

CES219631-L

Site and Residential Grading with Civil 3D

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Learning Objectives

- Learn how to use feature lines effectively
- Learn how to build the finished surface through levels
- Understand when to use feature lines, corridors, and grading objects
- Learn how to create an easily editable finished surface

Description

The old days of tissue paper seemed to have died with Civil 3D software, or have they? The mentality and methods used to grade are often using the computer as a sketch tool. We will look at how to use Civil 3D software to provide us with information and grade our site and subdivision efficiently and with a well-defined model. We will learn about feature lines, grading groups, grading objects, corridors, and surface editing.

About the Speaker

Josh Modglin is recognized as a leader in the use, training, implementation, consultation, and customization of Autodesk, Inc.'s, Infrastructure software products. Josh started with AutoCAD Release 12 software over 20 years ago and he is now building Microsoft .NET applications for AutoCAD Civil 3D 2019 software. For years Josh has served as the technical editor for the best-selling book, Civil 3D Essentials. Josh recently has produced multiple training courses with LinkedIn. In addition to writing and working with the software, Josh has been a top-rated presenter at Autodesk University for 4 years. Josh currently serves as a managing partner for InMotion Consulting, a Technical Consulting Solution provider and a member of the Autodesk Developer Network. His passion for helping others in the use of Autodesk products is stronger than ever.

INTRODUCTION

This class is designed to challenge the way you have ever done grading. It is time to step away from the trace paper, spots, and sketched contours and time to look at grading as is done in the field. The goal is that you view grading as a phased process.

Some Key Points First

- You will not pick up grading in a day because grading in Civil 3D is as much an art form as grading on trace paper.
 - Although Civil 3D assists you in grading it will NOT grade your site for you. It relies on YOU the designer.
-

Why Use AutoCAD Civil 3D Grading

Ultimately, you will be able to grade faster (not the first time but as you iterate through designs...and you DO iterate), better and more accurately, and when it is done you have a 3D model for use with the rest of your design.

Let's get started.

GRADING FEATURES OVERVIEW

Let's first make sure we are all on the same page. To do so let's review some basic information regarding feature lines and grading groups.

Feature Lines

Feature Line Geometry

Feature lines have two types of points that define their geometry: **PIs** and **elevation points**. A **PI** is represented by a square grip and can be modified in all three dimensions. An elevation point is represented by a circle grip and has a more constrained editing behavior. The elevation of an elevation point can be edited, but its location in plan view must slide along the feature line geometry determined by the PIs. This constrained behavior is actually quite handy because you can create many elevation points on a simple plan view shape such as a rectangle.

There are two main ways to create feature lines – from scratch or by converting an existing object. Creating a feature line from scratch is very similar to creating a polyline with an additional prompt for each vertex. Each prompt takes time and these add up. A faster method is usually to create a polyline first and convert the polyline into a feature line.

Editing Feature Lines

Sites and Feature Lines

When working with feature lines, you have to consider the use of sites. Feature lines in the same site are “aware” of one another and will try to interact if the opportunity presents itself. For example, if one feature line crosses over another feature line in the same site, one of the feature lines will bend so that the two share the same elevation at the intersection point. The point where they intersect is called a split point.

This can be a useful or extremely destructive function depending on how it is used. In cases where this interaction needs to be prevented, you can simply place each feature line in its own site or make the feature line a 'Siteless' feature line. Do not limit yourself to one Site. Utilize the functionality of interaction but know when to divide.

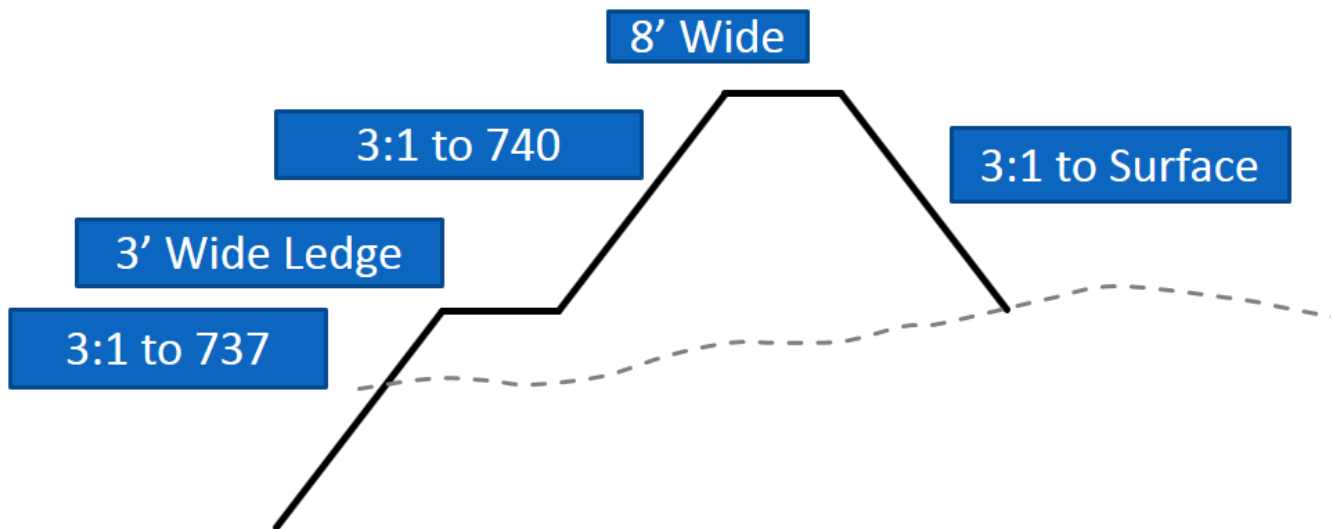
Which feature line controls the other is based upon many different variables. From last created, style, if one feature line has a PI or EP at the implied intersection location, etc.

Grading Criteria Sets

Automated grading within C3D is all accomplished with Feature Lines. Thus, we need a feature line as a starting point. To grade from this to a point, we always need to answer two questions:

- Where are we going?
- How are we going to get there?

C3D automates the process of creating other feature lines and even surfaces based upon this methodology.



To use grading criteria to grade the pond from the bottom feature line out, we would need criteria that would answer the following:

1. 3:1 to 737
 - Where are we going? Absolute elevation of 737 (Target: Elevation)
 - How are we going to get there? At a 3:1 slope from our current position. (Format: Slope)
2. 3' Wide Ledge
 - Where are we going? A distance of 3' (Target: Distance)
 - How are we going to get there? At a flat grade (Format: Grade)
3. 3:1 to 740
 - Where are we going? Absolute elevation of 740 (Target: Elevation)
 - How are we going to get there? At a 3:1 slope from our current position (Format: Slope)
 - Note that this criteria is exactly like #1 with the exception of the elevation
4. 8' Wide
 - Where are we going? A distance of 8' (Target: Distance)

Grading Method	
Target	Elevation
Elevation	Surface
Projection	Elevation
Cut Slope Projection (up)	Relative Elevation
	Distance

- How are we going to get there? At a flat slope (Format: Grade)
 - Note that this criteria is exactly like #2 with the exception of the distance
- 5. 3:1 to Surface
 - Where are we going? To the existing ground (Target: Surface)
 - How are we going to get there? At a 3:1 slope from our current position (Format: Slope)

Do you see how this methodology works?

