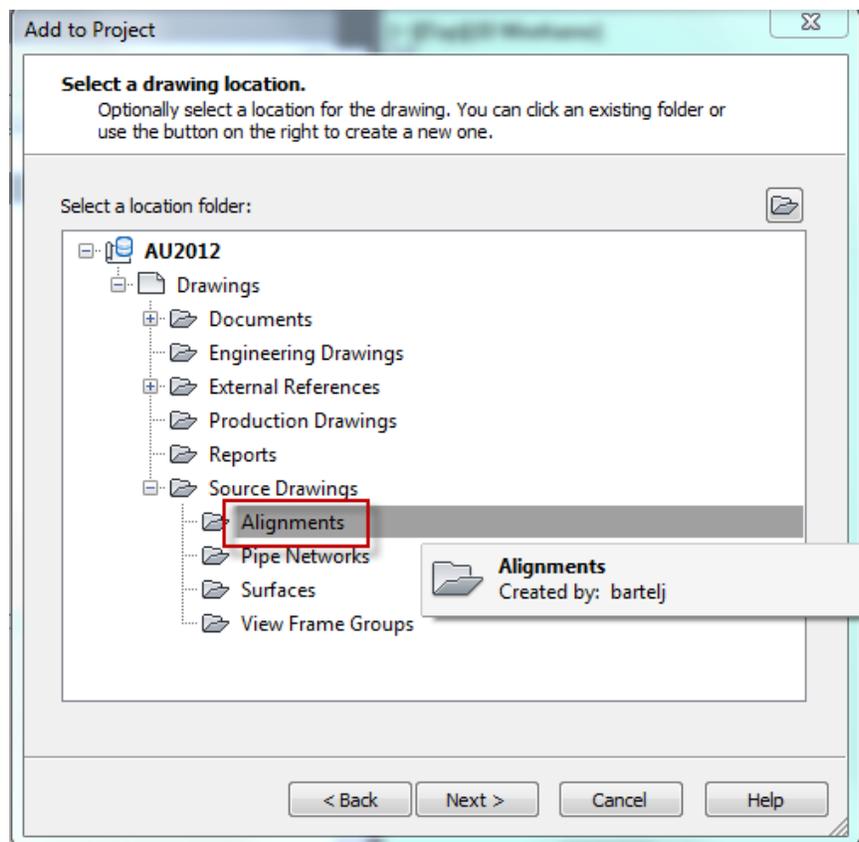
We can accomplish this by right clicking on the Survey database under the AU2012 project on the prospector tab and choosing “Check In”.



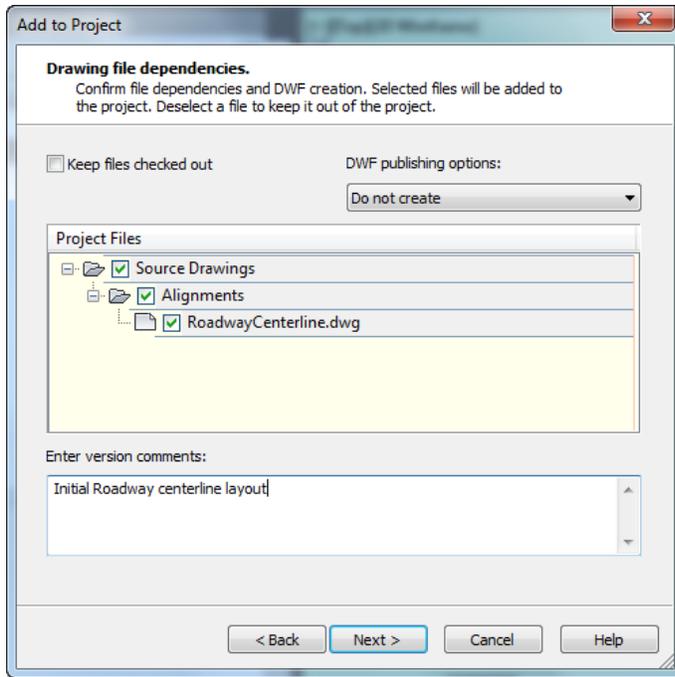
Because we are finished with the Mandalay Ln centerline, we will check it into the Vault as well. We will accomplish this by right clicking on our drawing name ROADWAYCENTERLINE on the prospector tab of the Civil 3D Tool Space and selecting Check in...

Vault will display the dialog box (right) where we can choose where in the Vault we would like to store our file.

In our example, we will save it in the AU2012 project under the Alignments folder.

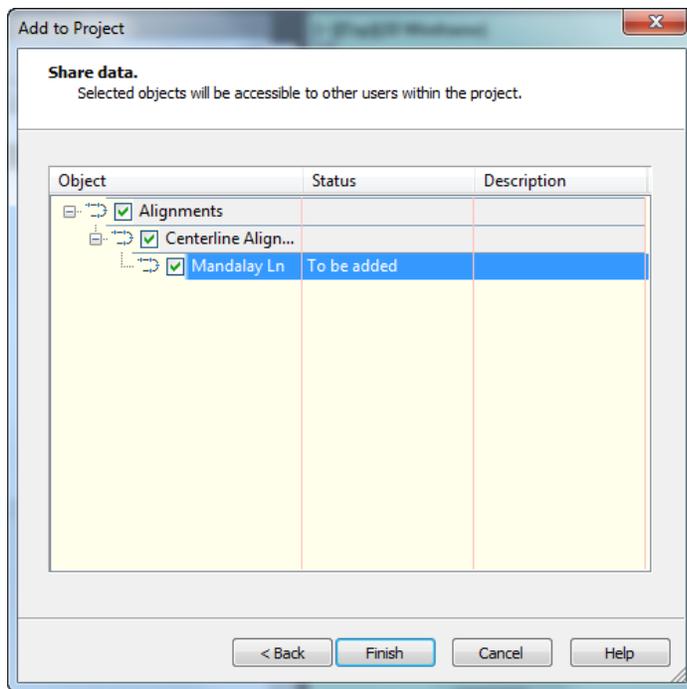


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We are then presented with a dialog box where we can add version comments to our file for the record.

In our example, I am just indicating that this drawing contains the the initial roadway centerline layout.



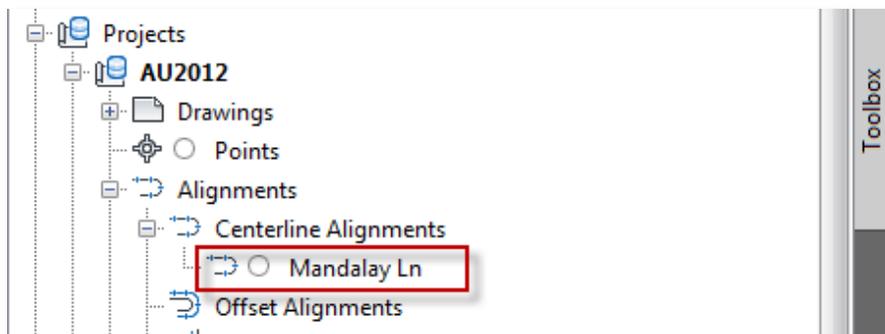
We are then given the choice of which Civil 3D objects to allow other users within the project to use.

In our case there is only one so the choice is pretty simple.

Having said this, we can't forget to check Mandalay Ln. 😊

We will click Finish to complete the check in process.

Once complete, the Mandalay Ln Centerline Alignment is immediately available to project users under the AU2012 project on the Prospector Tab.



Our next step in the process is to create a surface to represent the existing ground conditions. In this demonstration, I do not have a survey file containing this information but I do have a HUGE geospatial file containing contours for an area much larger than our project. (The .SHP file is approx. 750Mb.) We will leverage some of this data to create our surface.

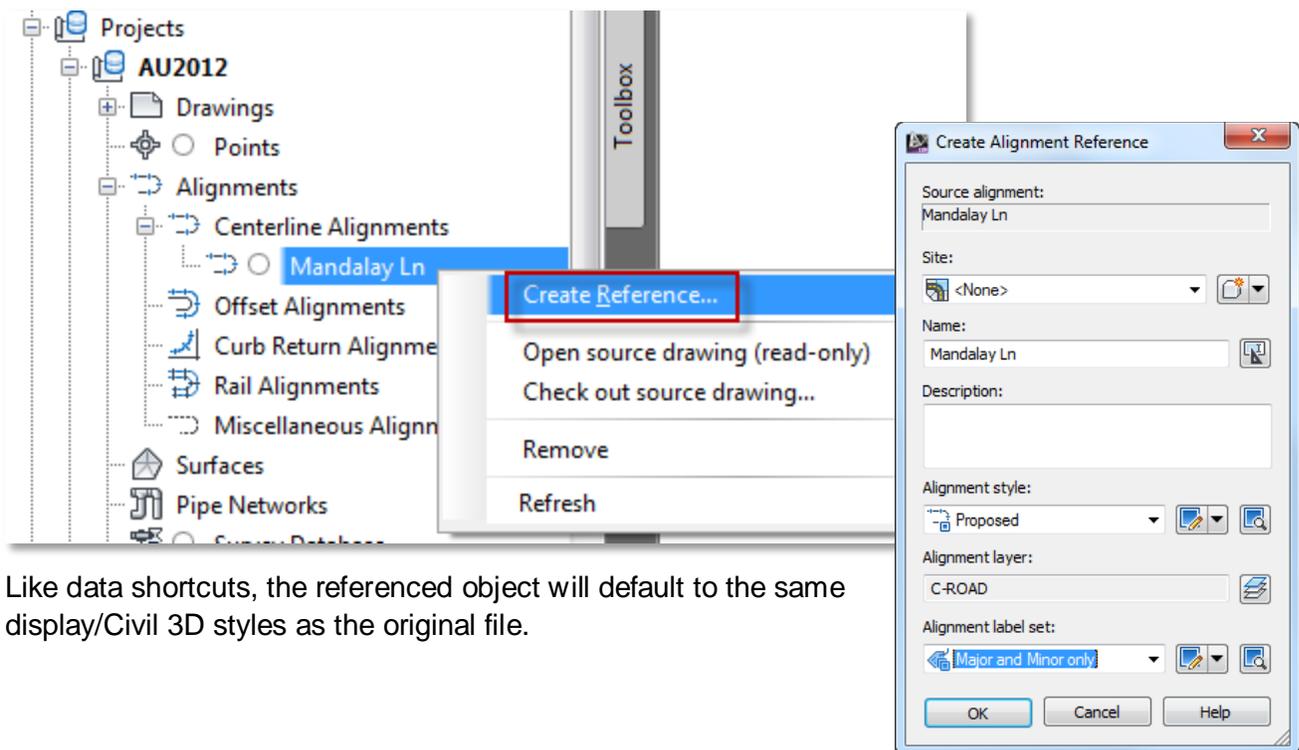
We will begin by creating a new drawing in Civil 3D and then assigning the DE83F coordinate system. Please refer to Page 9 for a review of this process.

After assigning the coordinate system, we will save the file as Existing Ground in our working folder under the AU2012 project in the Source Files, Surfaces folder.

