

*State of Florida
Department of Transportation*



FDOT Civil 3D Subassembly Composer

User Training Guide

PRODUCTION SUPPORT CADD OFFICE

TALLAHASSEE, FLORIDA

<http://www.fdot.gov/cadd/>

Table of Contents

1	INTRODUCTION	1-1
	AUTODESK SUBASSEMBLY COMPOSER	1-2
2	FIXED SUBASSEMBLIES	2-1
	FIXED GEOMETRY SUBASSEMBLY CREATION	2-1
3	TARGETS	3-1
	TARGETS	3-1
4	INPUT / OUTPUT PARAMETERS	4-1
	INPUT AND OUTPUT PARAMETERS	4-1
5	CODES	5-1
	POINT, LINK AND SHAPE CODES	5-1
6	CUT & FILL CONDITIONS	6-1
	CUT AND FILL CONDITIONS	6-1
7	IMPORTING / MODELING PKT FILES	7-1
	IMPORTING AND MODELING WITH PACKET FILES	7-1
8	EDITING PKT FILES / MODEL UPDATE	8-1
	MAKING CHANGES TO PACKET FILE AND UPDATING THE MODEL	8-1
9	APPENDIX A	9-1

FDOT Civil 3D Subassembly Composer

Description

This 1-day course provides participants with training on Civil 3D Subassembly Composer. To create and use a subassembly created with subassembly composer.

Objectives

The student will have a basic understanding of

FDOT Civil 3D State Kit Tools

Audience

This course is intended for roadway designers.

Prerequisites

Participants need to have a (basic) understanding of AutoCAD and Civil 3D.

Duration: 16 Hours

Professional Credit Hours: 8 PDHs

Note PDH Credit will only be available with Instructor lead or Computer Based Training (CBT) thru Learning Curve.

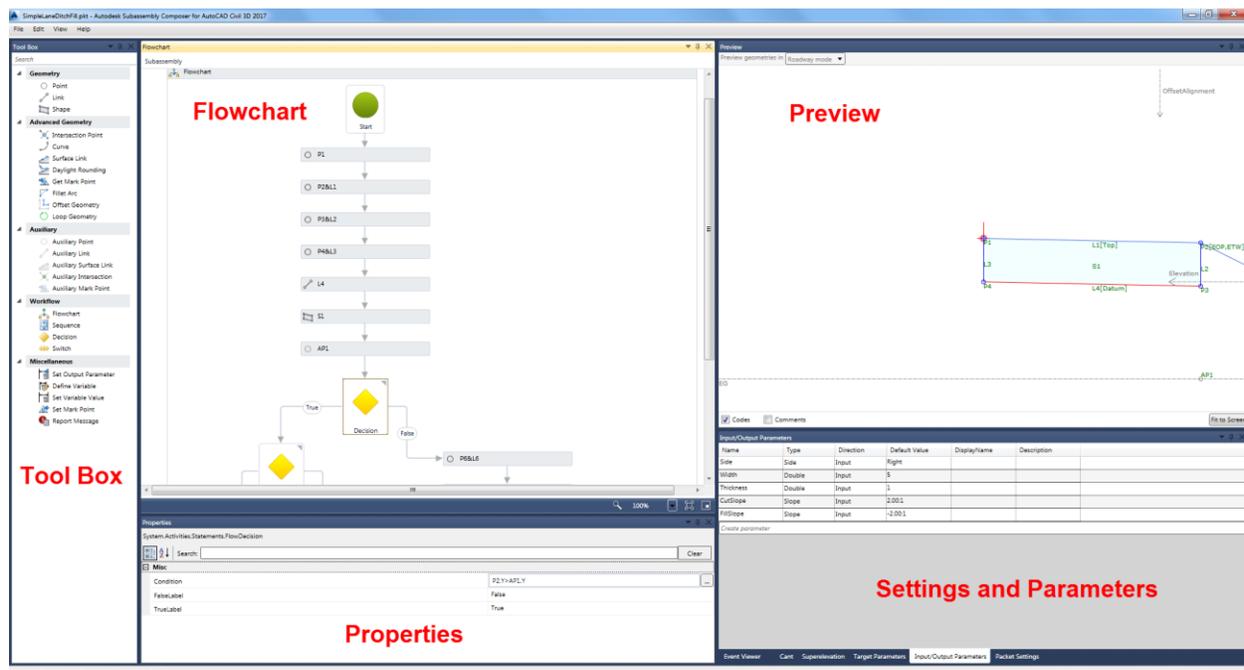
1 INTRODUCTION

AUTODESK SUBASSEMBLY COMPOSER

Autodesk Subassembly Composer for AutoCAD Civil 3D provides an interface for composing and modifying complex subassemblies, without the need for programming. It is available to be installed when installing AutoCAD Civil 3D. Without the need to be an expert in programming, users can create custom subassemblies to meet their specific needs that can be used again and again once they are imported in Civil 3D, making corridors have endless possibilities. In order to create subassemblies and as reviewed in this document, either Civil 3D or Subassembly composer are required.

To use a subassembly created with subassembly composer, users must have Autodesk Subassembly Composer installed on their machines. The subassembly in composer is saved as a pkt file, whenever the file is opened in AutoCAD Civil 3D, the pkt is automatically converted to its latest version.

Subassembly composer consists of five individual windows: Tool Box, Flowchart, Preview, Properties and Settings and Parameters. Each of these windows may be moved around independently using the docking controls . At any time, the default position can be regained by going to View> Restore Default Layout.



The Toolbox window is the storage location for elements available for constructing the subassembly. This window will provide all elements used to build the flowchart. There are five sections: Geometry, Advanced Geometry, Auxiliary, Workflow and Miscellaneous. To use any of these elements, simply click on the desired element and drag and drop it over into the Flowchart panel.

The Flowchart panel is used to build and organize the subassembly logic and elements. A flowchart could be a simple straight line of logic or it can be a complex tree of branching decisions either way always beginning at the

Start element. If there is a problem with the subassembly a small red circle with an exclamation point will be displayed in the upper right hand corner of this panel.

The Preview panel allows users to view your current geometry. There are two preview modes:

- Roadway Model which shows the subassembly built using any target surfaces, target elevations, and/or target offsets; and
- Layout Mode which shows the subassembly built using only the input parameters (no targets).

At the bottom of this panel are two checkboxes for Codes which are shown in brackets [] and Comments which are shown in parentheses (). If any Codes or Comments were entered in the properties for the points, links, or shapes then this information will be listed next to the applicable geometry.

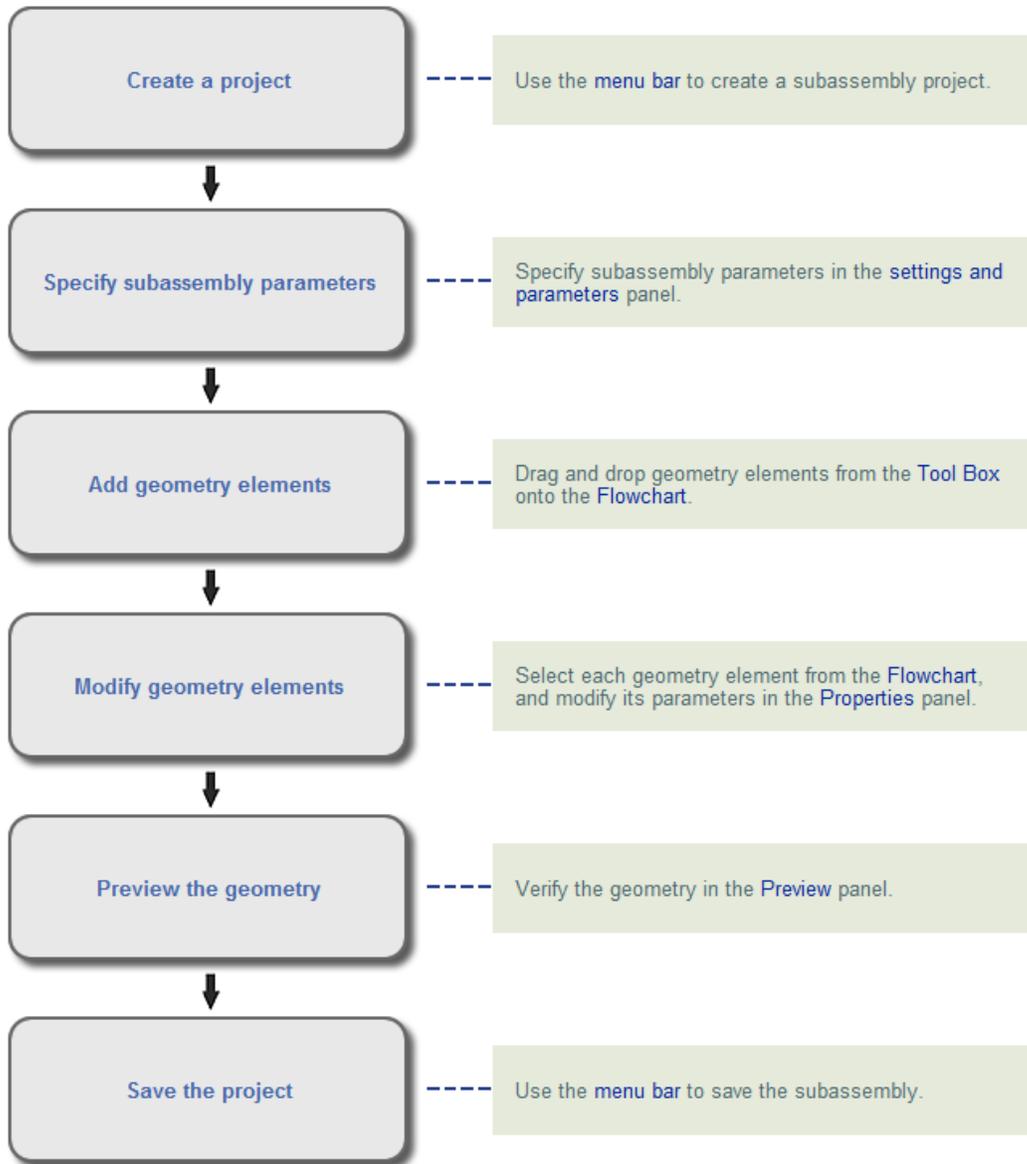
The Properties panel is the input location of the parameters that define each geometry element.