To use this methodology, C3D stores the grading criteria in a collection that can be used for grading. The collection is referred to as a grading criteria set. To create any grading objects in Civil 3D, a grading criteria set is used.

Grading Objects

Now that we have an idea of how Civil 3D builds grading objects and what a grading criteria set is, how do we use it for grading? We need to create a grading group that is associated to the Site that the reference feature lines are found on. A grading group gives you the ability to group the feature lines associated with the grading together. It is rare that you would have more than one group per site.

Each grading group has properties such as what grading criteria set to use and whether to automatically create a surface from the associated grading objects (feature lines).

What we have covered so far is an overview of the features and functions that are used for grading within C3D. Next, let's cover the concepts or methods used to efficiently leverage the features and functions to grade a site within Civil 3D.

GRADING IN PHASES

Thirty years ago, the method used to prepare land development plans was relatively the same as it had been for hundreds of years – plans were drawn on paper, providing only a two-dimensional depiction of what was to be built. The information that existed for the design was limited to what could be displayed on paper.

Then, with the advent of computers, something magical started to happen. Virtual versions of design components could be modeled electronically. They could be represented in all three dimensions and even have additional information attached to them. Thus, in 30 years we have progressed from ink on paper to 3D intelligent objects. The step from drawing with a pen to drawing with a mouse came early in that evolution—not 3D or intelligent, but lines on a screen that could be printed.

Civil 3D contains all the basic tools to represent designs in this manner. Unfortunately, the process done by many users has not evolved beyond taking the process done on paper and entering this into C3D. You may not realize the full potential of the dynamic relationships you build until you have the opportunity to use them, but you can bet that they will pay dividends on every single project.

Grading – Office Vs. Field

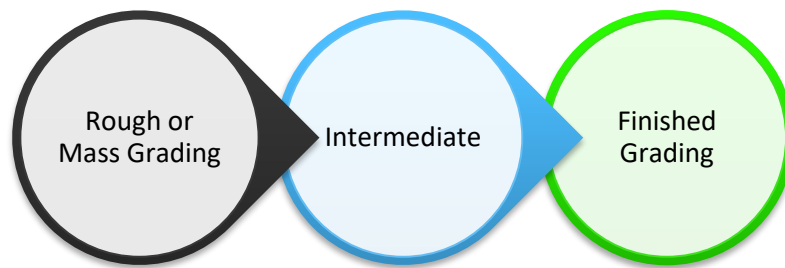
In the office, an engineer will sit down and set some key elevations and then walk through the design to place elevations along the design. For tie-in, usually the engineer will sketch the contours down until they daylight into the existing contours.

In the field, the contractor will look at the plans and split the grading into phases. Often these phases closely resemble the Erosion control phases (although not always).

Phase I you might consider as rough or mass grading. The goal of this phase would be to get the water to flow in the right direction across the entire site. Really, your grading is driven by drainage – keeping the water out of and draining away from the building, directing the water toward basins, etc. Of course, you want to reduce the amount of earthwork used to accomplish this and still tie-into the existing ground.

Phase II is starting to define key areas of the site such as building pads, parking areas, drives, etc. You are able to better grasp visually what is where during this phase.

Lastly, you have your finished grading where everything is well defined.



How many phases the contractor uses differs with each site and the needs of the project. The question is:

WHY AREN'T WE GRADING LIKE THIS?

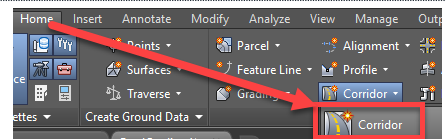
When we use AutoCAD Civil 3D, we are no longer just drawing plans but creating a 3D model. Thus, our work in Civil 3D mimics real world closer than ever before.

Establishing a grade plane

The first phase of grading is getting the drainage heading in the general direction. Depending upon the complexity of the project, this can be accomplished with one grading plane or through basic corridor development. For our sample project, we are going to use a basic corridor object.

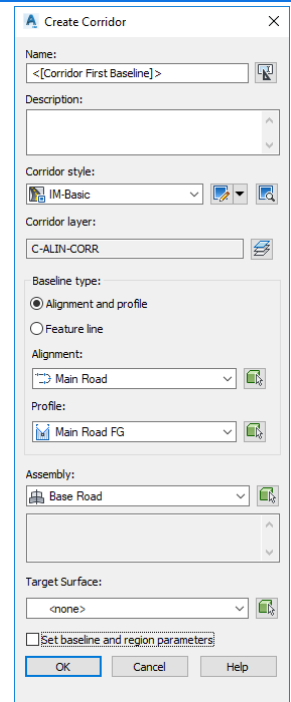
Creating a Grading Plane with a Corridor Object

- 1 From the dataset files, open 01-Corridor Base.dwg
- 2 From the Home ribbon tab, Create Design panel, select Corridor > Corridor



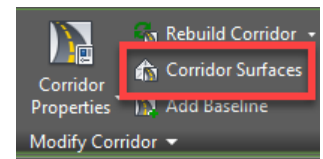
Creating a Grading Plane with a Corridor Object

- 3 Create a new corridor using the following parameters:
- Baseline Type: Alignment and Profile
 - Alignment: Main Road
 - Profile: Main Road FG
 - Assembly: Base Road



- 4 Select the newly created Corridor

- 5 From the Corridor contextual ribbon > Modify Corridor, select Corridor Surfaces



- 6 From the Surfaces tab, select to add a new Corridor Surface and name it Corr_Road FG

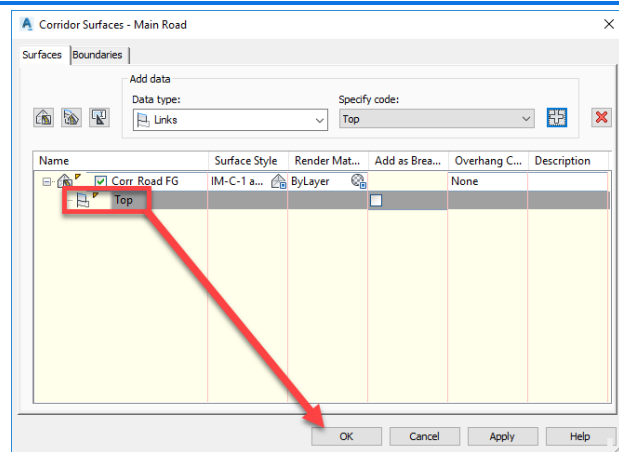


- 7 From the Surfaces tab, add the "Top" Link code data to the surface.



Creating a Grading Plane with a Corridor Object

- 8 Select Ok to close the Corridor Surfaces window



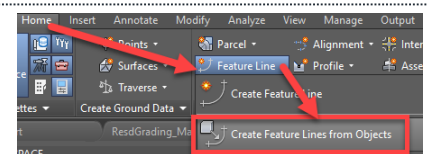
Note that the end result is much larger than the road. Remember what we are doing is establishing a **ROUGH GRADE PLANE** – nothing more. This surface simply establishes a drainage pattern to use for the rest of the grading. We will begin ‘cutting’ our grades out of this base, drainage pattern surface. Consider this somewhat the mass grading done by the contractor.