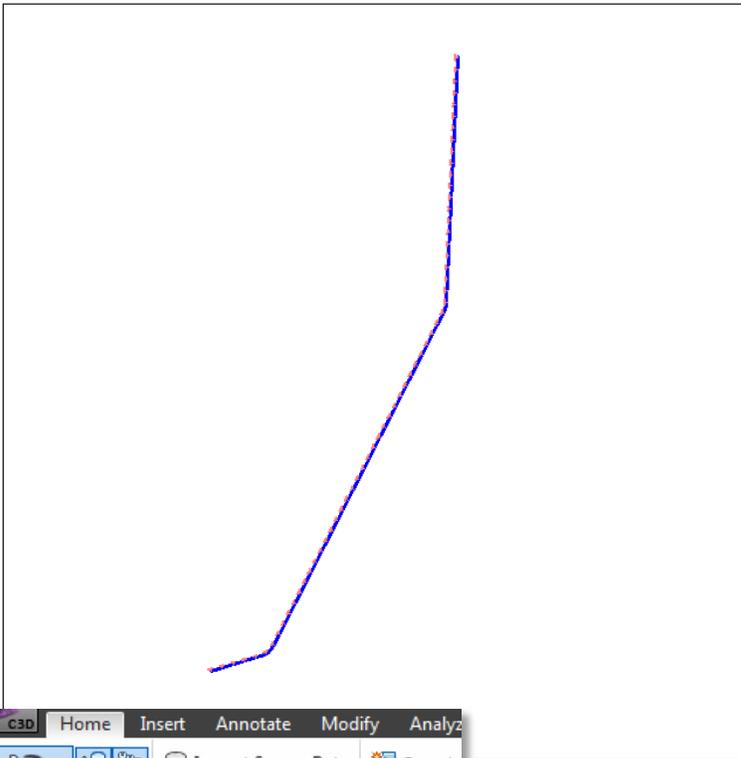


Like before, we will do this to keep things organized until we are ready to check this file into our AU2012 Vault Project.

As we begin, we have a completely blank canvas. To give me some context of the area where we will be working, I will reference our Mandalay Ln centerline. We can accomplish this by right clicking on the Mandalay Ln centerline object on the Prospector tab of the Civil 3D Tool Space and choosing Create Reference... (See Below)

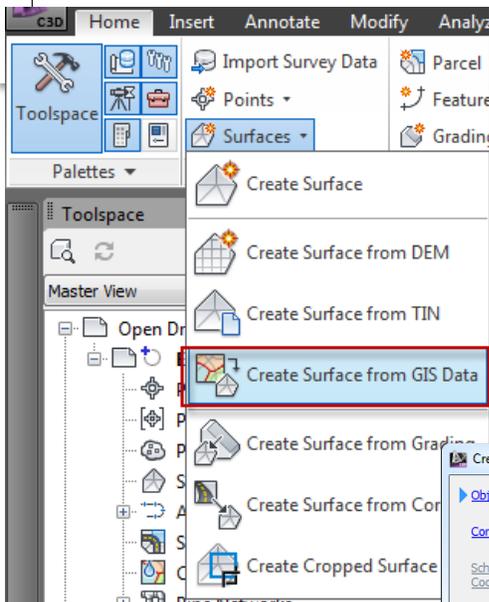


Like data shortcuts, the referenced object will default to the same display/Civil 3D styles as the original file.



Because our GIS file contains contour data for an area much larger than what we are interested in, I will create a rectangle around the area I am interested in.

Note: The GIS contour file is approx. 750Mb and using this rectangle will allow me to selectively determine what area I would like to use rather than having to build a surface using the entire file.

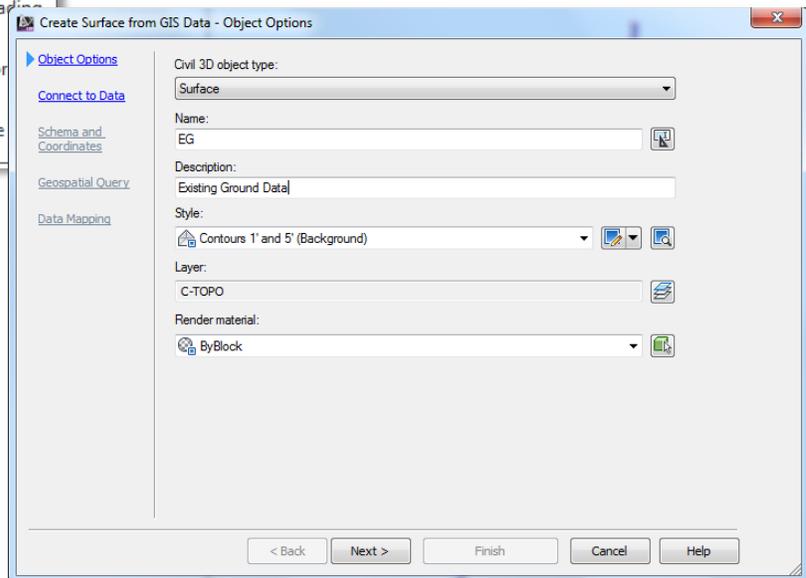


The next thing we will do is begin the surface creation process. The process starts by selecting Surfaces on the Home ribbon and choosing Create Surface from GIS Data.

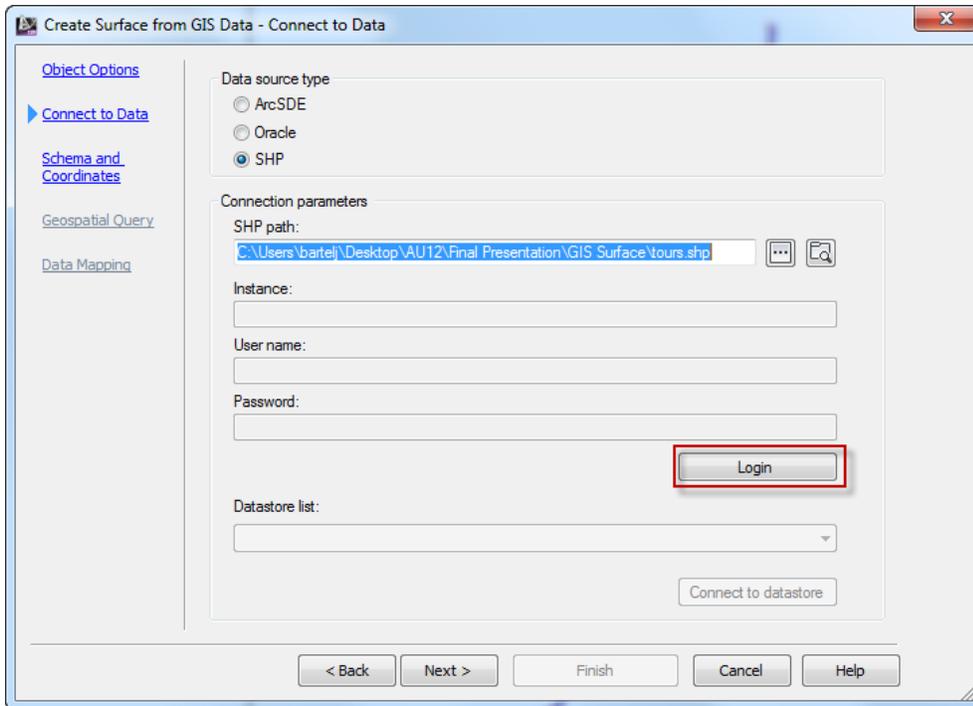
A Wizard Dialog box is then displayed which will walk us through the five step process.

In step one; we will name our Surface EG give it a brief description and set the display style as Contours 1' and 5' Background.

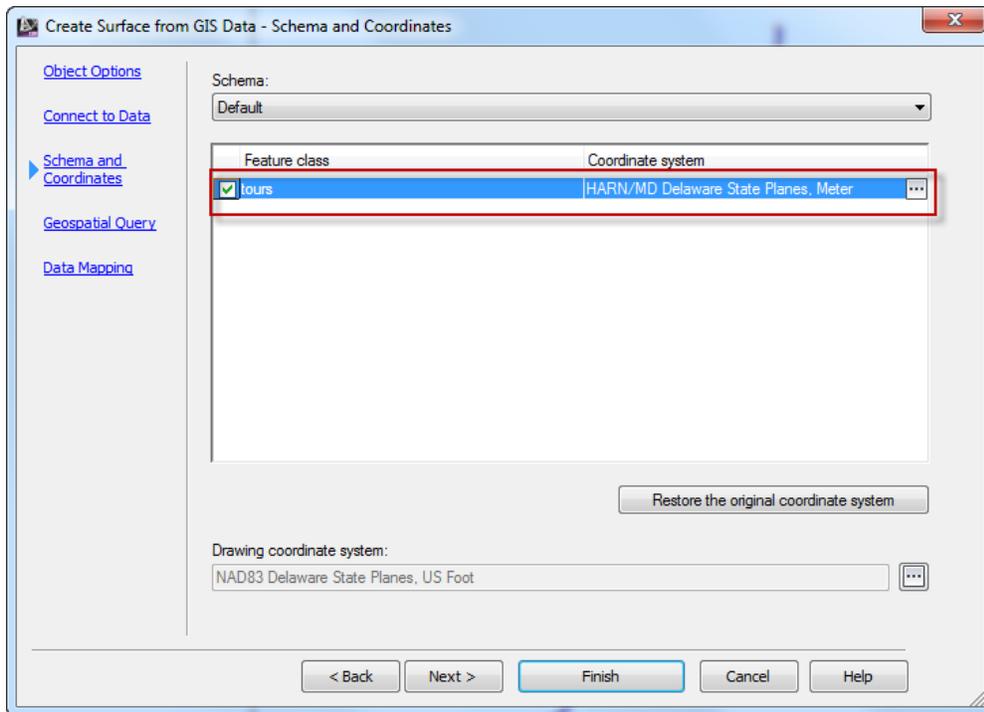
We will then click Next.