The Settings and Parameters panel consists of five tabs that define the subassembly: Packet Settings, Input/Output parameters, Target parameters, Superelevation, and Event Viewer.

Typical workflow

The typical workflow for creating a subassembly is broken into six steps:

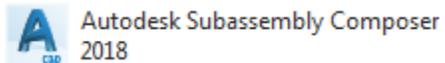
- 1 Create a Project
- 2 Specify subassembly parameters
- 3 Add geometry elements
- 4 Modify geometry elements
- 5 Preview Geometry
- 6 Save the project and import into AutoCAD Civil 3D.



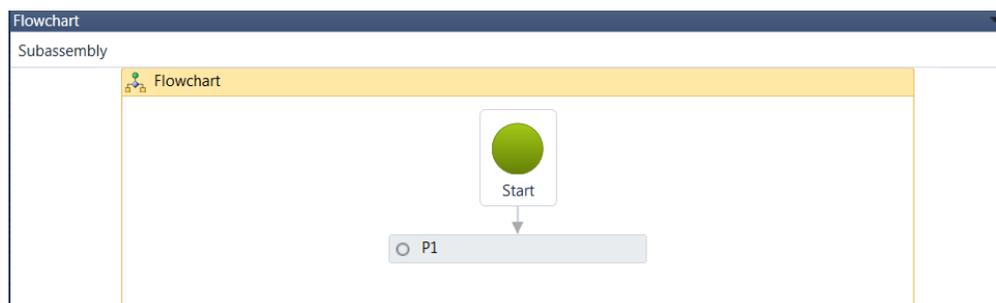
2 FIXED SUBASSEMBLIES

FIXED GEOMETRY SUBASSEMBLY CREATION

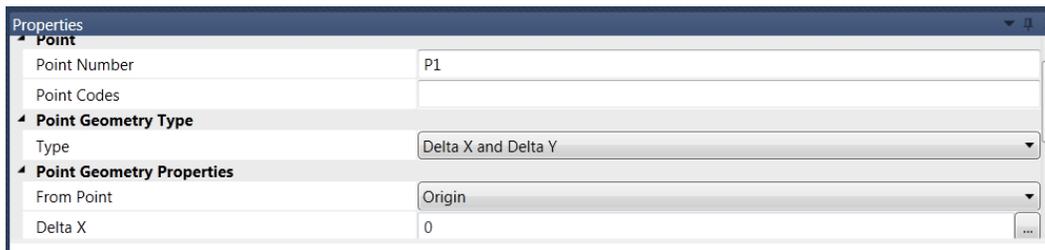
- 1 Open Autodesk Subassembly Composer from All programs > Autodesk > Autodesk Subassembly Composer 2018



- 2 Select File > Open the file 2.0 - Fixed - Start.pkt from the C:\Civil 3D 2018\Projects\22049555201\Roadway folder
- 3 Grab the Point from the Geometry Toolbox and drop it under the Start Icon on the Flowchart panel



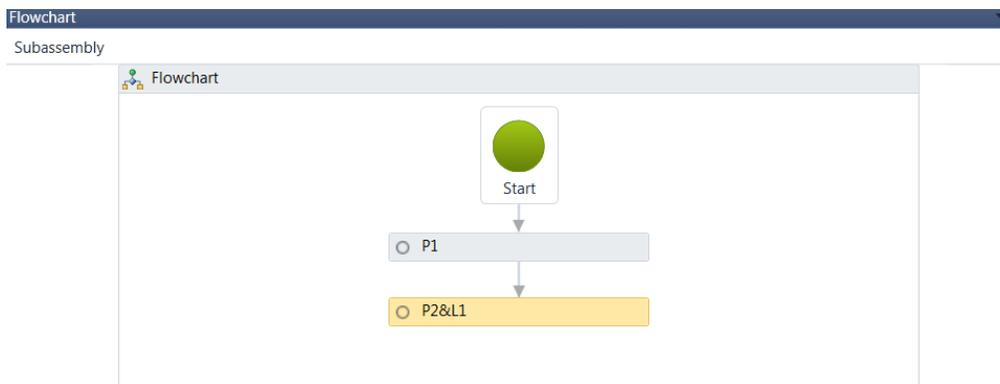
- 4 Notice and review the Properties panel automatically updated upon the point creation:



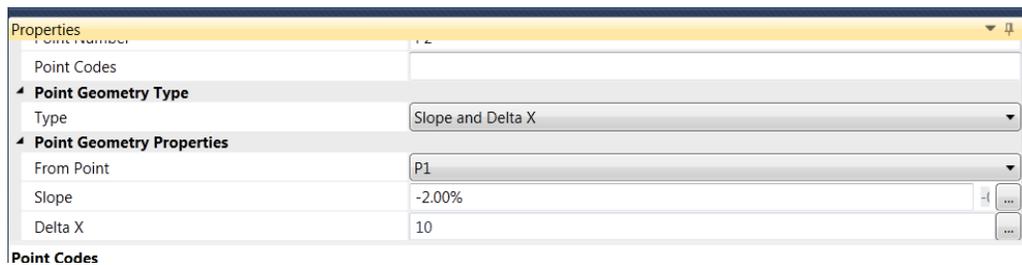
- 5 The Point is automatically assigned a Point Number, P1, the From Point is set to Origin. Notice and review the Preview panel with the point created



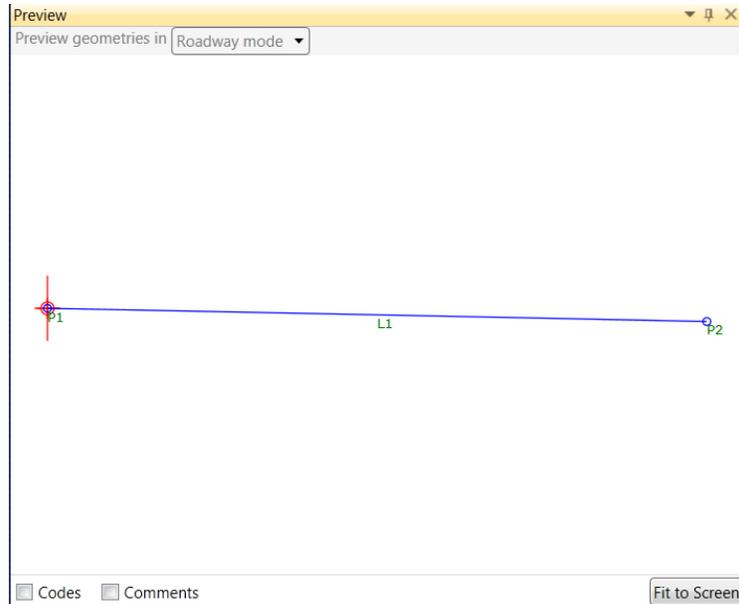
- Grab the Point from the Geometry toolbox and drop it under the point previously created, P1. Notice that the new point P2, is automatically assigned and a Link is automatically created:



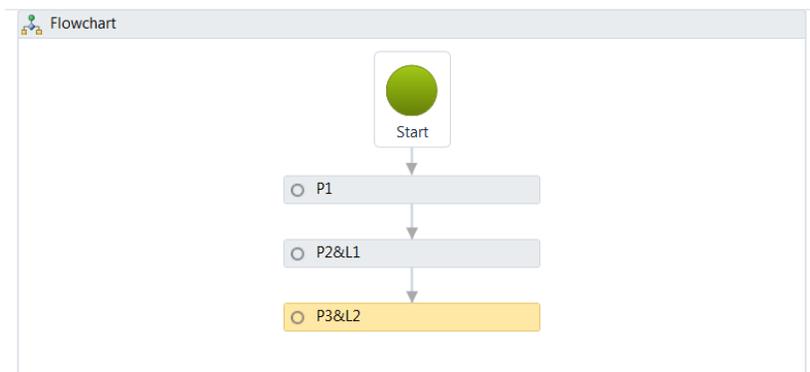
- Under the Properties panel, under the Point Geometry Type, change the Type to Slope and Delta X. Under Point Geometry Properties, select From Point P1, Slope of -2% and Delta X, 10



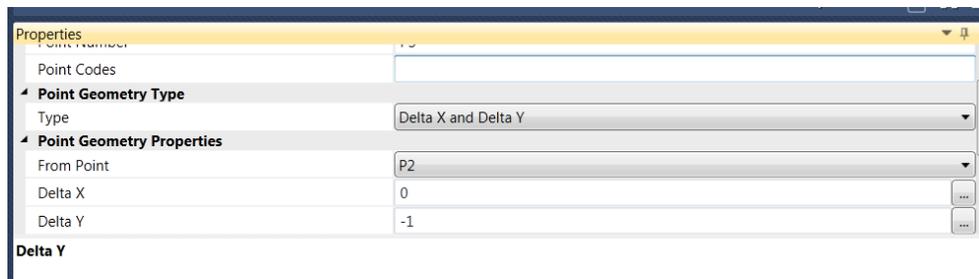
- On the Preview panel, select the Fit to Screen button to visualize the Point and Link created based on the geometry parameters previously created:



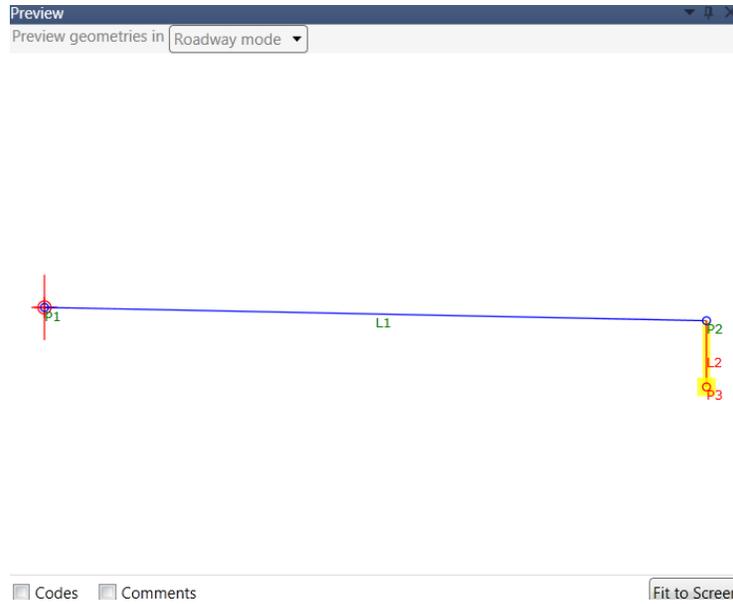
- Grab the Point from the Geometry toolbox and drop it under the point previously created, P2. Notice that the new point P3, is automatically assigned and a Link is automatically created:



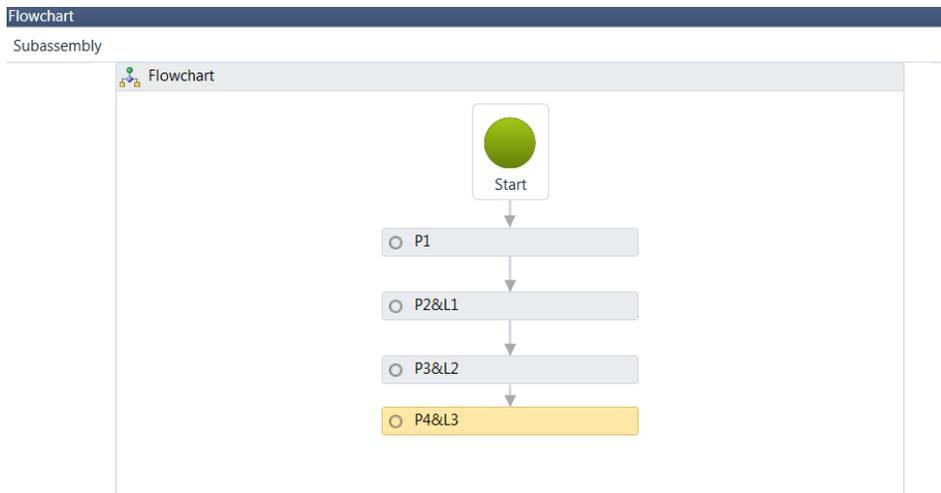
- Under the Properties panel , verify that the Type under Point Geometry Type is set to Delta X and Delta Y. Under Point Geometry Properties, select From Point P2, type in 0 for Delta X and -1 for Delta Y:



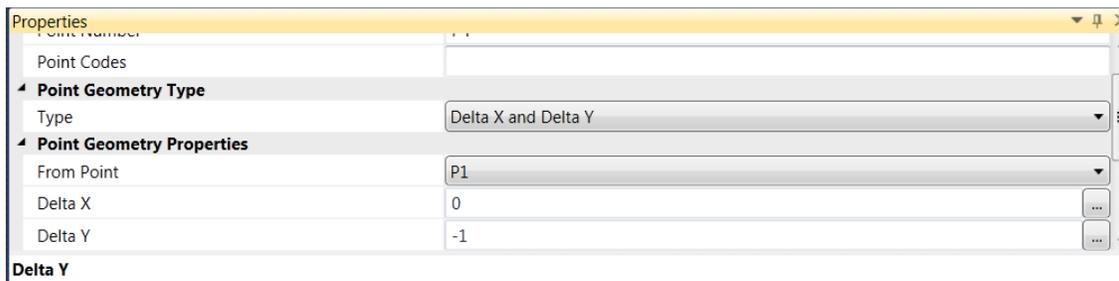
- Select the Fit to Screen button. The Link and Point are created:



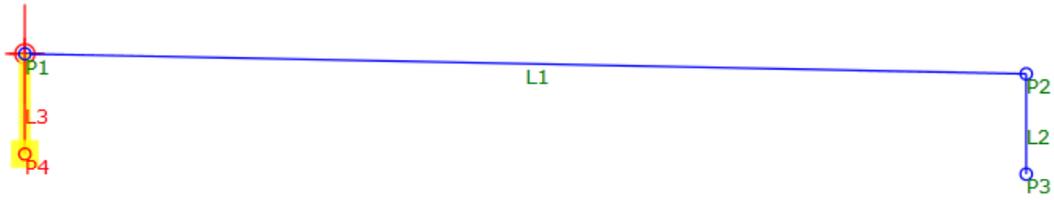
- Grab the Point from the Geometry toolbox and drop it under the point previously created, P3. Notice that the new point P4, is automatically assigned and a Link is automatically created:



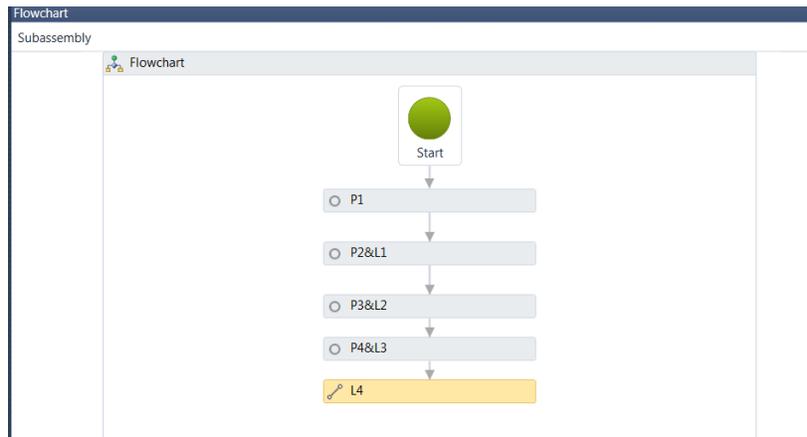
- Under the Properties panel, verify that the Type under Point Geometry Type is set to Delta X and Delta Y. Under Point Geometry Properties, select From Point P1, type in 0 for Delta X and -1 for Delta Y:



- The Preview panel is automatically updated:



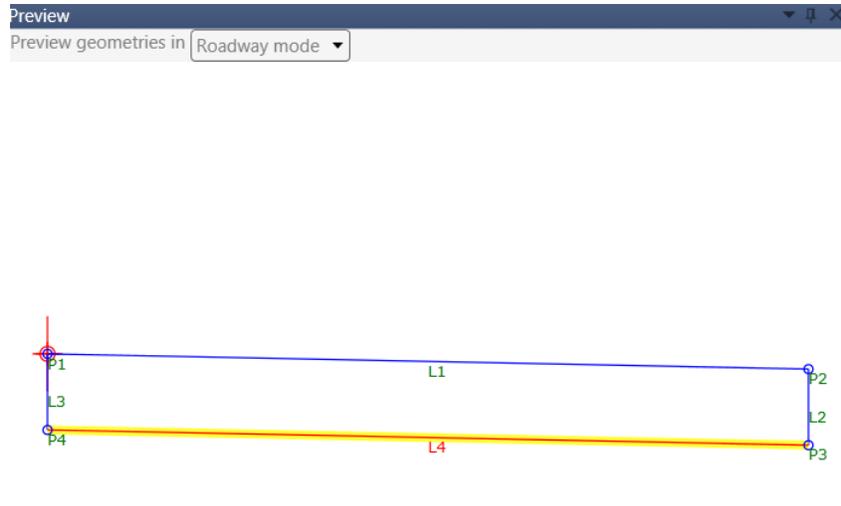
- Grab the Link from the Geometry toolbox and drop it under the point previously created, P4. Notice that the new link, L4, is automatically assigned and a Link is automatically created:



- Under the Properties panel, change the Link Position. Select Start Point P3, and End Point, P4:

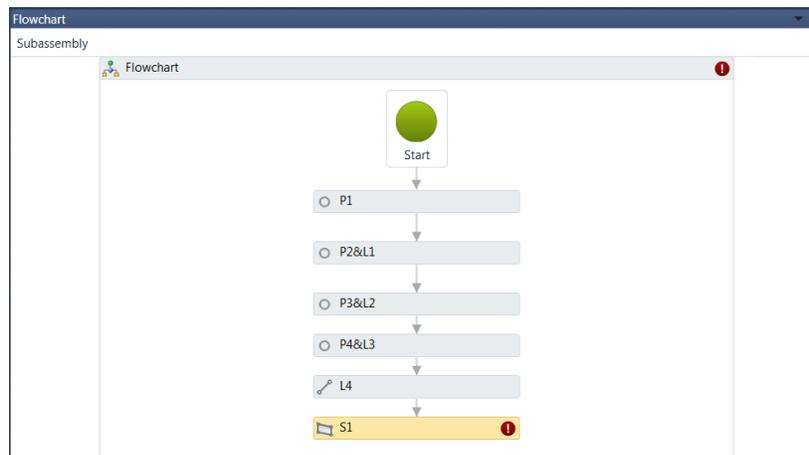
Properties	
Link	
Link Number	L4
Link Codes	
Position	
Start Point	P3
End Point	P4
Miscellaneous	
Comment	

- The Preview panel is updated:



Note The geometry so far is made out of Links and Points.

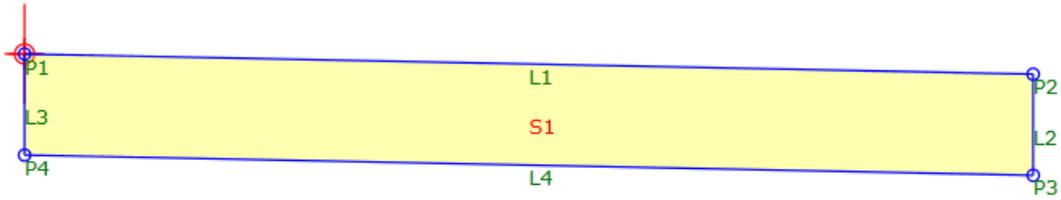
- In order to create a shape, grab the Shape from the Geometry toolbox and drop it under the link previously created, L4. Notice that the new shape, S1 is automatically created:



- Under the Properties panel , on the component, Links, select the green cube icon located on the right side:



- Place a data point anywhere on the rectangle made by points and links on the Preview panel . A new Shape, S1 is automatically created:



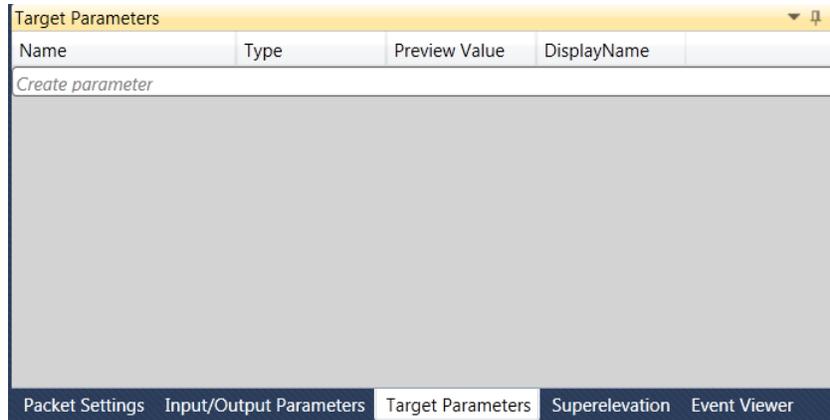
So far, the shape, links and points are static. They are defined by a geometry established under the Properties panel .

Nothing, at this point, is targeting anything. We will make point P2 be defined by a slope and distance as defined previously or this point may also be targeting an offset alignment.

3 TARGETS

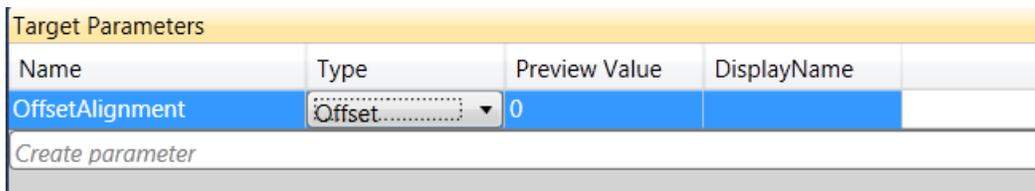
TARGETS

Targets are defined under the Settings and Parameters panel on the Target Parameters Tab and can be set to Surfaces, Elevations or Offsets.

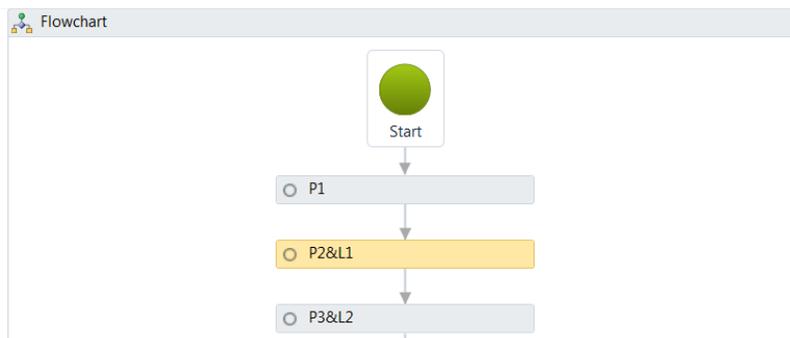


Continue working on the same file or open the file 3.0 - Targets - Start.pkt from the C:\Civil 3D 2018 Projects\22049555201\Roadway folder

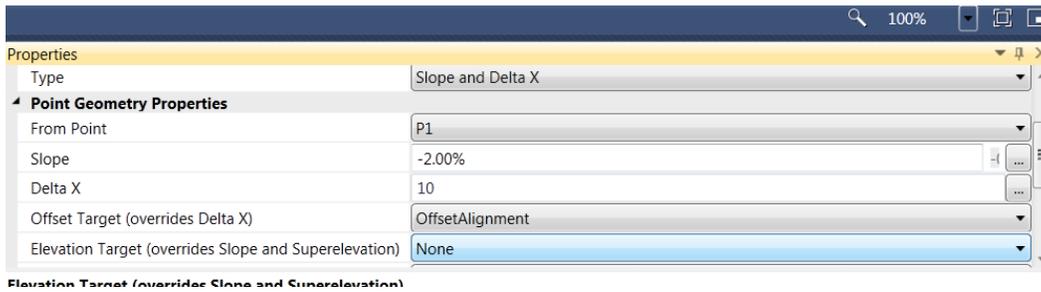
- 1 Under the Settings and Parameters panel select the Target Parameters tab.
- 2 Create an *Offset* target by selecting the italic *Create Parameter* line. Rename TargetParameter1 to **OffsetAlignment**, and set the Type to **Offset**.