Cutting out the Pavement Elements

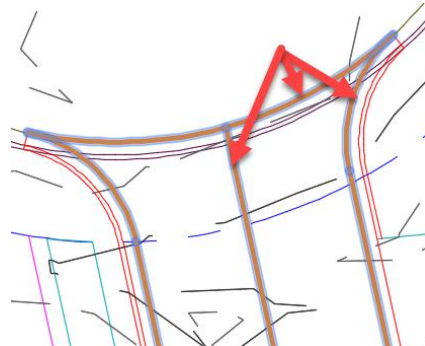
Now that we have the grading plane to work from, we can begin cutting out the pavement elements. We do this using polylines and convert these polylines into feature lines.

Cutting out the Pavement Elements

- 1 From the dataset files, open 02-Pavement Elements.dwg
- 2 From the Home ribbon tab, Create Design panel, select Feature Line > Create Feature Lines from Objects



- 3 Select the three polylines on the C-GRAD-PVMT layer. Press enter to end selection.

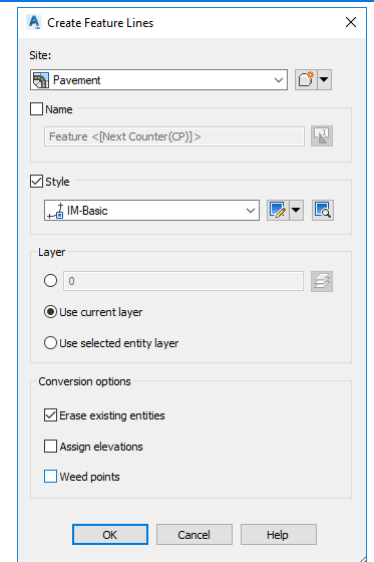


Cutting out the Pavement Elements

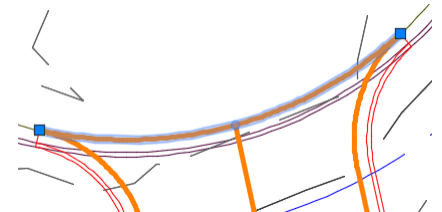
In the Create Feature Lines window, Set the values as follows:

- 4
 - Site: Pavement
 - Assign Elevations: Unchecked

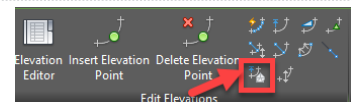
Select Ok



- 5 Select the feature line running along the top at the existing cul-de-sac tie-in



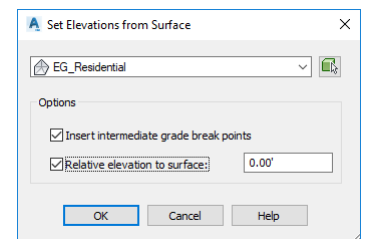
- 6 From the Feature Line contextual ribbon, Edit Elevations panel, select the Elevations From Surface Option



In the Set Elevations From Surface window, set the values as follows:

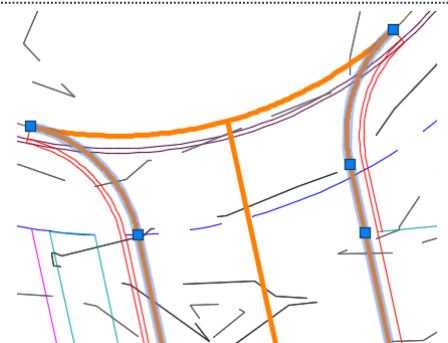
- 7
 - Surface: EG_Residential
 - Insert Intermediate Grade Break Points: Checked
 - Relative Elevation From Surface: Checked / 0.00

Select ok



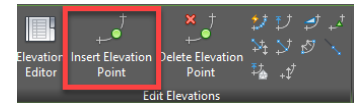
- 8 Select the same feature line from Step 5. Press enter to end command. Press Esc to clear selection

- 9 Select the feature line running along the edge of the asphalt pavement along road

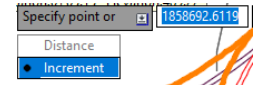


Cutting out the Pavement Elements

- 10 From the Feature Line contextual ribbon, Edit Elevations panel, select the Insert Elevation Point

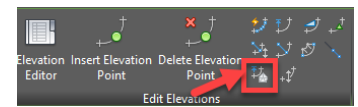


- 11 Select the Increment option



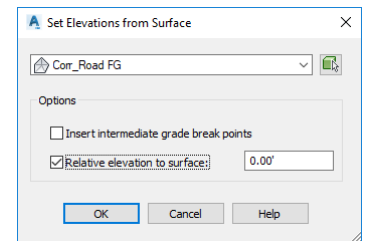
- 12 Type 5 as the Increment. Press enter to end command.

- 13 From the Feature Line contextual ribbon, Edit Elevations panel, select the Elevations From Surface Option



In the Set Elevations From Surface window, set the values as follows:

- 14
- Surface: Corr_Road FG
 - Insert Intermediate Grade Break Points: Unchecked
 - Relative Elevation From Surface: Checked / 0.00



Select ok

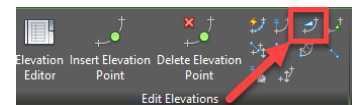
- 15 Select the same feature line from Step 9. Press enter to end command. Press Esc to clear selection

- 16 Repeat steps 10-15 for the feature line running down the center of the road.

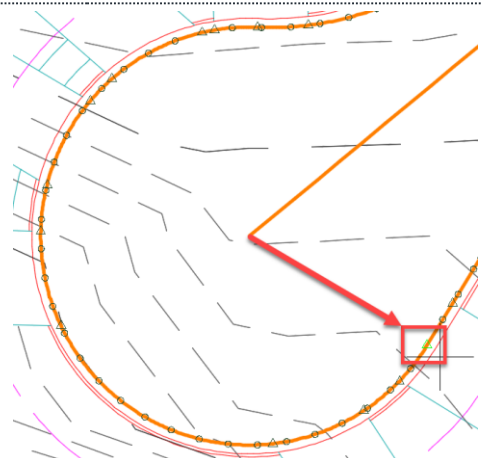
- 17 Pan and zoom to end of proposed cul-de-sac

- 18 Select the same edge of asphalt feature line as from Step 9

- 19 From the Feature Line contextual ribbon, Edit Elevations panel, select the Elevations From Surface Option



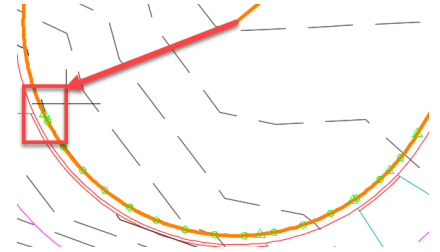
- 20 Specify the PI shown in the image as the Start Point



Cutting out the Pavement Elements

- 21 Press enter to accept the current elevation

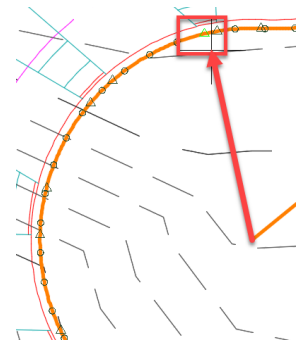
- 22 Specify the PI shown in the image as the End Point



- 23 Specify the grade as 2.5%

- 24 Continue the command by selecting the same feature line

- 25 Specify the PI shown in the image as the Start Point



- 26 Press enter to accept the current elevation

- 27 Specify the same End Point PI as Step 22

- 28 Press enter to accept the current grade

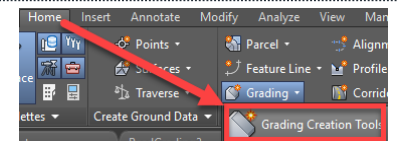
You now have well defined curb edges and crown of the road. Also with the addition of the feature line along the beginning of the road, we have created an enclosed space we will use for our grading objects.