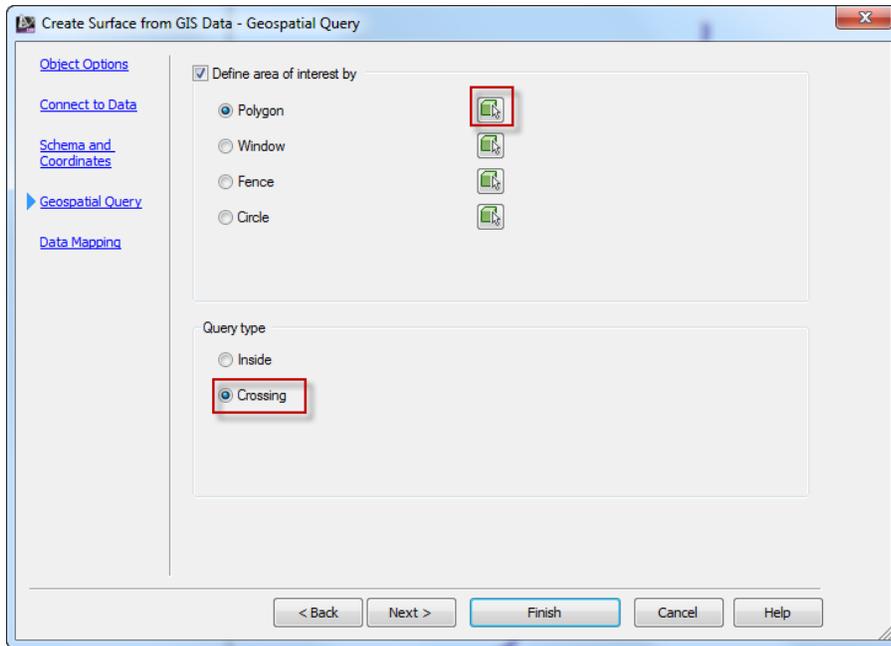
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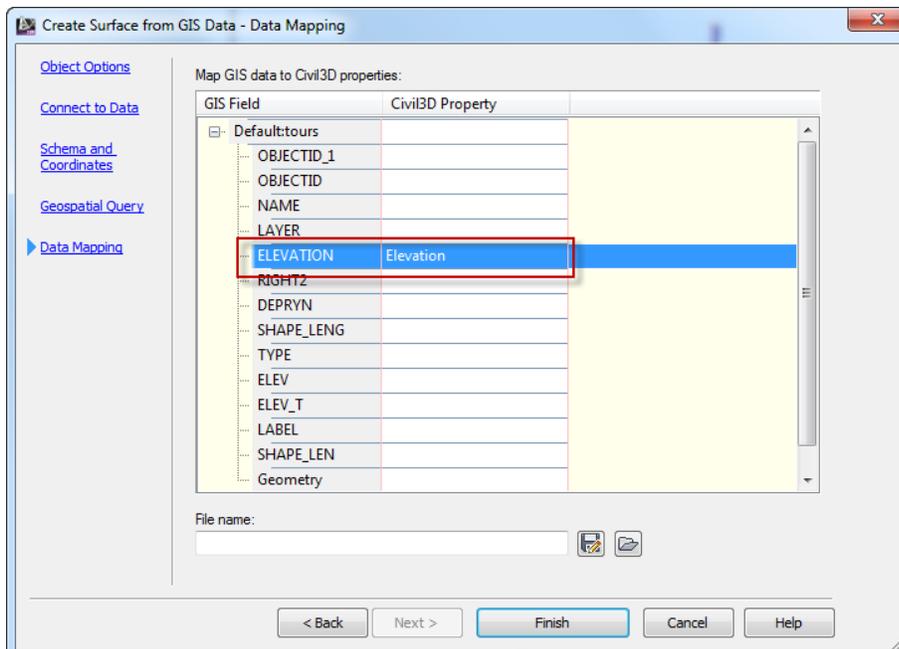
We will then connect to the TOURS.SHP file by selecting the SHP data source type and then browsing to the file. We will advance to the next step by clicking on Login. (See Above)



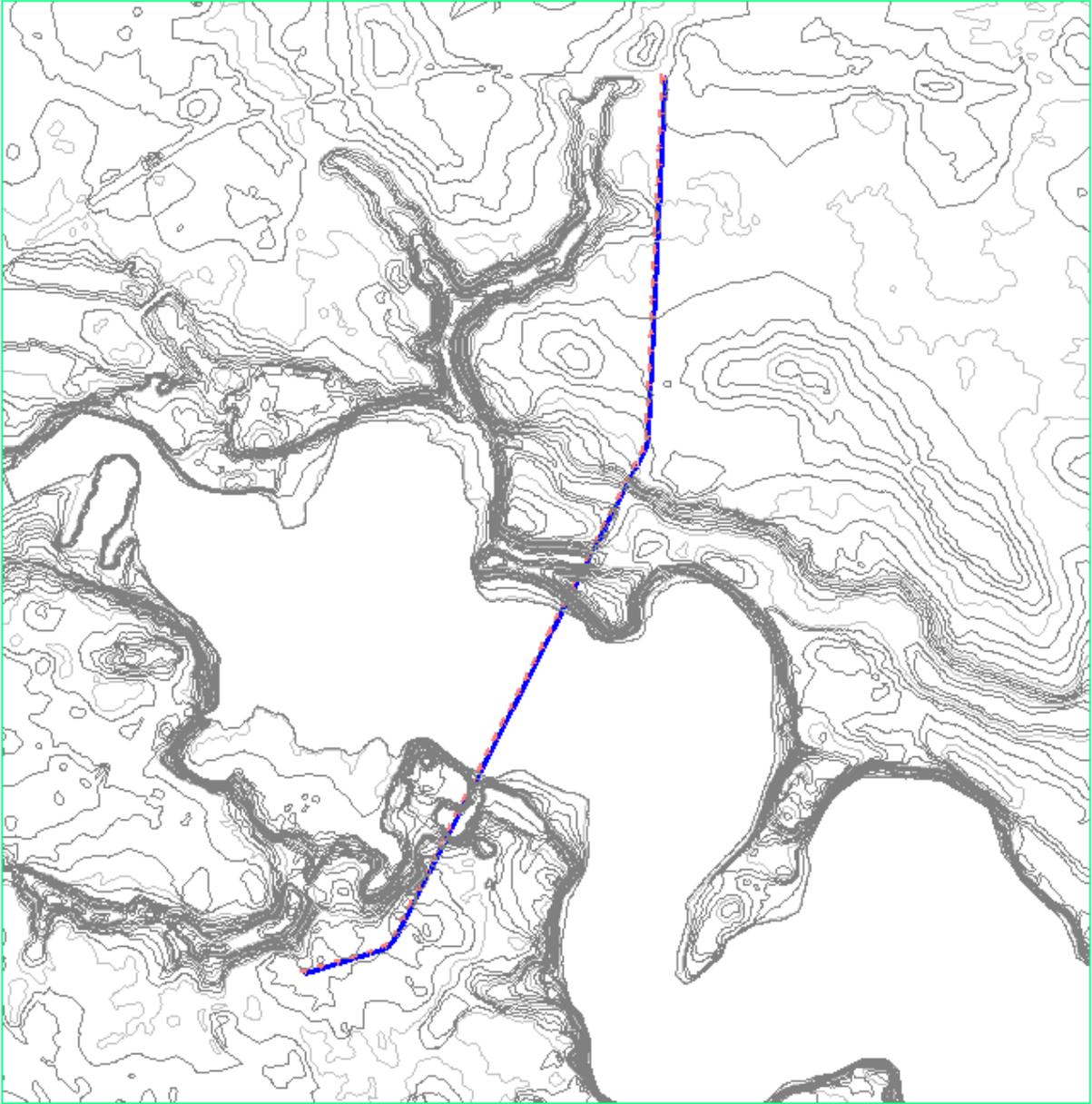
Next, we will select the feature class “tours”. Notice that the coordinate system defined with the data is metric. (very different than our DE83F) Civil 3D will resolve this automatically!! Very Cool! We will click Next to advance to the next step.



In this step, we will define our area of interest. (i.e. which of the contour lines in this massive file we want to use) We will select Polygon and click on the icon to the right. We can then choose to select the rectangle we created earlier. We will also select the Crossing Query type so our surface will be built from all contours completely or partially within our rectangle. We will then click Next to continue.



Finally, we will assign the Elevation attribute in the GIS file to the Elevation property of the Civil 3D surface on the right. We will then click Finish to complete our Existing ground surface.

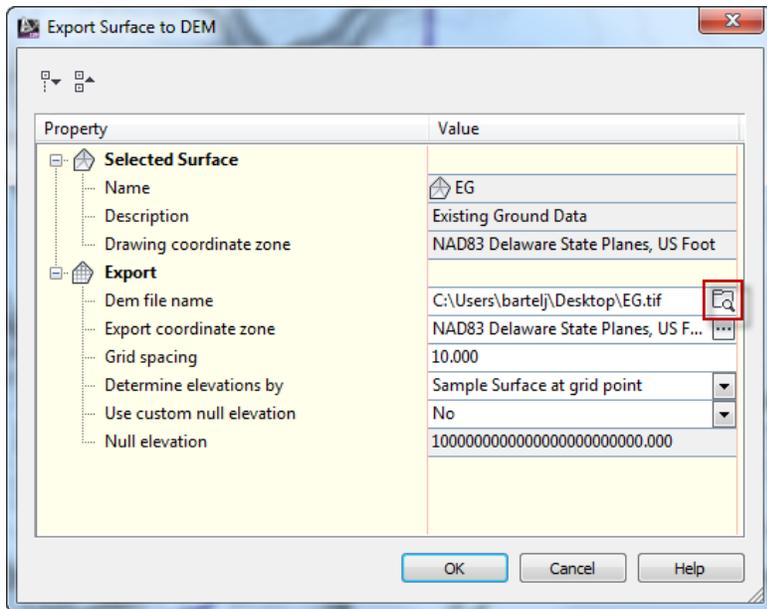


After a short amount of processing, our Existing ground surface is complete and ready for use

****Bonus Information****

I am sure you can imagine that the potential of creating a large and cumbersome surface from GIS data is high. Here is a workflow for quickly perusing a large amount of surface data.

First, create the surface using the style Border Only. The surface will be large but the fact that you are not showing contours will allow you to move around the model quite quickly.



Next, right click on the surface name on the Prospector Tab of the Civil 3D Tool Space and choose Export Surface to DEM...

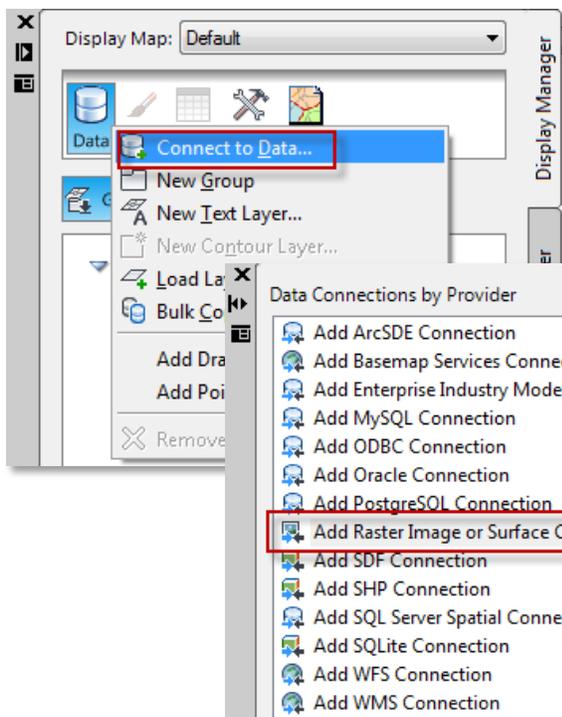
Using the dialog, click on the icon to the right of the DEM file name and change the file type at the bottom to GEOTIFF.