- 3 Leave the Preview Value at its default value. Notice also the change on the Preview panel .
- 4 Click on the P2&L1 rectangle on the Flowchart panel:

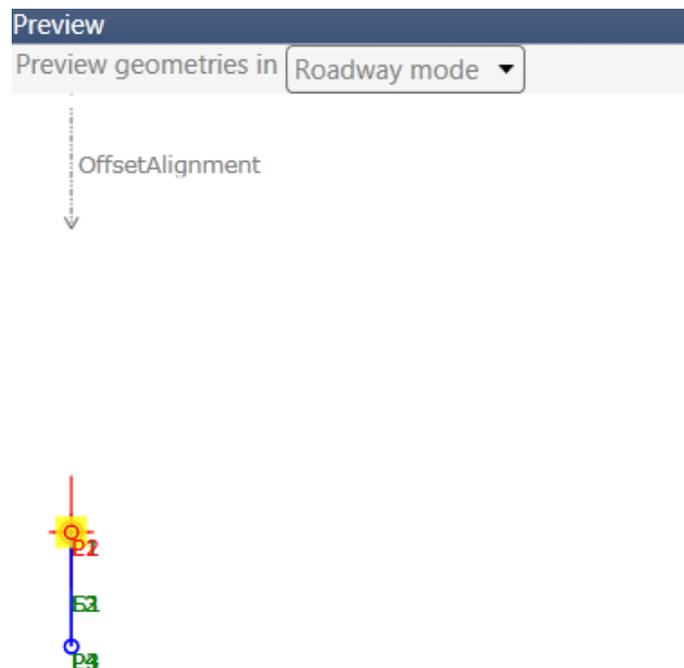


- On the Properties panel, change the Offset Target (overrides Delta X) to OffsetAlignment (This target was created previously and available for Selection):

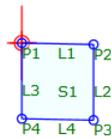
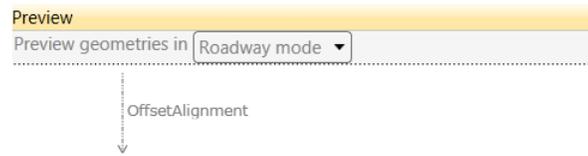


Note If the OffsetAlignment exists, it will overwrite the Delta X value.

- In order to test the behavior, notice the Preview panel the arrow with the OffsetAlignment name. It depicts the target recently created and available for testing. The geometry is shrunk since the OffsetAlignment preview value is 0:



- 7 Select the OffsetAlignment arrow. It should turn yellow and drag it to the right. Release the selection. Notice that the Preview value under the Target Parameters changes and the shape geometry is updated:



Codes Comments

Target Parameters			
Name	Type	Preview Value	Display
OffsetAlignment	Offset	0.948	

Create parameter

Note Point P2 is now being controlled by an Offset Alignment.

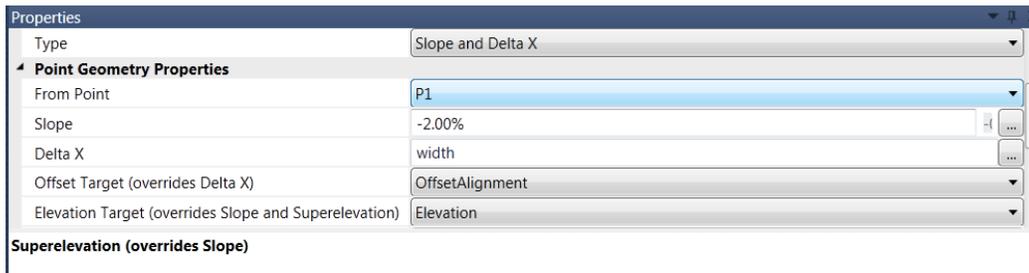
- 8 Under the Settings and Parameters panel select the Target Parameters tab.
- 9 Create an *Elevation* target by selecting the italic *Create Parameter* line. Rename TargetParameter2 to Elevation, set the Type to Elevation and set the Preview Value to -1

Target Parameters			
Name	Type	Preview Value	DisplayName
OffsetAlignment	Offset	4.061	
Elevation	Elevation	-1	

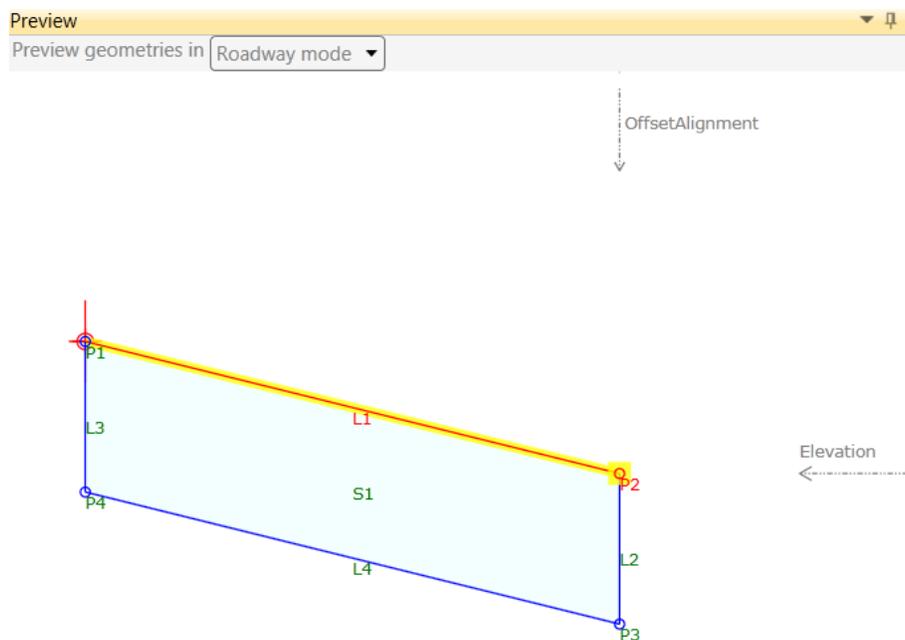
Create parameter

Packet Settings Input/Output Parameters Target Parameters Superelevation Event Viewer

- 10 Select the P2&L1 rectangle from the Flowchart panel. Set the Offset Target to OffsetAlignment and set the Elevation Target to Elevation.



- 11 On the Preview panel , select and drag the OffsetAlignment and Elevation arrows and review the behavior of the shape and link:

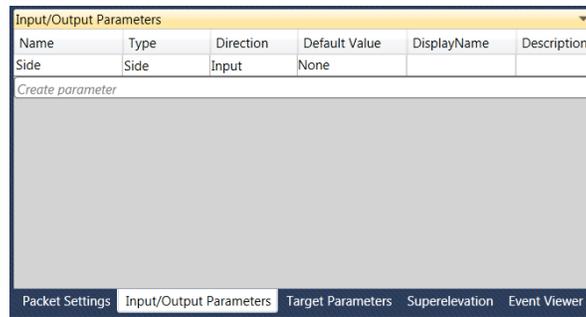


If these targets are defined in the Corridor in Civil 3D, the width and slope of the link will be controlled by an alignment and Elevation Targets.

4 Input / output parameters

INPUT AND OUTPUT PARAMETERS

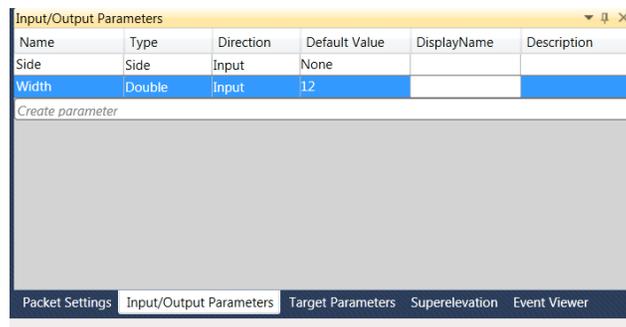
Input and Output Parameters are values that can be defined once the assembly is imported into full blown Civil 3D. They are defined under Setting and Parameters window Input/Output tab on the bottom right window of Subassembly composer:



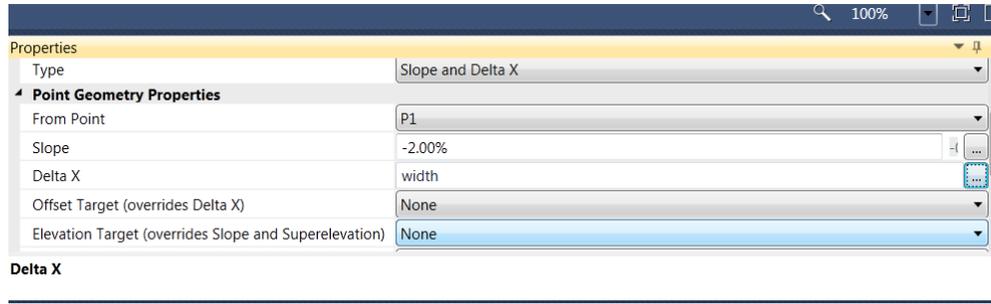
If now, the width of the shape is to be controlled not by a target parameter, but by an input/output parameter, they must be defined on this window.