Let's take the feature lines and create a surface. The natural response may be to add the feature lines as breaklines to a surface. Let's look at a cleaner way to do this.

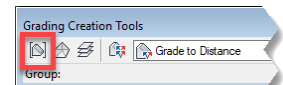
Creating a Grading Group

- 1 From the dataset files, open 03-Create Grading Group.dwg

- 2 From the Home ribbon tab, Create Design panel, select Grading > Grading Creation Tools



- 3 On the Grading Creation Tools toolbar, select the Set Grading Group function

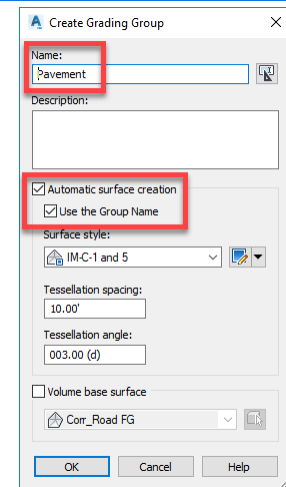


Creating a Grading Group

Set the Grading Group values as follows:

- 4
 - Name: Pavement
 - Automatic Surface Creation: Checked
 - Use the Group Name: Checked

Select Ok

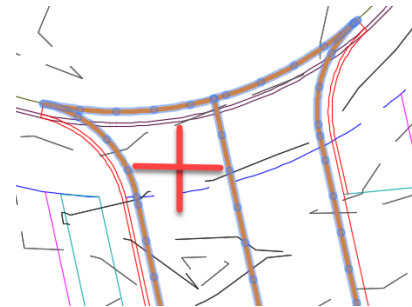


- 5 Select ok to the Create Surface window

- 6 On the Grading Creation Tools toolbar, select the Grading > Grading Infill function

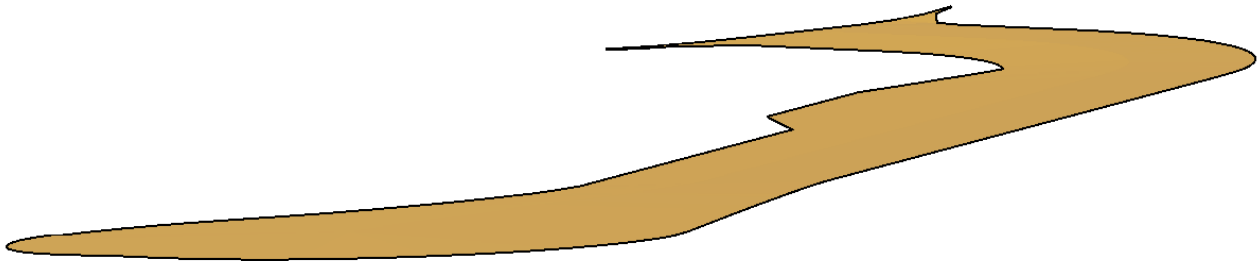


- 7 Pick anywhere inside the proposed road pavement



- 8 Press enter to end adding Infills

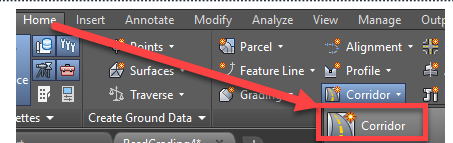
Infills are an effective way to build a surface from feature lines. The feature lines creating the enclosed space are added to the surface as breaklines. The surface also automatically manages the boundaries for you. So far we have reached the edge of our pavement. Let's continue to work up and out.



Using a Feature Line as a Corridor Baseline

1 From the dataset files, open 04-From Road to ROW.dwg

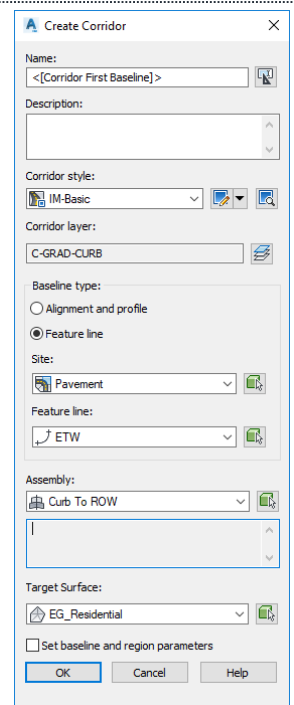
2 From the Home ribbon tab, Create Design panel, select Corridor > Corridor



3 Create a new corridor using the following parameters:

- Baseline Type: Feature Line
- Site: Pavement
- Feature Line: ETW
- Assembly: Curb to ROW
- Target Surface: EG_Residential
- Set baseline and region parameters: Unchecked

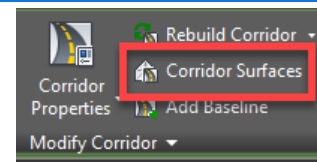
Select Ok to create the corridor.



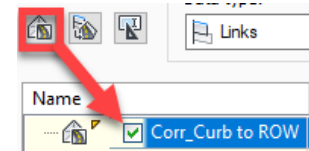
4 Select the newly created Corridor

Using a Feature Line as a Corridor Baseline

- 5 From the Corridor contextual ribbon > Modify Corridor, select Corridor Surfaces



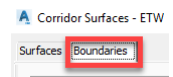
- 6 From the Surfaces tab, select to add a new Corridor Surface and name it Corr_Curb to ROW



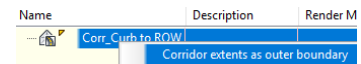
- 7 From the Surfaces tab, add the "Top" Link code data to the surface.



- 8 From the Corridor Surfaces window, select the Boundaries tab



- 9 From the Boundaries tab, right-click on the Corr_Curb to ROW surface and select Corridor extents as outer boundary



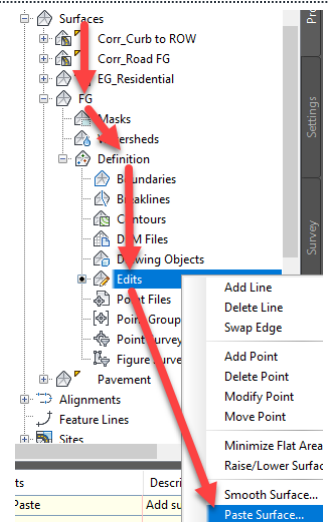
- 10 Select Ok to add the Corridor surface

We now have our pavement and associated features fully graded out. However, there are two surfaces now. This is where things really interesting. Let's bring them together into one finished grade surface.

Starting The Finished Surface

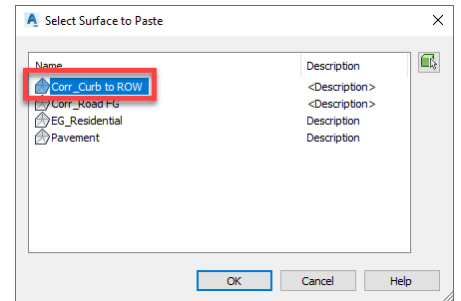
- 1 From the dataset files, open 05-Pasting Together.dwg

- 2 Using the Prospector tab in Toolspace, browse to Surfaces > FG > Definition > Edits. Right-click and select Paste Surface...