You can then set your Grid spacing to a size that makes sense. (i.e. you probably don't want to use 1' grid squares on a surface the size of an entire county 😊)

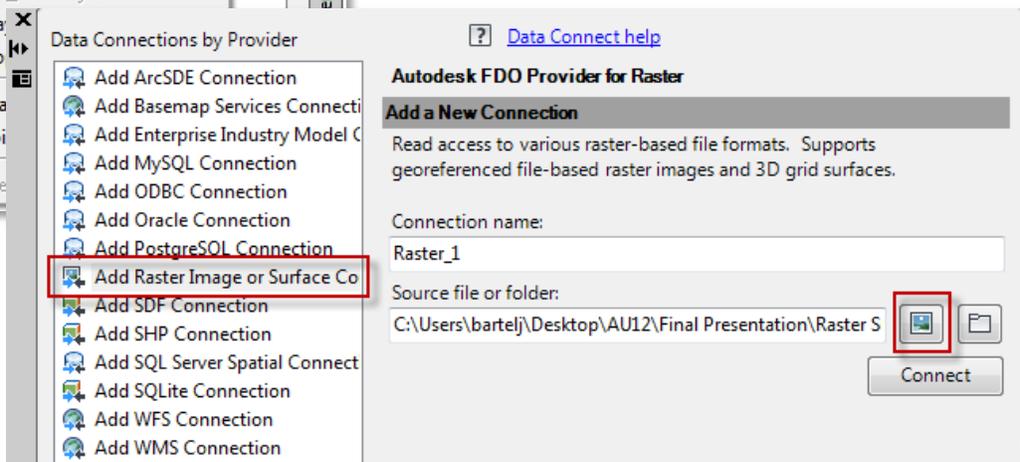
The process is completed when you click the OK button. Be patient as it may take several minutes to build your GeoTIFF file.

Note: If your surface was created from a GEOTIFF file, skip this step as you already have what you need.



Next, using the Map Task Pane, click on the Data icon and choose Connect to Data...

Next, choose Add Raster Image, navigate to the file you just created and click Connect followed by Add to Map.



Our EG.TIF is immediately displayed on the screen.

By default will usually look like green Play Doh.

It will quickly become a whole lot more useful once we adjust its display using the Map Task Pane.

By double clicking on the swatch next to our TIF image on the Map Task Pane (like we did back on page 11) we can set the display properties for the image.

We will begin by clicking on the down arrow next to Theme to alter the theme properties.



Scale Ranges for Layer rasters:Existing Ground

Style Editor

From	To	Preview
0	Infinity	

Raster Style for 0 - Infinity Scale Range

Band Detail | Hillshade Band: 1 | Elevation Band: 1 | Brightness: 0 | Contrast: 0 | Transparent

Band	Style	Cell Minimum	Cell Maximum
1	Theme		
*			

Specify a theme

Style ramp

Palette USGS DEM palette

Create legend labels

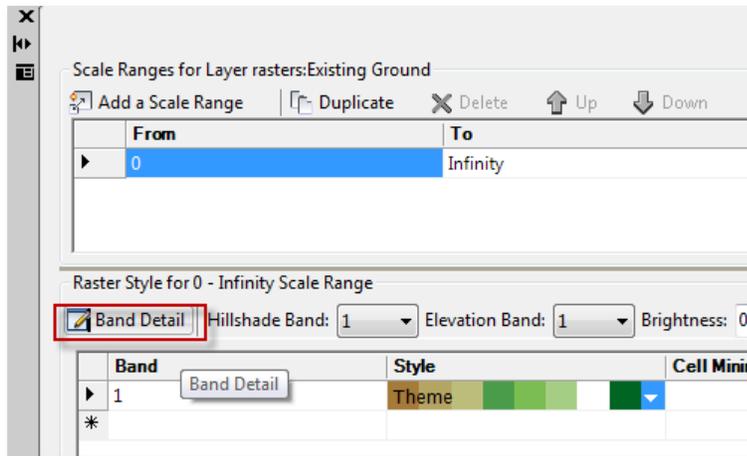
Label text: <Enter the legend label>

Label format: <Label text> <min> to <max>

Reset OK Cancel

Using the bottom options of the Theme settings, we will set our Palette to USGS DEM palette.

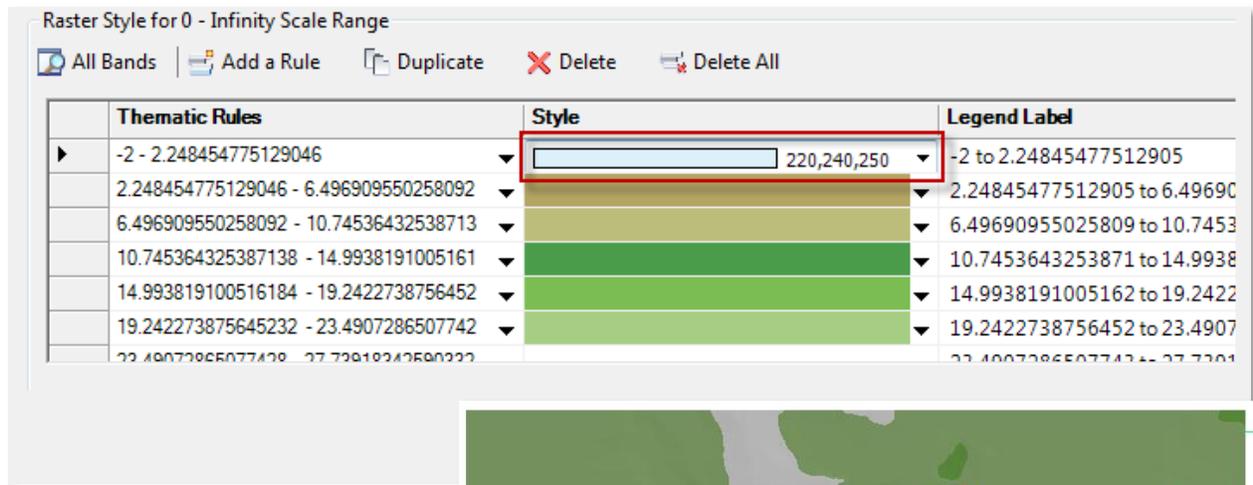
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Next, we will click on the Band Detail button to expose each of the colors being used in the palette.

You will notice that the color assigned to the lowest elevation is a dark brown. Because our lowest elevation will represent the river, we will change the color to a light shade of blue.

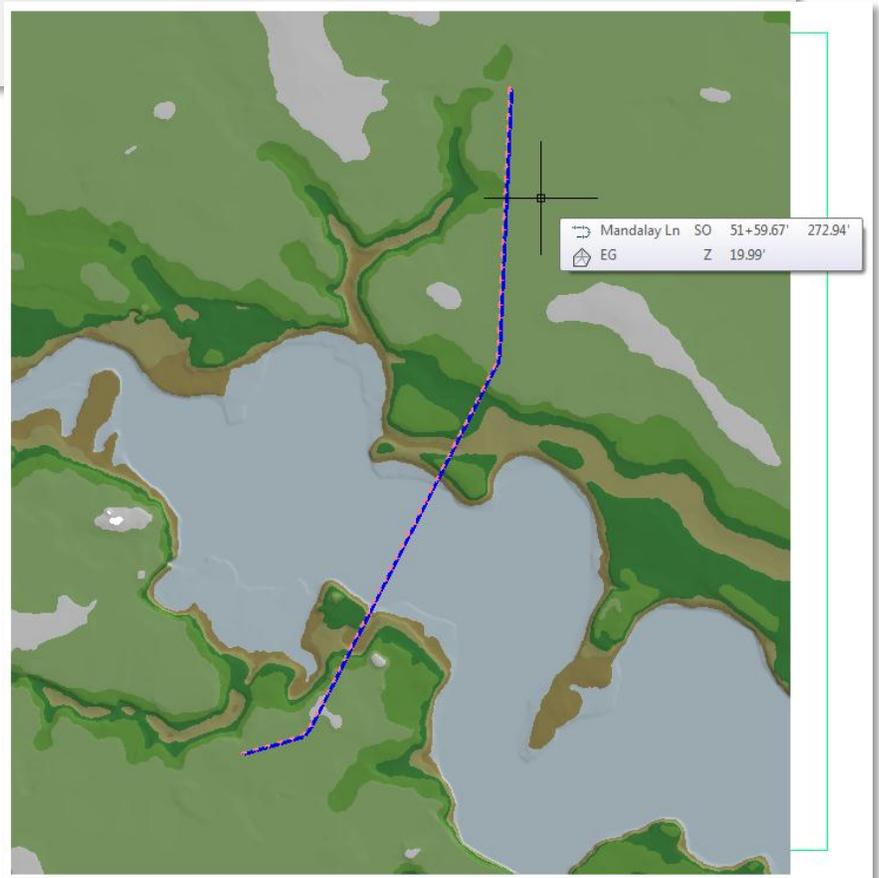
(A dark brown river is not at all attractive.)



Simply click on the color drop down and choose a color that better represents water. Click Apply when finished.

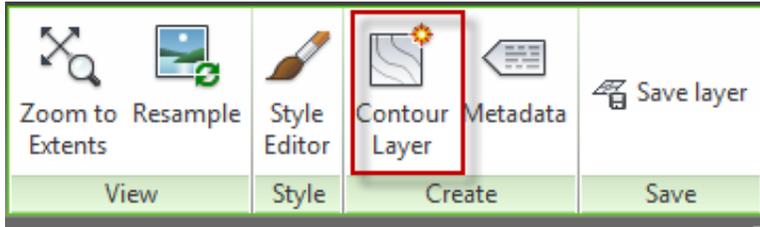
You now have a very lightweight surface that you can easily see the elevation definition. Also looks fantastic on exhibits!

At the same time, when hovering over the image, Civil 3D will still display the surface elevation tooltips.

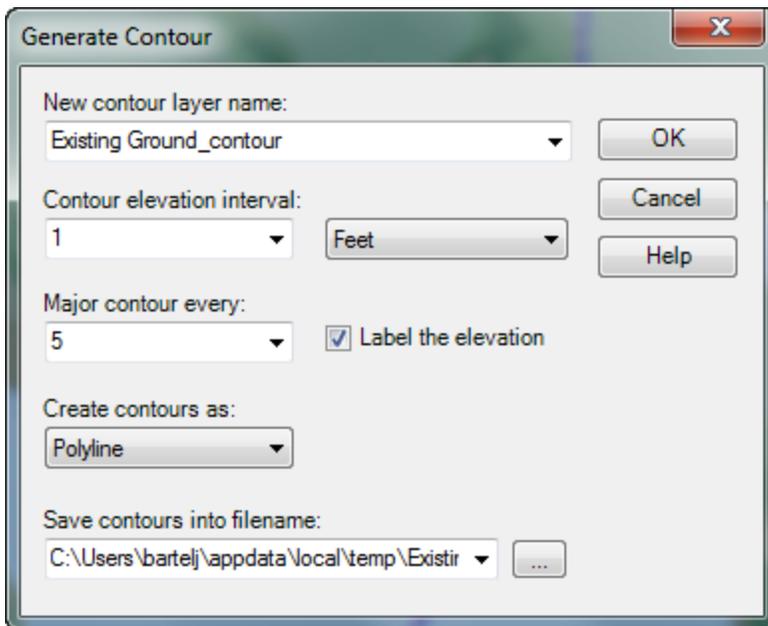


I know what you are thinking, that looks great, but I really need to see the contour data. Using the Map Task Pane, we can do that too!!