Continue working on the same file or open the file 4.0 - Input Output - Start.pkt from the C:\Civil 3D 2018 Projects\22049555201\Roadway folder

- 1 Under the Setting and Parameters window select the Input/Output Parameters tab.
- 2 Create an *Width* Input by selecting the italic *Create parameter* line. Rename Parameter2 to Width, set the Type to Double, set the Direction to Input, and set the Default Value to 12:

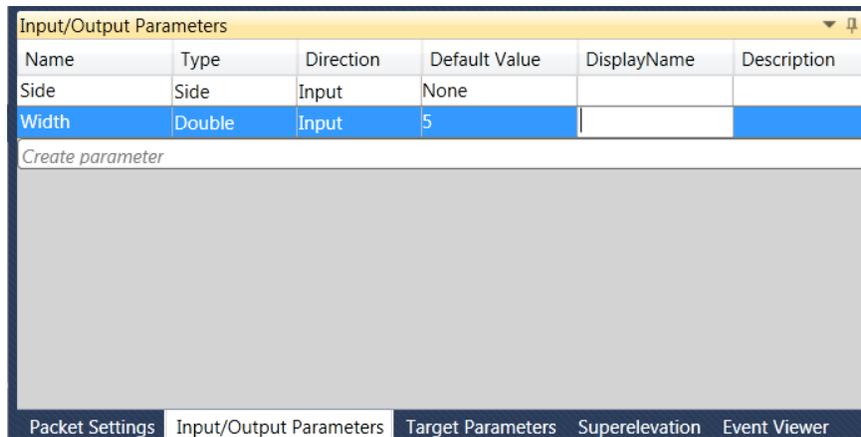


- 3 Highlight the P2 & L1 rectangle from the Flowchart panel and under Point Geometry Properties, revert the Offset Target (overrides Delta X) to None, Elevation target to None, leave -2% for the Slope and write in width for Delta X:

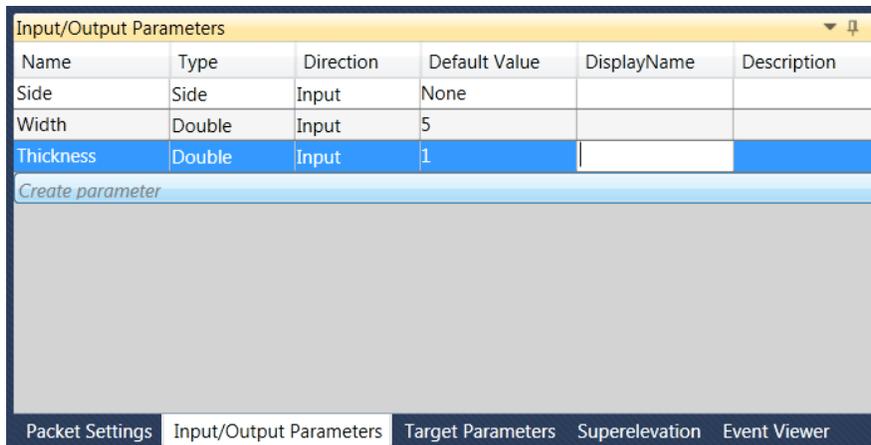


Note Notice the Preview panel automatically updated.

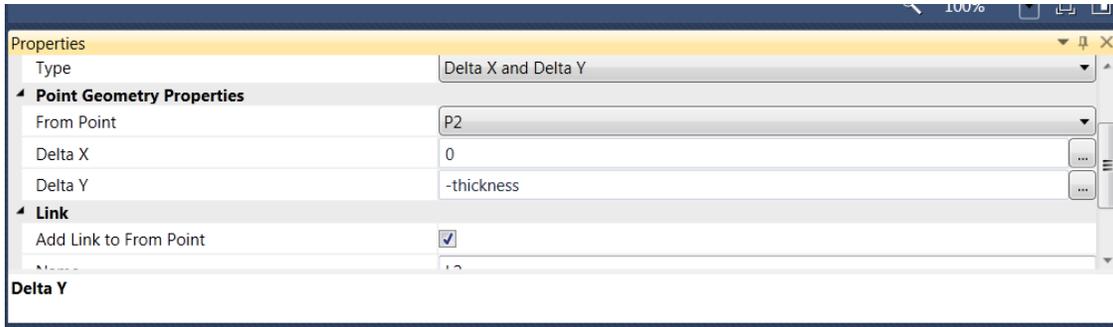
- 4 Under the Settings and Parameters panel select the Input/Output Parameters tab.
- 5 Change the Default Value for the Width parameter to 5.00. The Preview panel is automatically updated for the width.



- 6 Select the italic *Create parameter* line under the Input/Output Parameters tab. Rename Parameter3 to Thickness, set the Type to Double, set the Direction to Input, and set the Default Value to 1:

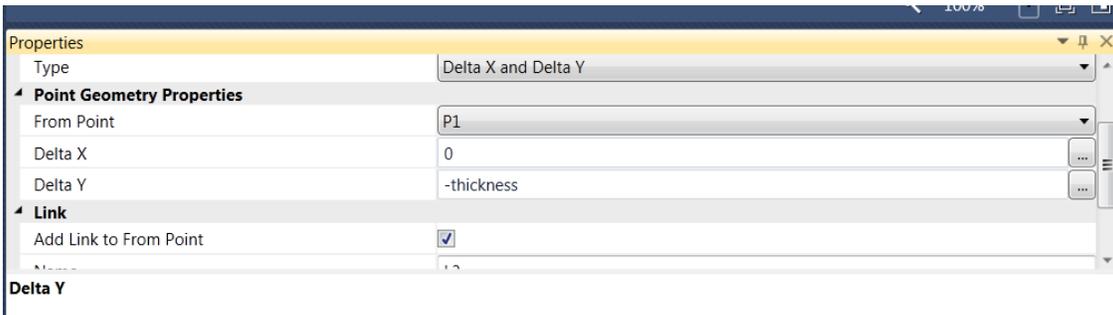


- 7 Highlight the P3 & L2 rectangle from the Flowchart panel and under Point Geometry Properties, change the Delta Y from -1 and write in *-thickness*:

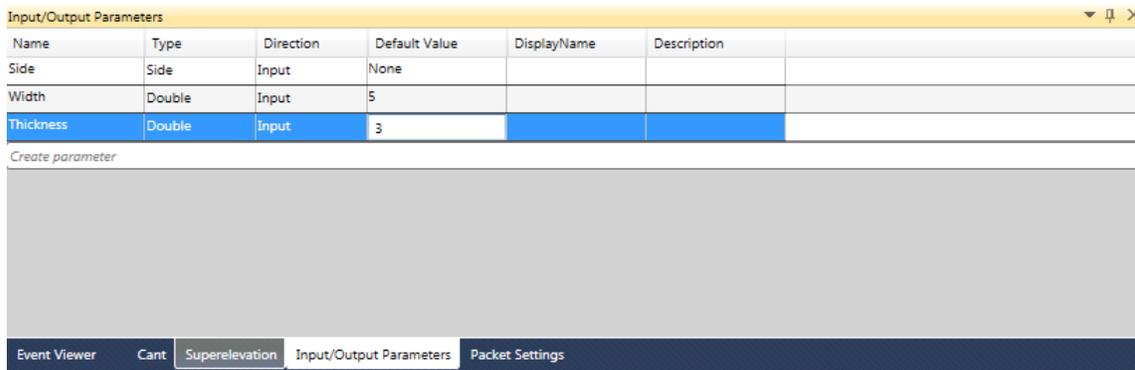


user for AutoCAD Civil 3D

- Highlight the P4 & L3 rectangle from the Flowchart panel and under Point Geometry Properties, change the Delta Y from -1 to -thickness:

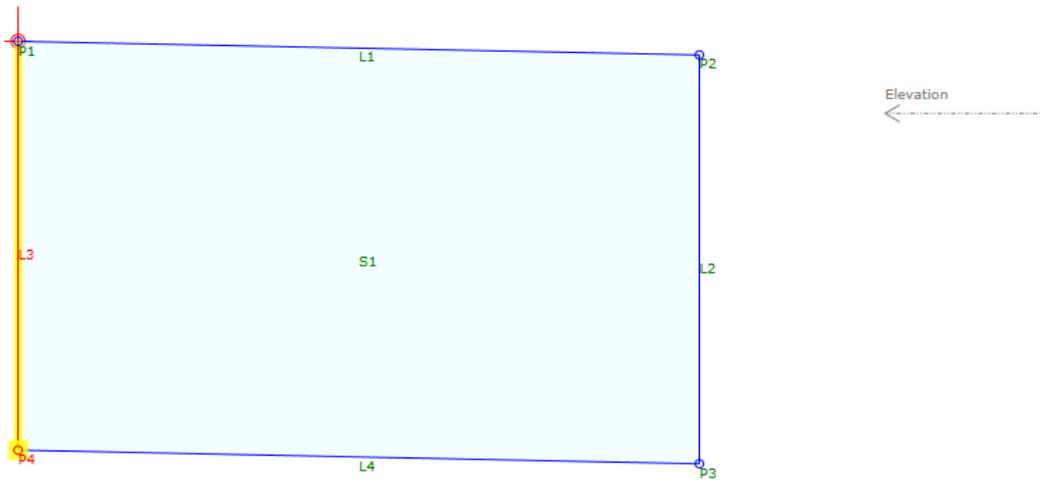


- On the lower right Input/Output Parameters window, change the Thickness parameter to 3: The Preview panel automatically updates.



Preview ▼ | 🔍 | ✕
 Preview geometries in Roadway mode

OffsetAlignment
 ↓



Codes Comments

Fit to Screen

10 Revert the value to 1:

Input/Output Parameters ▼ | 🔍 | ✕

Name	Type	Direction	Default Value	DisplayName	Description
Side	Side	Input	None		
Width	Double	Input	5		
Thickness	Double	Input	1		

Create parameter

Event Viewer Cant Superelevation **Input/Output Parameters** Packet Settings

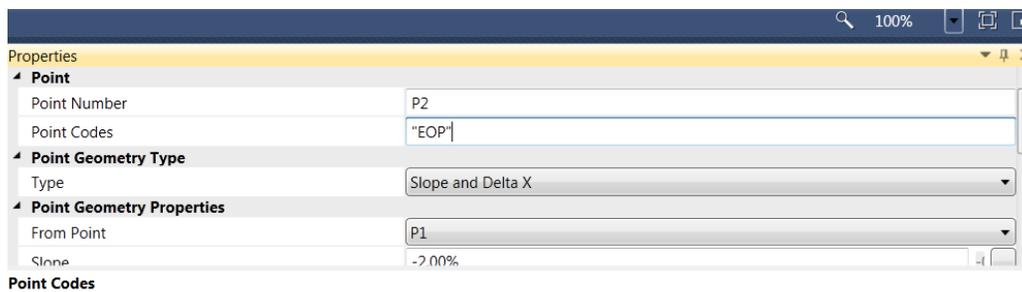
5 CODES

POINT, LINK AND SHAPE CODES

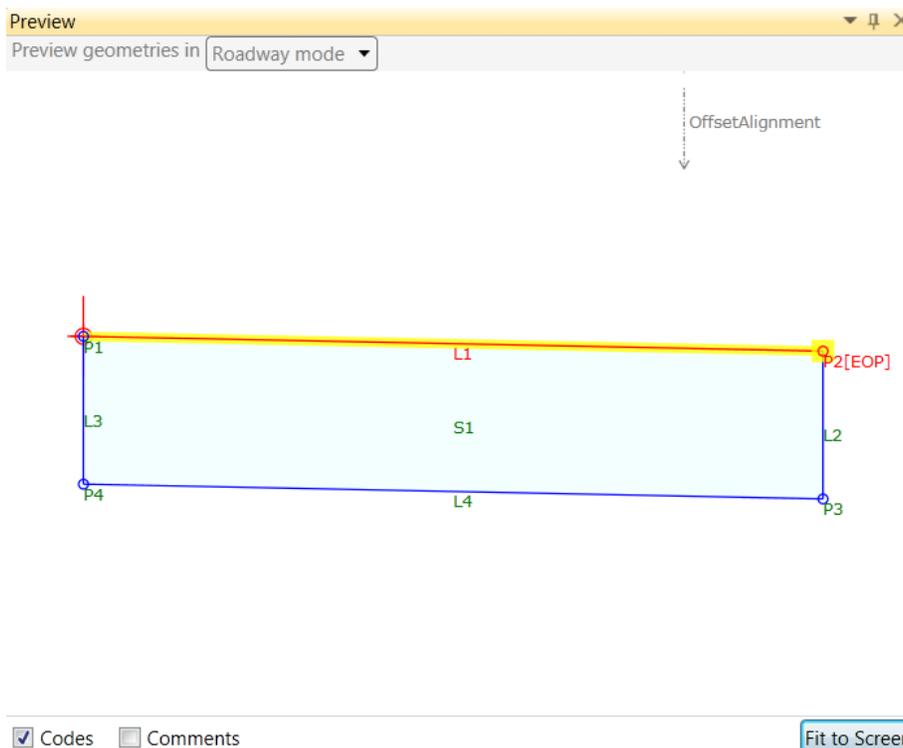
Point, Link and Shape Codes can be assigned directly in Subassembly Composer by typing any name under the Point, Link or Shape Code. Code names must be in quotes.

Continue working on the same file or open the file 5.0 - Codes - Start.pkt from the C:\Civil 3D 2018 Projects\22049555201\Roadway folder

- 1 Highlight the P2&L1 rectangle on the Flowchart panel. Under the Properties panel , type in “EOP” under Point Codes:

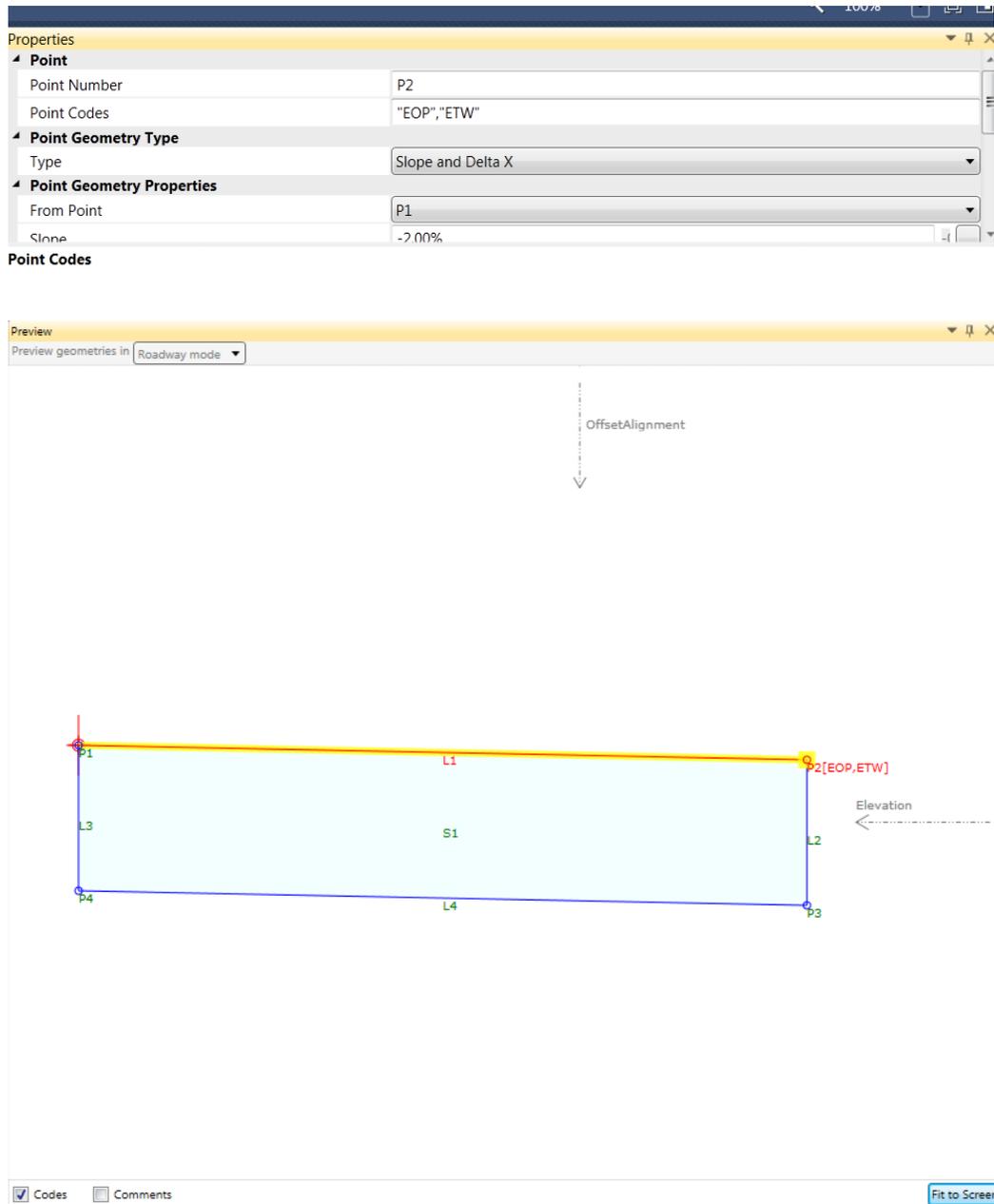


- 2 In the Preview panel , toggle on the Codes box at the lower left corner of the window. Notice that P2 has the EOP Point Code name displayed in brackets.