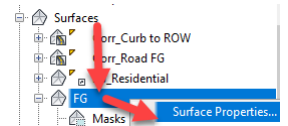


Starting The Finished Surface

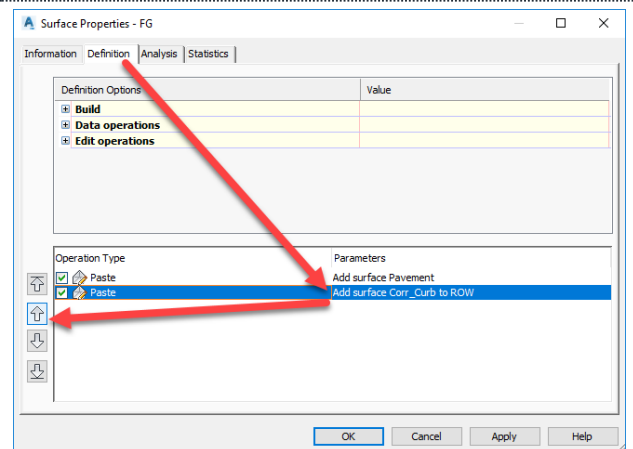
- Select the Corr_Curb to ROW surface
- Select Ok to complete
- 3 *Note that the Pavement surface is already pasted into the FG surface. The order of surface is incorrect. We will adjust this in the next steps.*



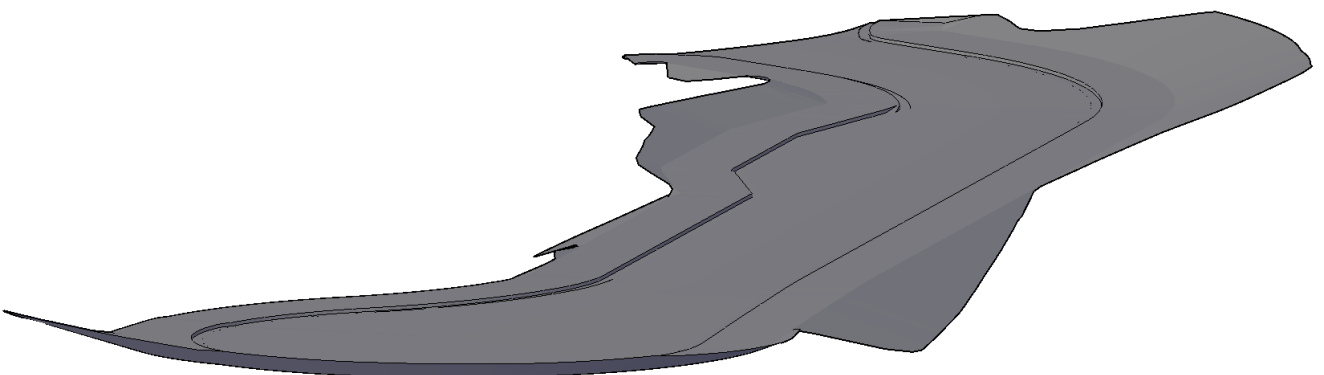
- 4 Using the Prospector tab in Toolspace, browse to Surfaces > FG. Right-click and select Surface Properties...



- 5 From the Surface Properties window > Definition tab, note the Operations listed below. Select the Corr_Curb to ROW surface. Using the Up Arrow on the left, move the selected surface above the Pavement surface.



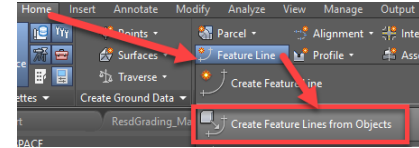
- 6 Select Ok to and Rebuild surface to complete



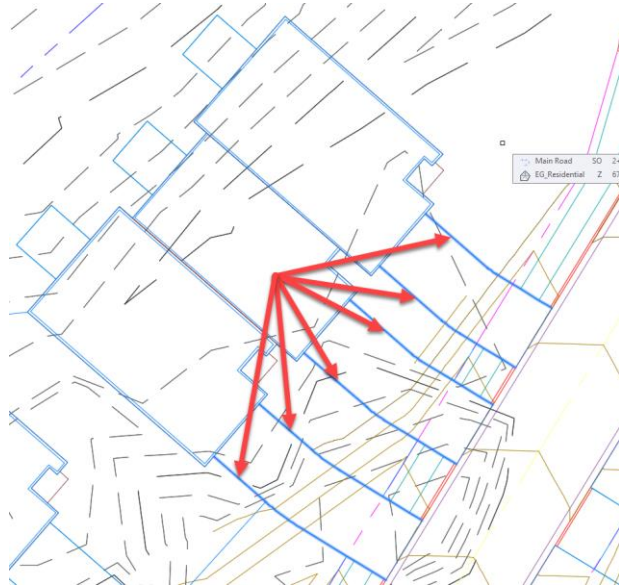
We now have one complete surface. This FG surface will be what we add all final element to. Consider the FG surface as your plan sheet. It contains just references but no actual design data. As we build in phases, we begin to cut in our buildings and associated driveways.

Grading the Building and Drives – A Mix of Manual and Dynamic

- 1 From the dataset files, open 06-Building and Drives.dwg
- 2 From the Home ribbon tab, Create Design panel, select Feature Line > Create Feature Lines from Objects



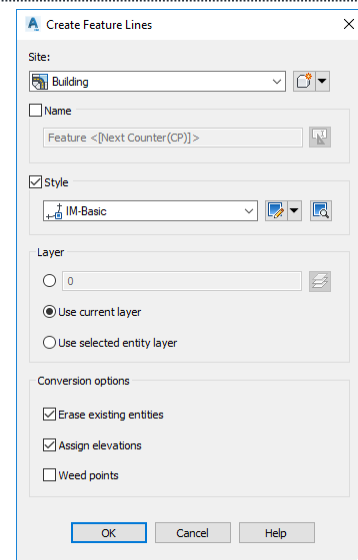
- We will be focusing on grading the buildings and driveways on the northwest side.
- 3 Select the 6 polylines representing the driveway edges
Press enter to end selection.



In the Create Feature Lines window, Set the values as follows:

- 4
 - Site: Building
 - Erase existing entities: Checked
 - Assign Elevations: Checked

Select Ok

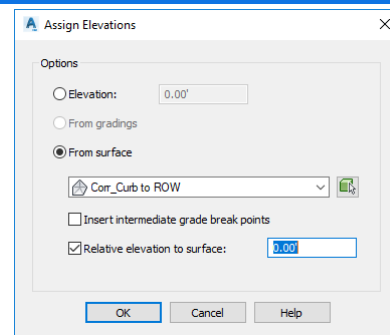


Grading the Building and Drives - A Mix of Manual and Dynamic

In the Set Elevations From Surface window, set the values as follows:

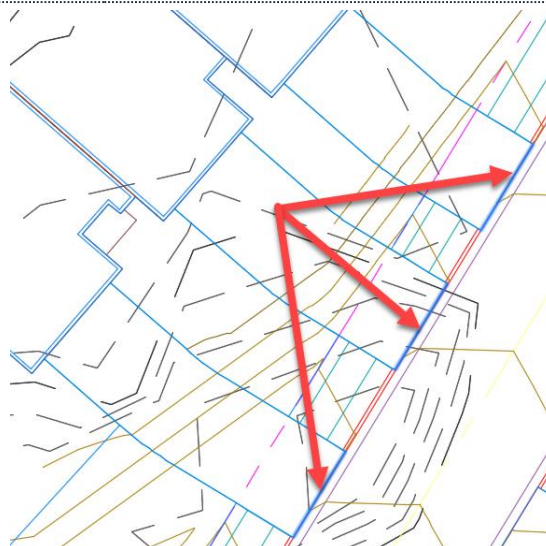
- 5
 - Surface: Corr_Curb to ROW
 - Insert Intermediate Grade Break Points: Unchecked
 - Relative Elevation From Surface: Checked / 0.00

Select ok



Repeat step 2 and select the 3 polylines along the drive to road edge.