With the GEOTIFF surface selected in the Map Task Pane, the following contextual ribbon is displayed. Using the ribbon, we will leverage Map to display contours by clicking on the Contour Layer option.



After clicking the ribbon button, the Generate Contour dialog box is displayed. Using the dialog, we can control how we would like to see our contours.



For this example, we will set the increment values to 1' and 5'. I will also switch the units to Feet. (Defaults to Meters)

In addition, I will also click on the Label elevation check box.

At the end of the day, Map is building an external .SDF geospatial file to represent the contour information.

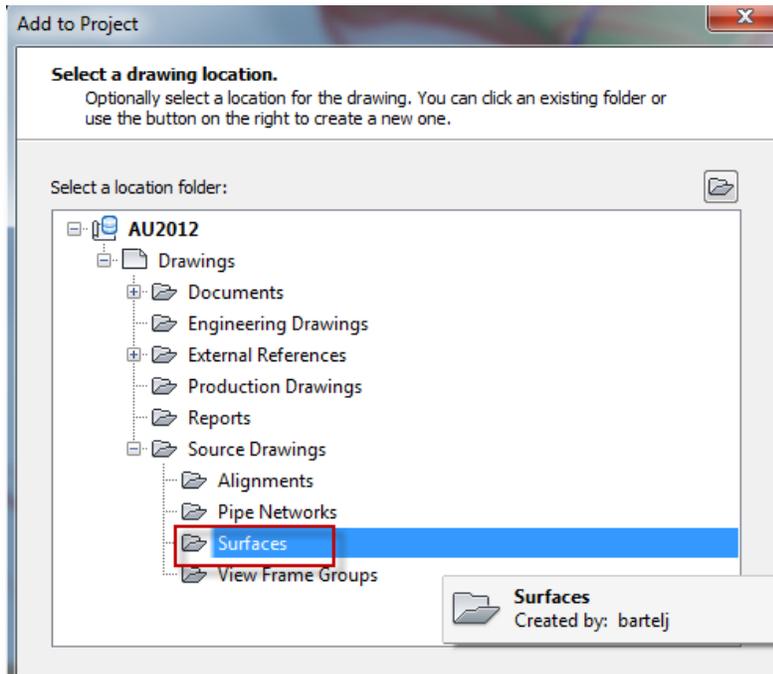
This gives you the opportunity to use the contours for other purposes as well. Very Cool!



Our result is an extremely large lightweight surface with contours and labels that we can quickly use for analysis, creating profiles, sections...

Having said this, I want to make sure no one is confused. The contours shown here are lightweight geospatial lines. They are not Civil 3D contours and will not do everything that Civil 3D contours do.

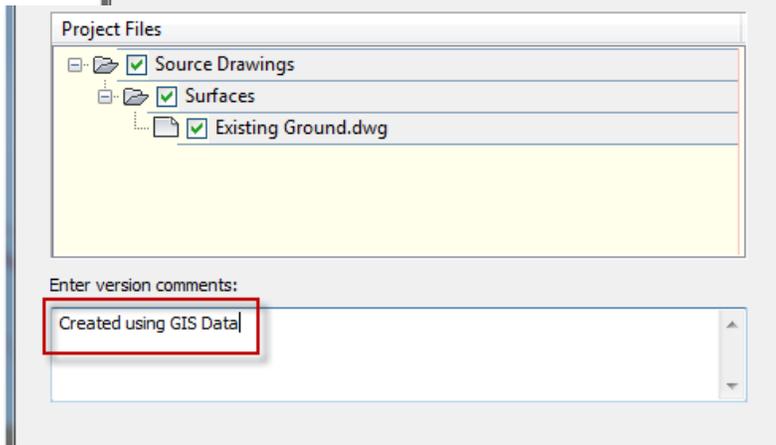
For now, we will assume our Existing Ground surface is ready to be shared with the rest of the project team. As a result, we will now check it into the Vault.



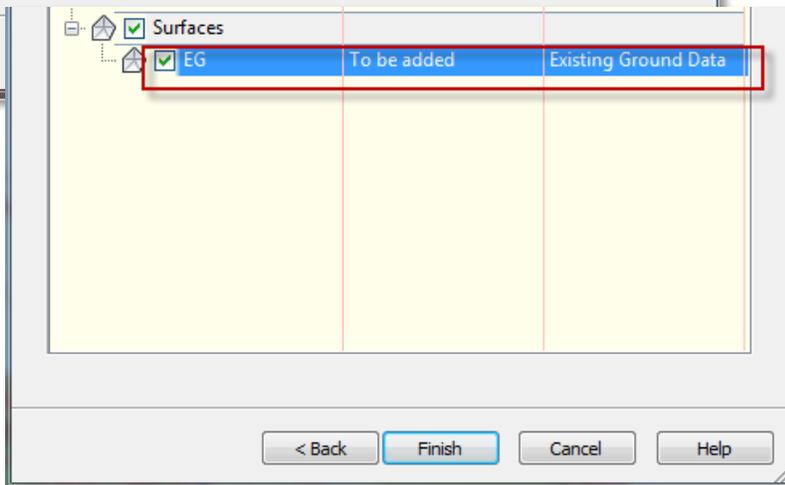
To accomplish this, we will use the same process as with our Mandalay Ln alignment.

We begin by right clicking on the Existing Ground drawing name in the Prospector Tab of the Civil 3D Tool Space and choosing Check In...

We then choose the Surfaces folder under the AU2012 project folder structure and click Next.



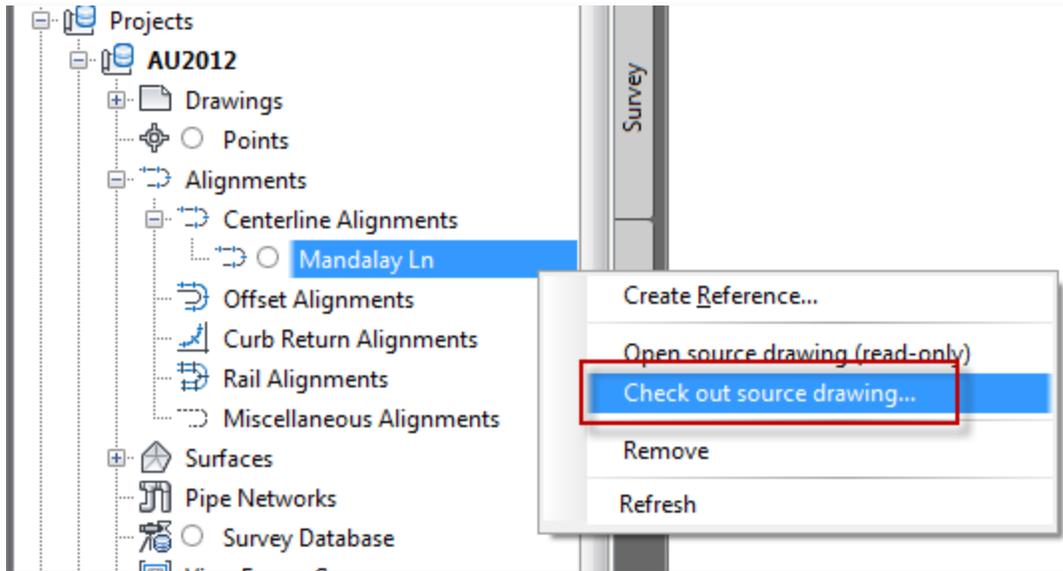
In the bottom of the next dialog, I will add a comment to note what kind of data was used to build the surface. And click next.



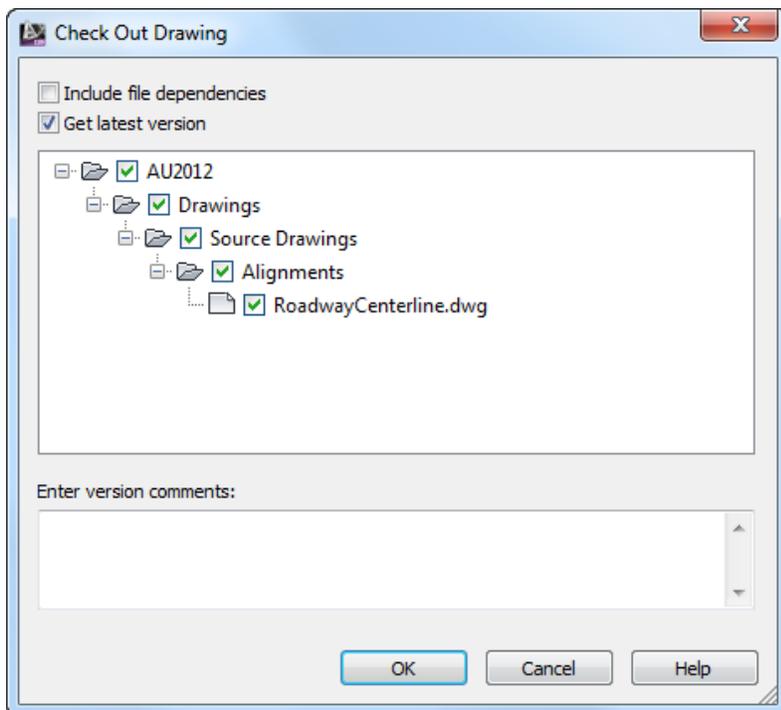
I will complete the process by selecting the EG surface to share with the rest of the AU2012 project team and click Finish.

My next step in the process is to build my existing and proposed ground profiles. I will do this by opening the drawing that contains my Mandalay Ln centerline alignment, reference my newly created existing ground surface and then build my profiles.

To begin, I am going to locate the Mandalay Ln Alignment under the AU2012 project on the Prospector Tab and right click.

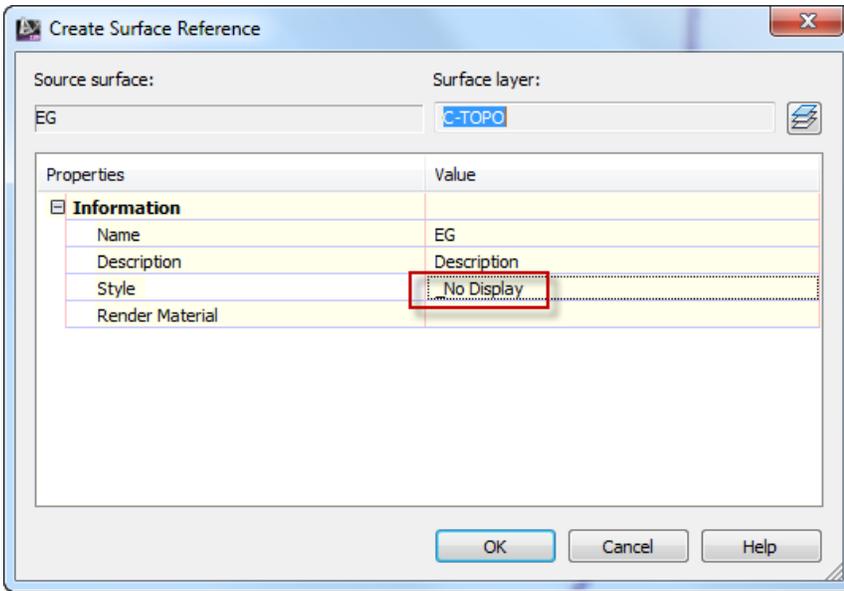


I will then choose the Check out source drawing.. option. This is incredibly helpful in that Vault is remembering the drawing file names and locations for me. I need only tell it I want to use the source file for the object and Vault goes and gets it for me.



Prior to opening the file, Vault also lets me choose file dependencies (if applicable), get the latest version of the file or add some comments.

In this demonstration we will just accept the defaults and click OK.



Next, I will reference my EG surface by right clicking on it under the AU2012 project on the Prospector Tab and choosing Create Reference.

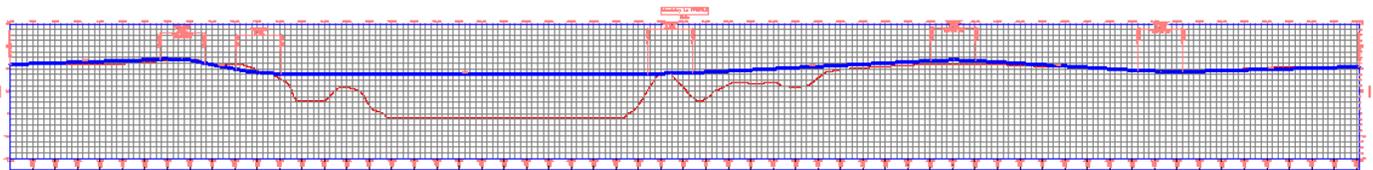
(Just like we referenced the Alignment file back on page 22)

As for display options, I am going to set the EG surface style to No Display to keep my file very light weight.

(Even though we can't see the surface, we can still use it to create profile data)

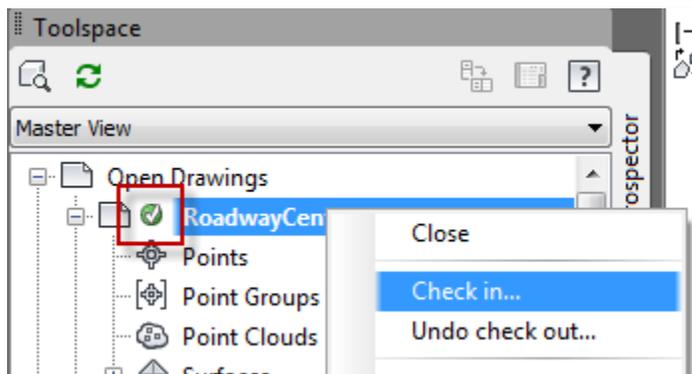
With my centerline alignment and existing ground surface available, I will create both my Existing and Proposed profiles.

Note: Step by step will not be documented for creating profiles as it is standard Civil 3D functionality and will be available in a number of other sessions this week. (I will however be doing it live during my session.)



As you can see from above, I have created an existing ground surface profile and proposed profile for Mandalay Ln. For the most part, my goal is to match existing as much as possible with the exception of the new bridge location.

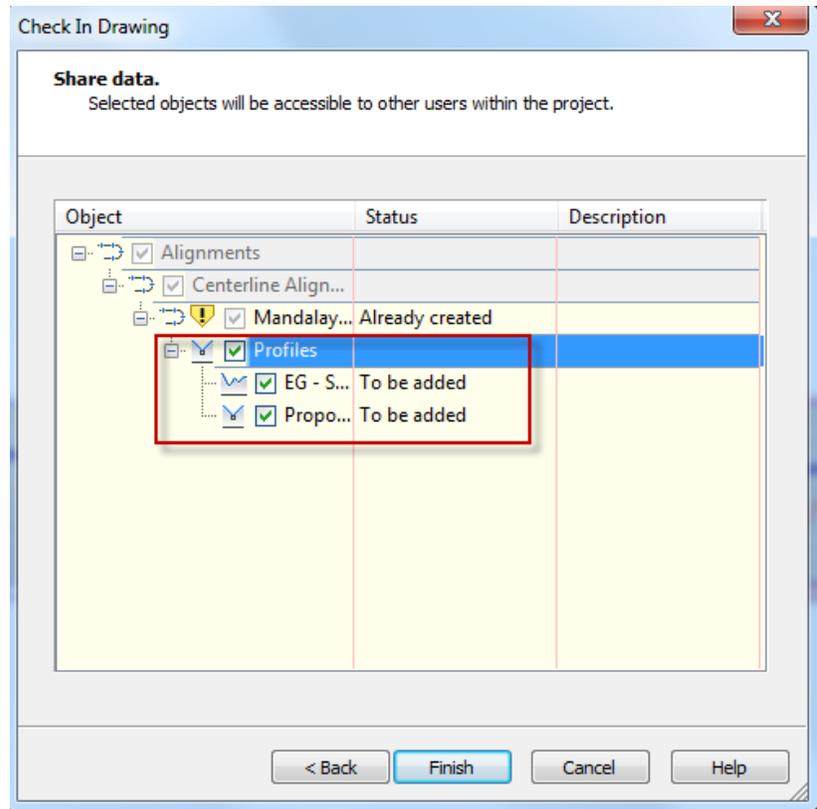
Now that my profiles are complete, I will check them into the Vault by checking my Mandalay Ln centerline alignment back into the vault.



The process is the same as before. We will right click on the file name and choose Check in...

Note, the icon is now a green circle with a check mark. This indicates that it is checked out to you and the version in your working folder is newer than the version in the vault.

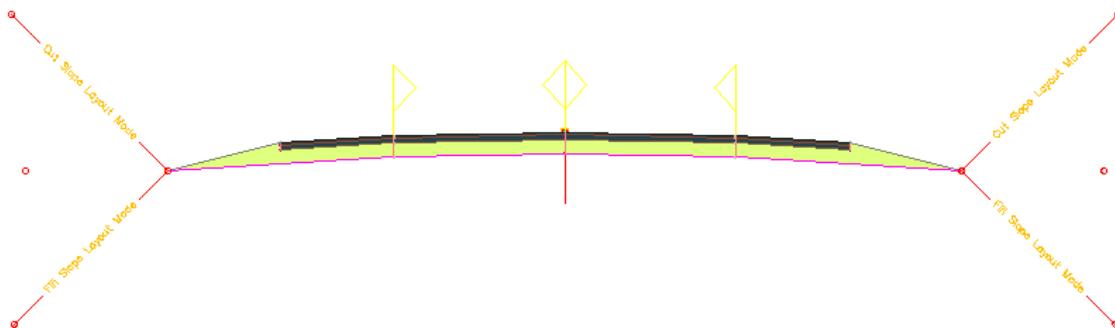
The only difference this time is we will have to check our newly created Civil Objects (profiles) to share them with the rest of the team before we click Finish.

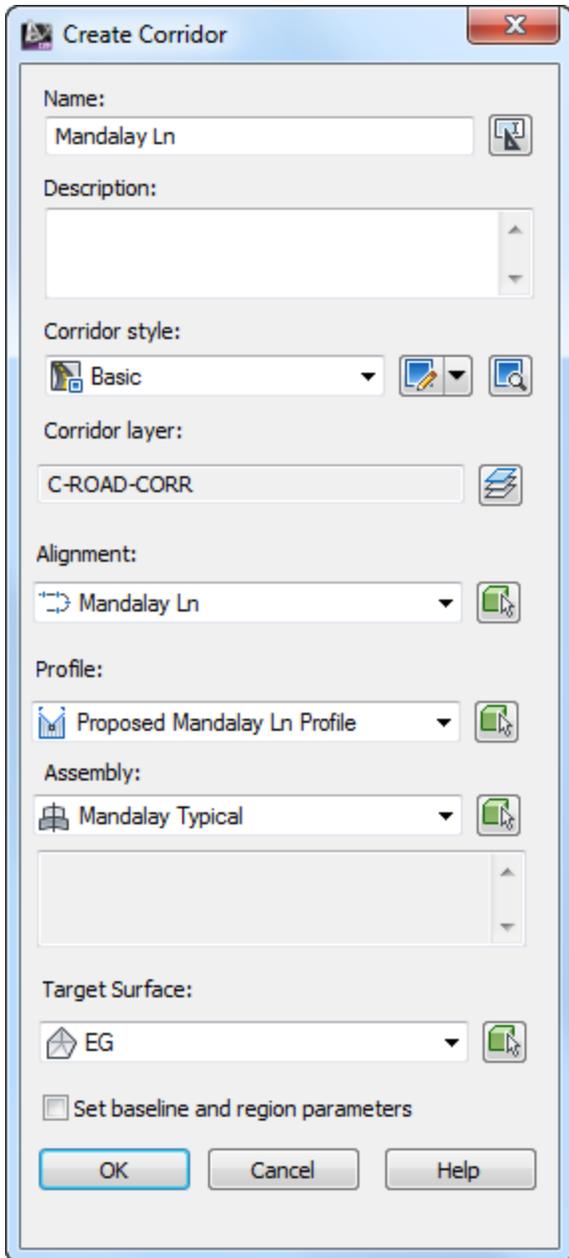


Finally, we will create a file where we can work on the corridor model for Mandalay Ln. To accomplish this, we will create a new file and reference the Alignment, EG surface and both profiles.

This process is exactly the same as we have been doing so far so we will jump ahead to where I have created a new drawing called Mandalay Corridor Model.DWG with the coordinate system set to DE83F. I will also use the process we just discussed to data reference the centerline alignment, both profiles and the existing ground surface. (I will set the surface display to none for now as well to keep the file size down)

My next step will be to build an assembly. I will call it Mandalay Typical and set it up like what is shown below. (The process of building an assembly is also something that will be covered at length in many sessions this week. Having said this, I will build it during our session and it will be included in the session recording)