- 6
 - Press enter to end selection.

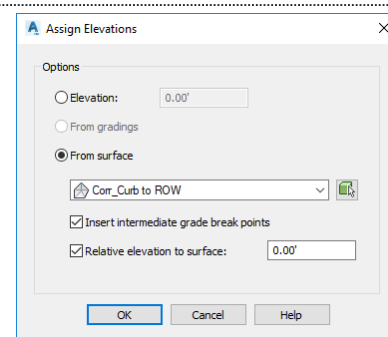


- 7 In the Create Feature Lines window, Set the values as shown in step 4

In the Set Elevations From Surface window, set the values as follows:

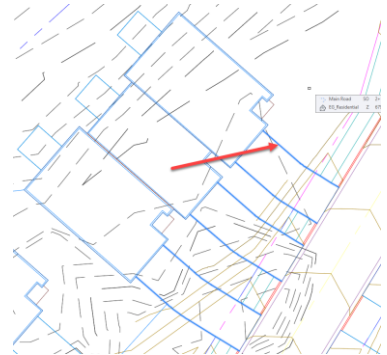
- 8
 - Surface: Corr_Curb to ROW
 - Insert Intermediate Grade Break Points: Checked
 - Relative Elevation From Surface: Checked / 0.00

Select ok

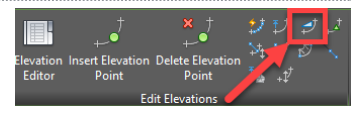


Grading the Building and Drives - A Mix of Manual and Dynamic

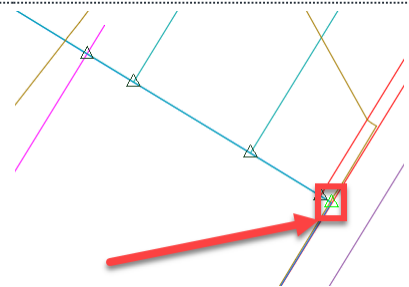
- 9 Select the northern driveway edge feature line



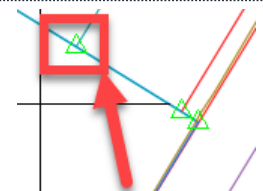
- 10 From the Feature Line contextual ribbon, Edit Elevations panel, select the Elevations From Surface Option



- 11 Specify the PI shown in the image as the Start Point
Press enter to select the default elevation



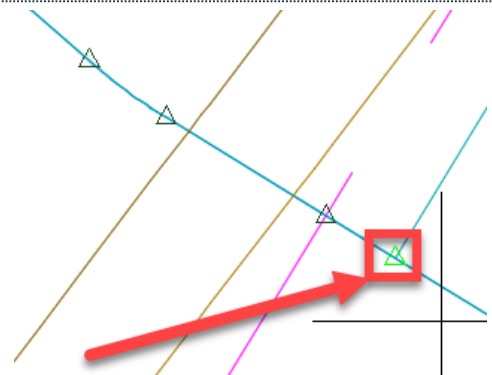
- 12 Specify the PI shown in the images as the End Point
Press enter to accept the current grade



- 13 Select the same feature line from step 9

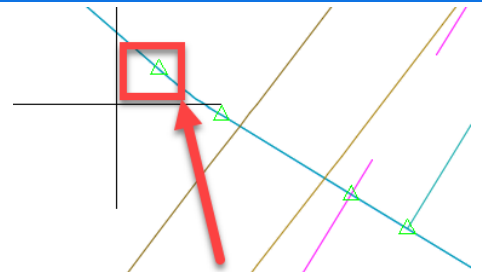
- 14 Specify the PI shown in the image as the Start Point
Press enter to select the default elevation

Note the location of the PIs was well thought out to accomplish the design parameters

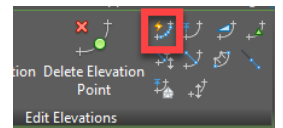


Grading the Building and Drives - A Mix of Manual and Dynamic

- Specify the PI shown in the images as the End Point
- 15 Enter -3 as the grade down
Press enter to complete the function

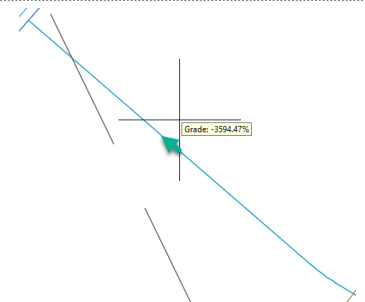


- 16 From the Feature Line contextual ribbon, Edit Elevations panel, select the Quick Elevation Edit



- Float over the same feature line . When the arrow points toward the garage, pick on the screen.
- 17 Enter 2 as the grade and press enter

As you float over the PI at the garage end, note that the elevation is 681.39. You can round it to 681.40 to set the building FFE



As you can see, this part of the grading takes the longest. Whether it is the buildings and parking lot, whether it is each lot, this will take some time. Note though that we are utilizing the relative elevation nature of feature lines where possible and only adjusting where needed.

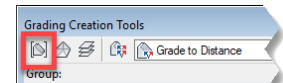
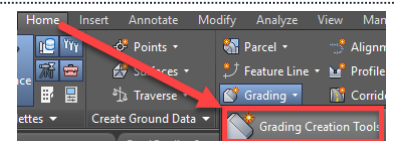
Note that there are two feature lines for the building. The interior feature line represents the elevation of the finished floor. The outer feature line represents the edge of the building and exterior grade.

Also note that in every location there

Once all the feature lines for the buildings and drives are done, how do we add them to our finished grade? Note that in every case with the building feature lines, they create an enclosed space. Let's utilize Grading Infills.

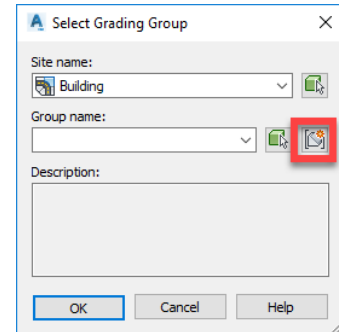
Adding the Building to the Finished Grade

- 1 From the dataset files, open 07-Pasting Together 2.dwg.dwg
- 2 From the Home ribbon tab, Create Design panel, select Grading > Grading Creation Tools
- 3 On the Grading Creation Tools toolbar, select the Set Grading Group function

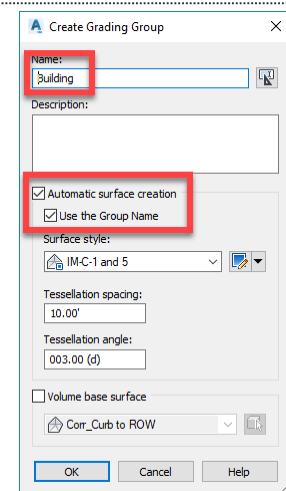


Adding the Building to the Finished Grade

- 4 On the Select Grading Group, set the Site name to Building.
For the Group name, select New Grading Group