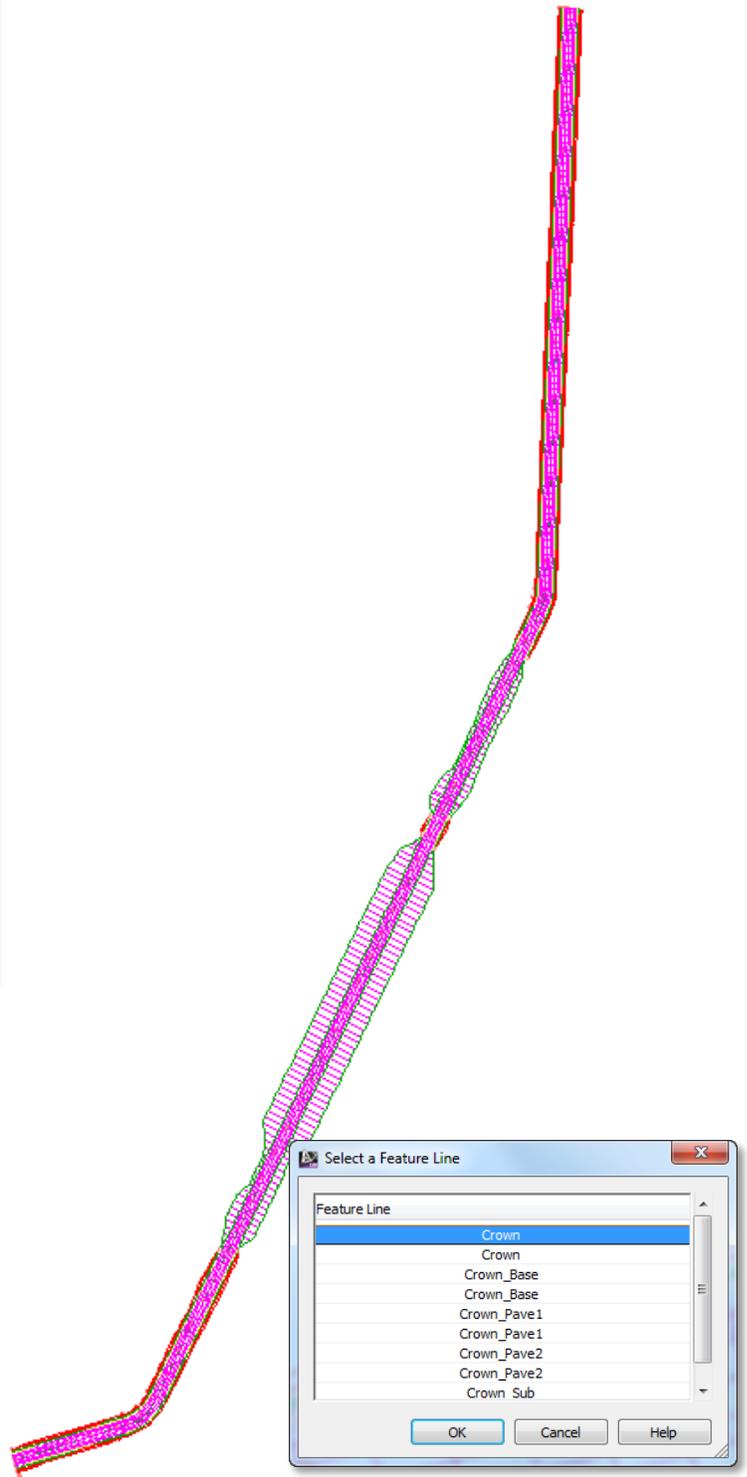


Next, I will build my corridor (Mandalay Ln) using my referenced alignment, profile, surface and newly created assembly.

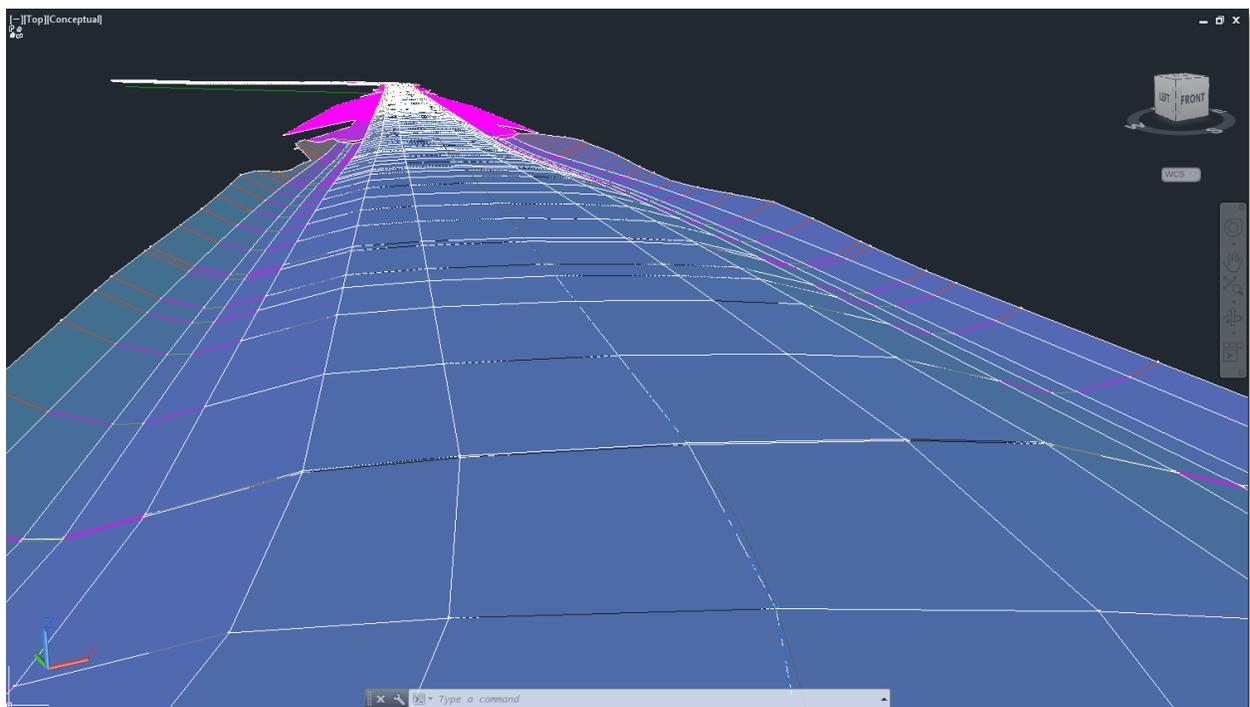
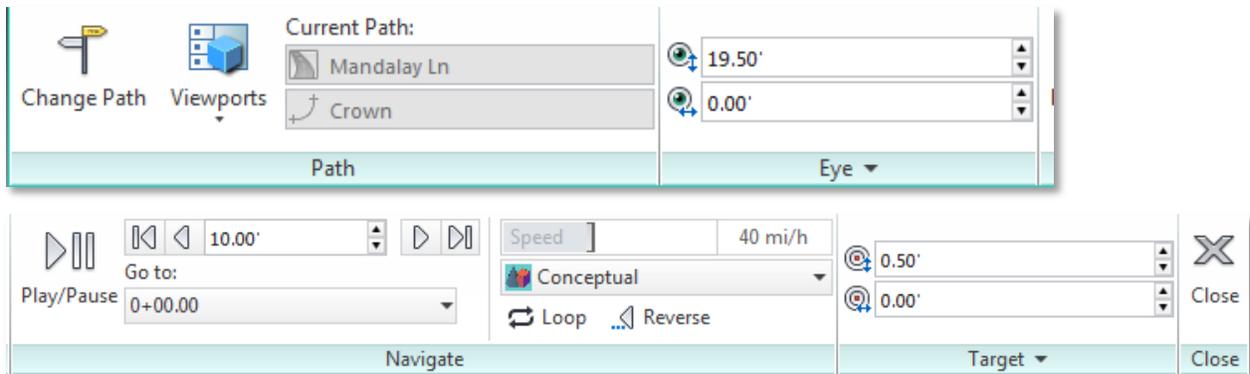
I will complete the process by clicking OK.

My completed corridor model is immediately displayed. To get a better view of the results, I am going to click on the corridor and choose the Drive tool from the contextual ribbon.

When asked which feature line to follow, I will select the roadway Crown.

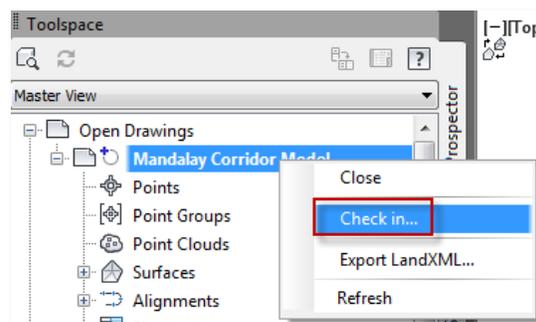


Once in the Drive tool, we can adjust various settings in the ribbon to “experience” our roadway design. For printing purposes, I split the ribbon into two pieces to make the various settings easier to see. They are all very intuitive and extremely easy to use.



When finished reviewing our corridor model, we can click on the CLOSE option on the contextual ribbon to restore our standard top down display. For now, we will proceed under the assumption our preliminary corridor model is ready to be handed off to the next person in the design process.

Our only remaining step is to check it into the Vault as we have our earlier components.



With the Corridor model checked in, we have succeeded in our strategy of delivering a preliminary corridor model to the project engineer while at the same time breaking the entire model up into smaller pieces such that numerous team members can work on the project in parallel.

For example...

The surveyor can work on the Existing Ground surface while a designer works on the centerline alignment geometry while another designer makes adjustments to the corridor model all at the same time. In addition, the file sizes are relatively small as compared to the information used to create them.

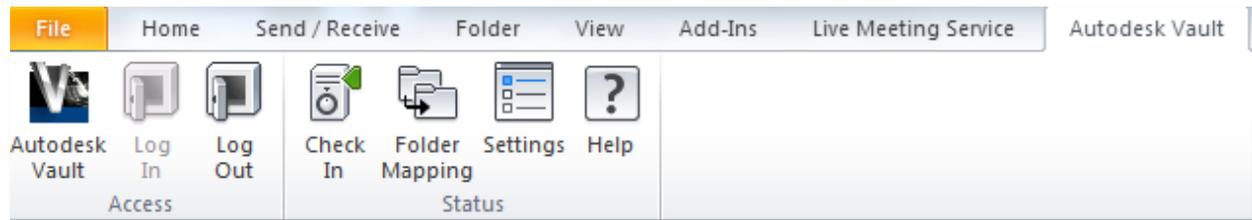
Communication with others...

“Number one, cash is king... number two, communicate... number three, buy or bury the competition” – Jack Welch

There will likely be a lot of email transmissions as a result of this project. Fortunately, Vault gives us the ability to easily store it in a centralized location. For our final part of this session, we will set up our Outlook such that project related emails can quickly be routed to a folder within our Vault project.

Note: The first thing we need to do is make sure the Microsoft Outlook Vault client has been installed. It is not installed by Default!!

Open Microsoft Outlook and see if the Vault ribbon is available. (See Below)

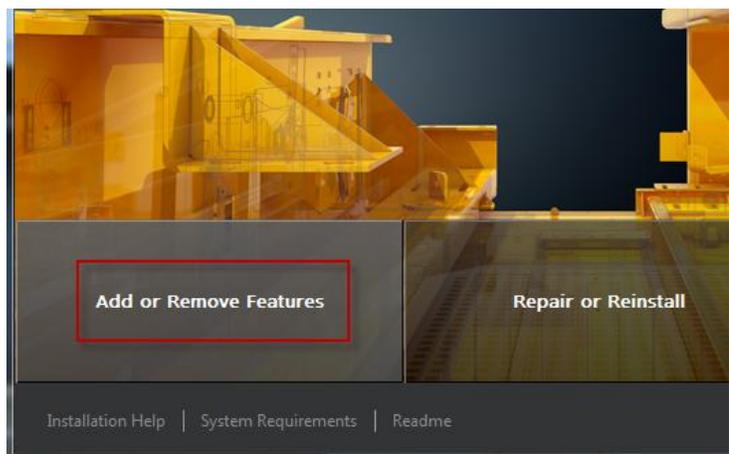


If it is not there, you will need to go to “Control Panel”, “Programs and Features” and select Autodesk Vault Collaboration 2013 (Client). After selecting, you can right click and select “Uninstall/Change”.