- Set the Grading Group values as follows:
- Name: Building
 - Automatic Surface Creation: Checked
 - Use the Group Name: Checked
- Select Ok



- 5 Select ok to the Create Surface window. Select Ok to the Select Grading Group window

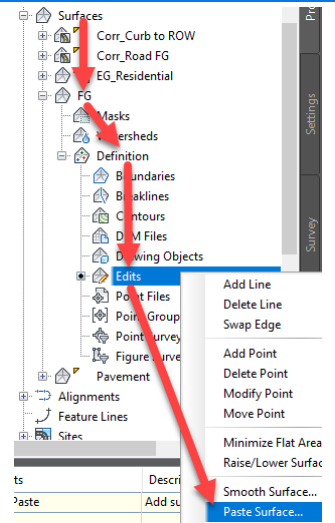
- 6 On the Grading Creation Tools toolbar, select the Grading > Grading Infill function



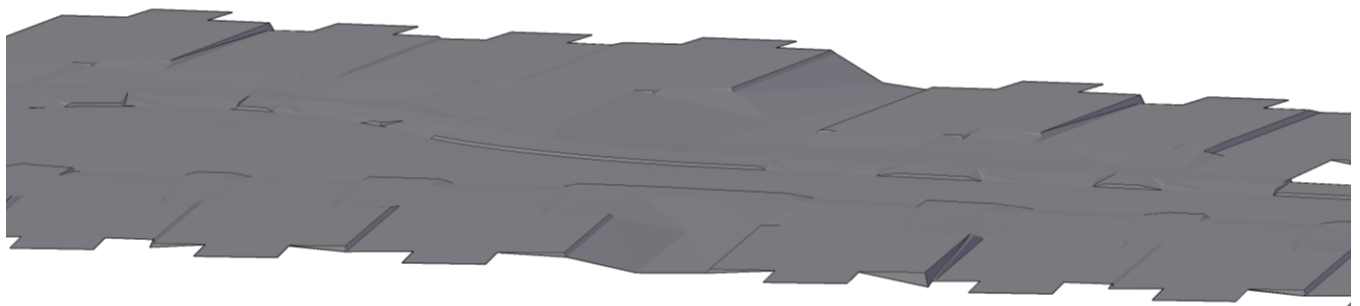
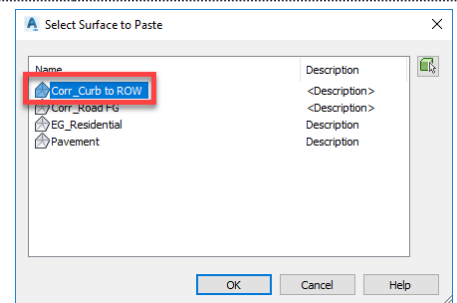
- 7 Pick inside each area containing a closed space by Building feature lines. Note in between the exterior and interior building feature lines. Also note the landscape areas between drives.
- 8 Press enter to end adding Infills

Adding the Building to the Finished Grade

- 9 Using the Prospector tab in Toolspace, browse to Surfaces > FG > Definition > Edits. Right-click and select Paste Surface...



- Select the Building surface
- 10 Select Ok to complete
- Confirm the order of pasted surfaces.*



Are you starting to see the power of the modular process in building your surfaces?

Do you see how easy infills are to add the feature lines to your surface. When they are added, they are added, not just as breaklines, but also as boundaries!

We would use the same process to add daylight elements, walls, ponds, etc. to your model.

Refining the model

Once the main portions of the model have been completed, there is always some clean up that needs to be done to portions of the model. We will look at one with our model.

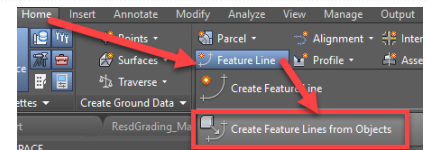
Contour smoothing

Some may see that a property within the surface style is to be able smooth contours. However, this is only for display. This does not change the shape of the model. **We must fight the mindset that if the contours look okay, then the model is good.** More and more of the actual work is done straight from our MODEL – not printed plans or even drawing files. Do not fall victim to the use of contour smoothing for any proposed models. In certain cases, it may be appropriate for existing surface model displays.

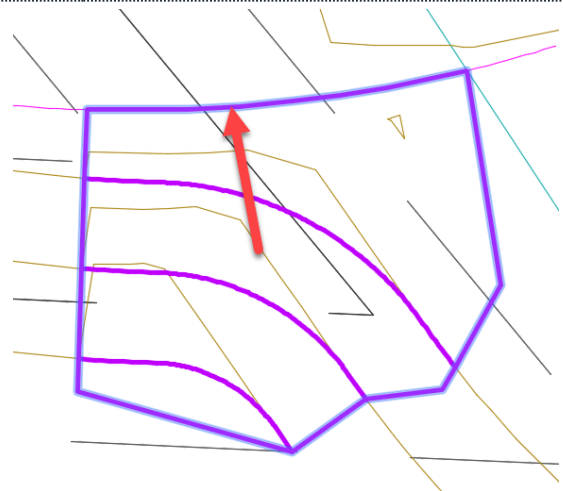
We do want nice, clean contours but this is for presentation purposes only and should be left as the last phase prior to printing a deliverable. Adjusting the look of the contours should not have any major impact on the model as a whole. Let's see how we can do this.

Manual Clean Up

- 1 From the dataset files, open 09-Cleanup.dwg
- 2 From the Home ribbon tab, Create Design panel, select Feature Line > Create Feature Lines from Objects



- 3 Select the outer polyline on the C-GRAD-TIEN layer.
Press enter to end selection.

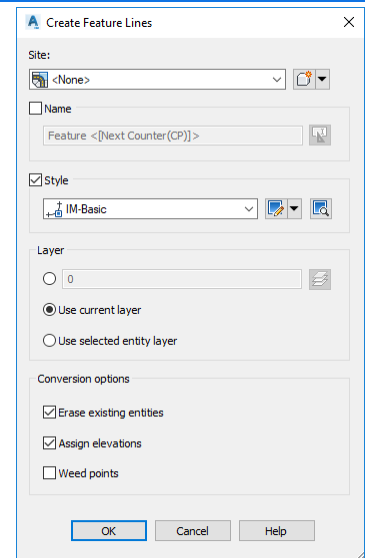


Manual Clean Up

In the Create Feature Lines window, Set the values as follows:

- 4
 - Site: <None>
 - Erase existing entities: Checked
 - Assign Elevations: Checked

Select Ok

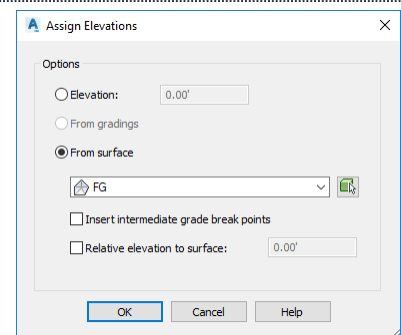


In the Set Elevations From Surface window, set the values as follows:

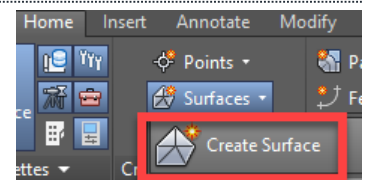
- 5
 - Surface: FG
 - Insert Intermediate Grade Break Points: Unchecked
 - Relative Elevation From Surface: Unchecked

Select ok

Note that we did not set the elevations to be relative. Since we are about to paste this surface into FG, we can set the feature line to be relative.