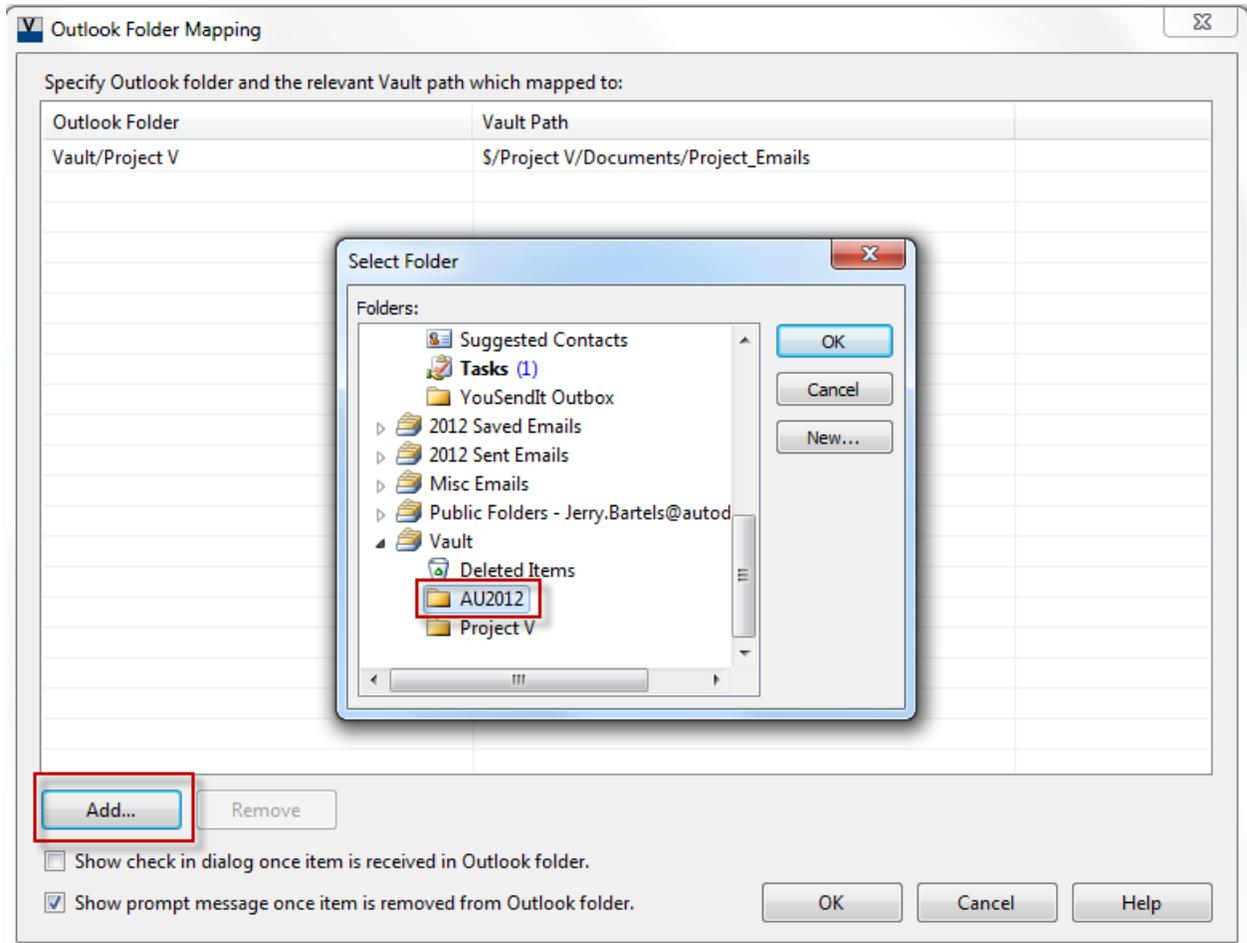
There will then be an option in the lower left of the dialog to Add or Remove Features.

Typically, the Outlook client defaults to unchecked.

Add the client and you are all set.

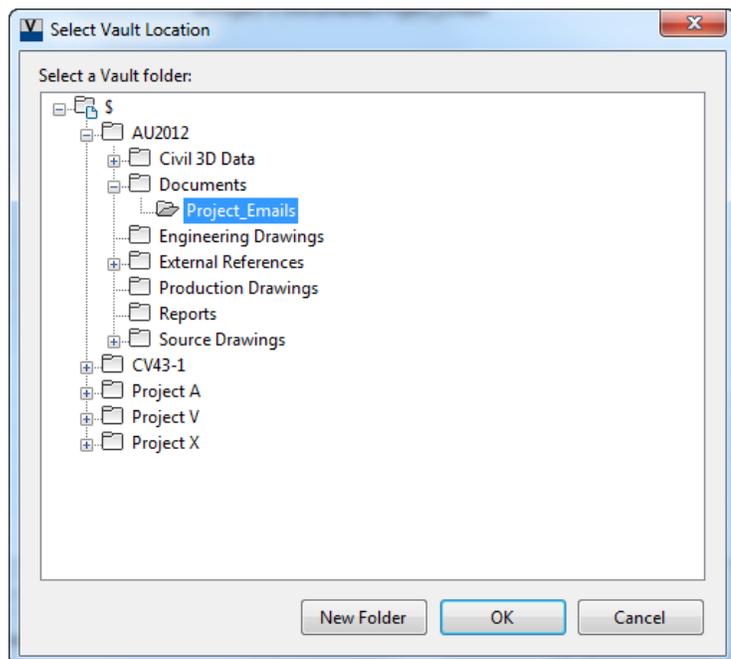


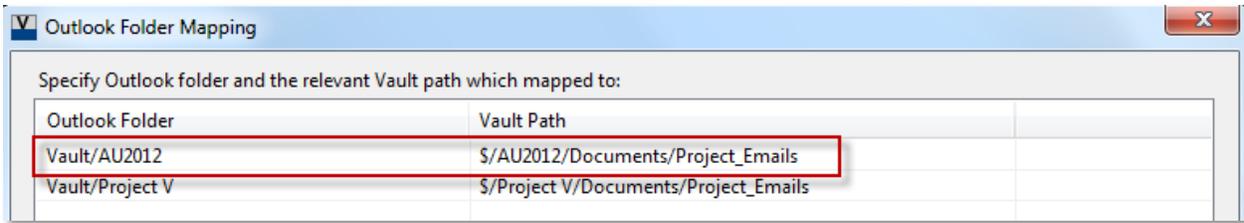
Once the client is ready, you can use the Ribbon in Microsoft Outlook to log into Vault just like in Civil 3D. Once logged in, you can Map a Folder in Microsoft Outlook to a corresponding folder in Civil 3D.



We accomplish this by clicking on Folder mapping and clicking the Add.. button when the dialog displays. Next, we navigate to the folder where we will be storing our Project emails. In this case, I have already created a new folder in Outlook called AU2012. I will click OK to continue.

Next, I will click on the Project_Emails folder under the AU2012 project in my Vault and Click OK. If you do not have a folder ready you can create one using the New Folder button.

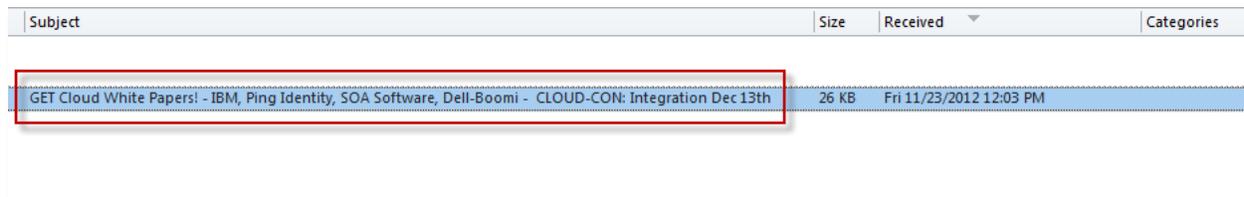




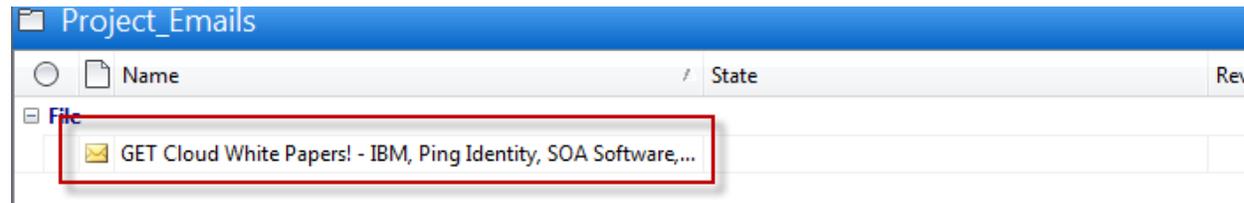
When finished, our new matched folder pair is displayed in the dialog and we can click OK to finish.

From that point forward, any email dragged from any mailbox in Outlook to the AU2012 folder is automatically sent to the Vault AU2012 project email folder.

Outlook display:



Vault Collaboration 2013 Client Display



Note: If you are a fan of using Outlook rules, you can experiment with creating rules where any received email with the AU2012 project name in the Subject line or Body of the message will be automatically copied to the matched folder. Very Cool!!

Conclusion...

“Finally, in conclusion, let me just say this.” – Peter Sellers

What have we learned... Let’s go back and review our initial objectives...

- Use conceptual designs from Autodesk Infrastructure Modeler as a starting point for more detailed design in AutoCAD Civil 3D.

We received a conceptual design created using Autodesk Infrastructure Modeler. The file format was a .DWG containing the proposed Centerline and it was available to us using our Autodesk 360 Cloud Account.

- Use AutoCAD Map 3D to compile geospatial information for better engineering decision making.

We leveraged tools within AutoCAD Map 3D to assign coordinate systems, work with Parcel data, integrate aerial photos and make our existing ground surface more lightweight.

- Use AutoCAD Civil 3D and various analysis tools to move from conceptual design into more detailed preliminary design.

We referenced the initial concept centerline and then analyzed its route and location to determine the extents of our project. We also determined existing conditions of our road connection points as well as created an elevation analysis of our existing conditions. Using the Survey database we began the process of assembling data to locate property corners in the field.

- Use collaboration and data management tools to communicate and share data throughout the design process.

Using Vault, we broke the project up into multiple project components to facilitate several team members working on the project at one time. In addition, we have a survey database created that can be shared amongst all team members. We also have a system in place to quickly and easily capture project related emails in a centralized location.

Final Thoughts...

Hopefully this session gave you some ideas or strategies of using several of our software solutions to accomplish your next project. It was crafted to give you a broad overview of what is possible. If you have specific questions on any of the individual steps or techniques in this session or the other three sessions in this series, check the AU class schedule as there are sessions the rest of the week where you can experience a deeper dive into these topics.

Thanks and I hope you enjoy the rest of Autodesk University!