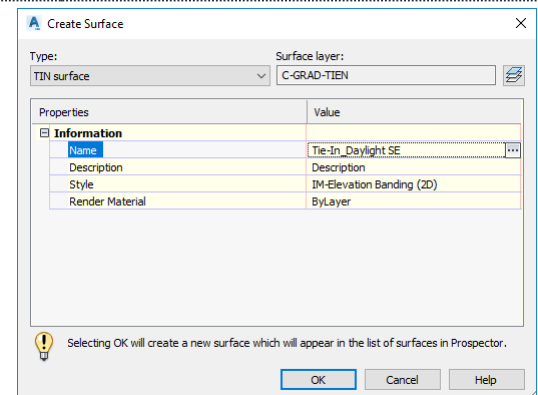


- 6 From the Home ribbon tab, Create Ground Data panel, select Surface > Create Surface



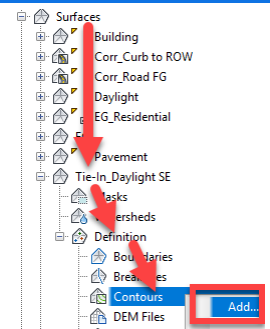
Name the Surface ***Tie-In_Daylight SE***

- 7 Select Ok to complete surface creation

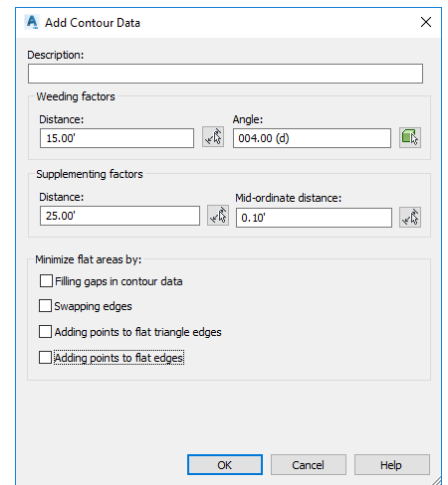


Manual Clean Up

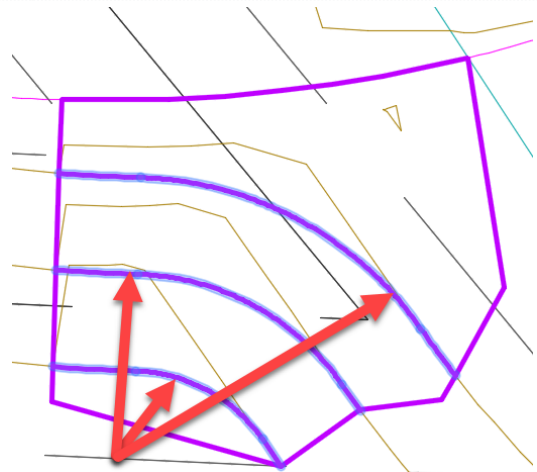
- 8 Using the Prospector tab in Toolspace, browse to Surfaces > Tie-In_Daylight SE > Definition > Contours
Right-click and select Add...



- 9 In the Add Contour Data window, set the following values:
- Supplementing factors: 25
 - Mid-Ordinate distance: 0.1
 - Minimize flat areas by options: Uncheck ALL

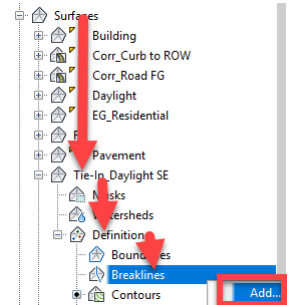


- 10 Select the three polylines enclosed by the featureline. Press enter to complete selection



Manual Clean Up

- Using the Prospector tab in Toolspace, browse to Surfaces > Tie-In_Daylight SE > Definition > Breaklines
- 11 Right-click and select Add...

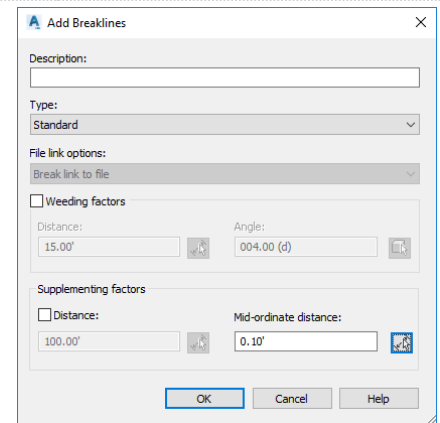


- In the Add Breaklines window, set the following values:

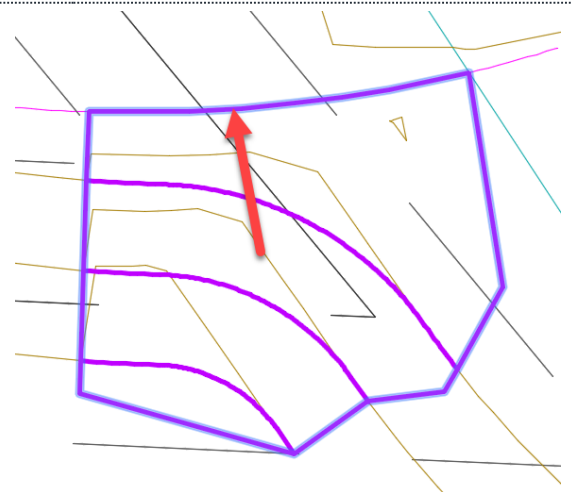
- Type: Standard
- Mid-Ordinate distance: 0.1

- 12 Select Ok to complete breakline options

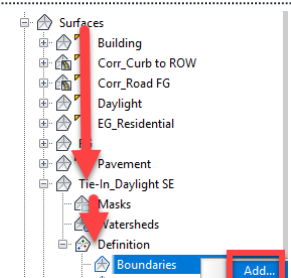
Note, in this case the mid-ordinate distance does not matter. However, adjusting this to the lowest reasonable value provides a more accurate surface if the feature line had horizontal curves



- 13 Select the outer featureline.
Press enter to end selection.



- Using the Prospector tab in Toolspace, browse to Surfaces > Tie-In_Daylight SE > Definition > Boundaries
- 14 Right-click and select Add...



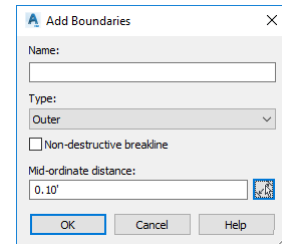
Manual Clean Up

In the Add Boundaries window, set the following values:

- Type: Outer
- Mid-Ordinate distance: 0.1

- 15 Select Ok to complete breakline options

Note, in this case the mid-ordinate distance does not matter. However, adjusting this to the lowest reasonable value provides a more accurate surface if the feature line had horizontal curves



-
- 16 Select the same feature line from step 13

-
- 17 Following previous exercise steps, paste the Tie-In_Daylight SE surface into the FG surface
-

CONCLUSION

This is not your father's software, so why are we grading using our father's methods?

Do you see the advantage?! Do you see the power?!

Each project's grading is different, but the goal is you begin to look at grading a project in stages and use AutoCAD Civil 3D's grading power to help you accomplish this in the most effective manner.