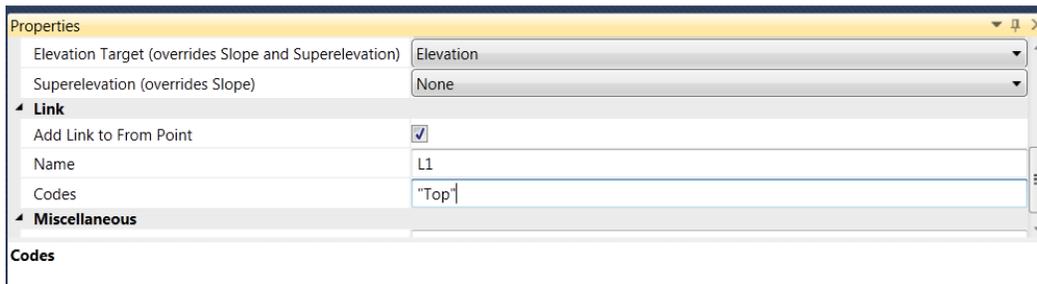


- 3 If multiple point codes are to be assigned to one point, names have to be separated by a comma. On the Properties panel for point P2, under Point Codes, type in a comma next to “EOP” and type in “ETW”. Point P2 has two point codes assigned to it. Notice that P2 displays now both the EOP and ETW Point Code names in brackets. If not, in the Preview panel, toggle off then back on the Codes box at the lower left corner of the window.

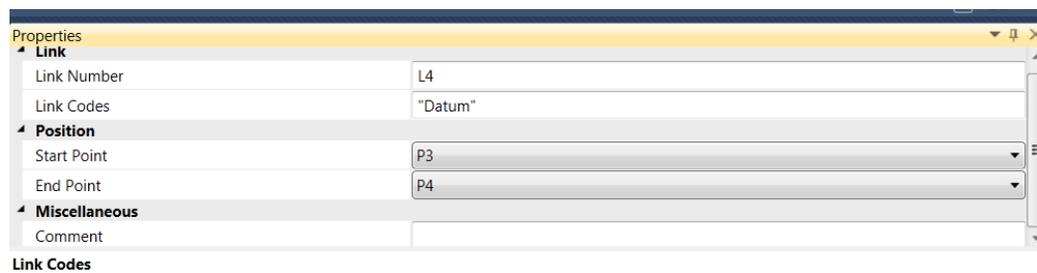
Note: To display both the EOP and ETW codes in the Preview panel you may have to roll your scroll wheel in or out on your mouse to zoom in or out. Hold your scroll wheel down on your mouse to pan around as well.



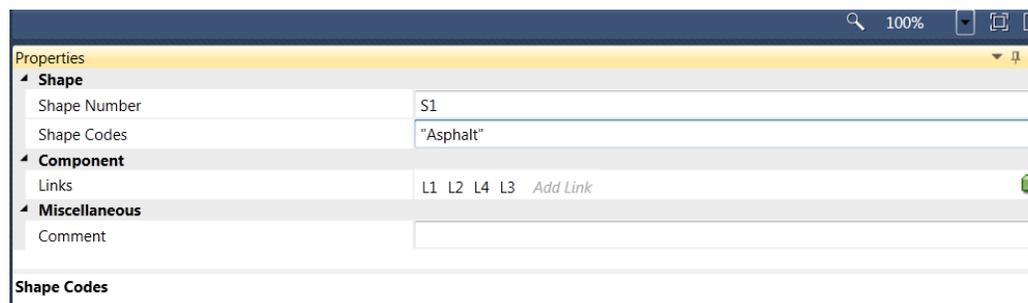
- 4 Scroll down on the Properties panel , and under Link, type in “Top” for the Codes:



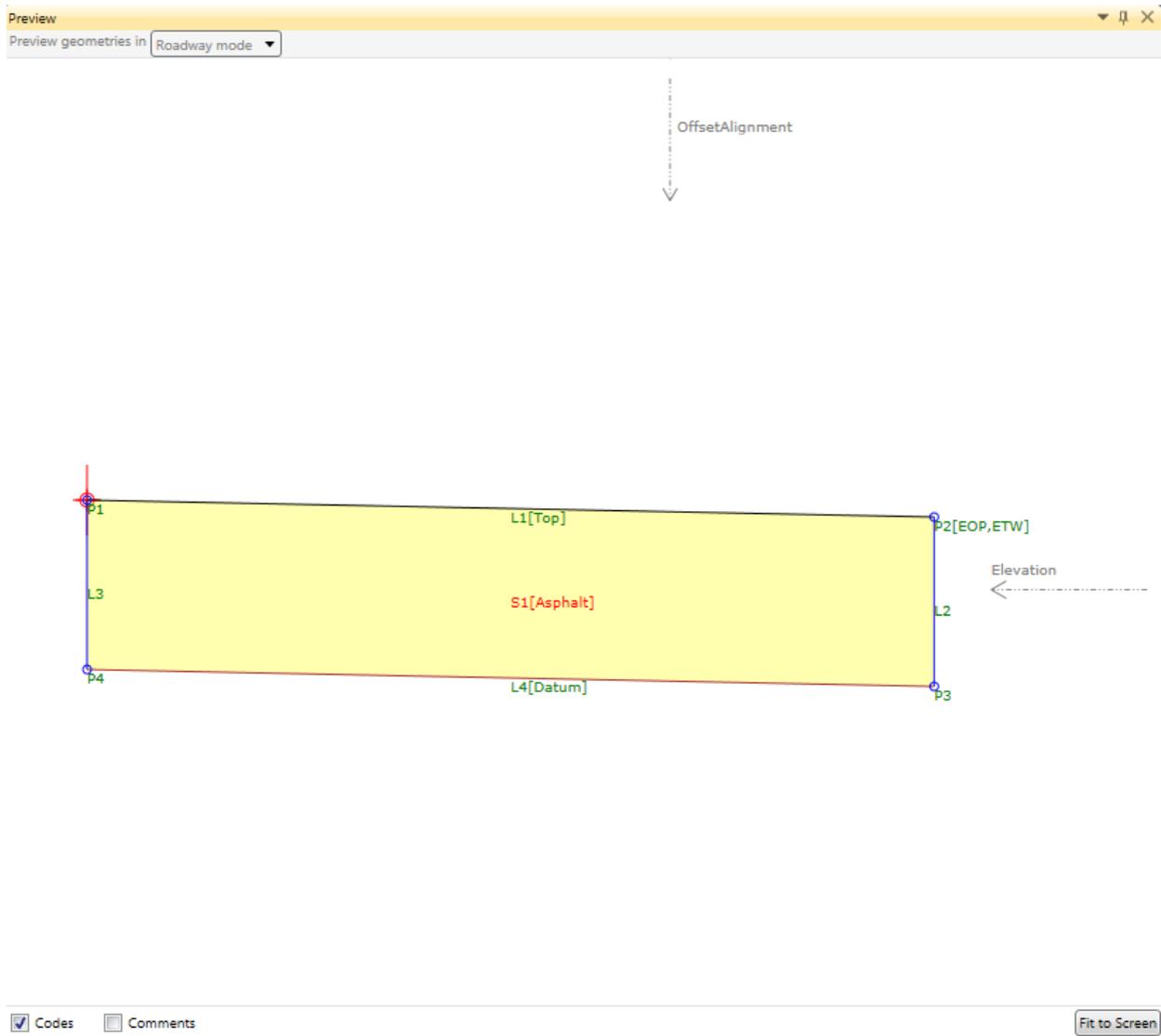
- 5 Select the L4 rectangle from the Flowchart panel and on the Properties panel , type in “Datum” under Link Codes:



- 6 Select the S1 rectangle from the Flowchart panel and on the Properties panel , type in “Asphalt” under Shape Codes:



- 7 In the Preview panel Point Codes for P2, L1, L4, and S1 are displayed in brackets. If not, in the Preview panel , toggle off then back on the Codes box at the lower left corner of the window.

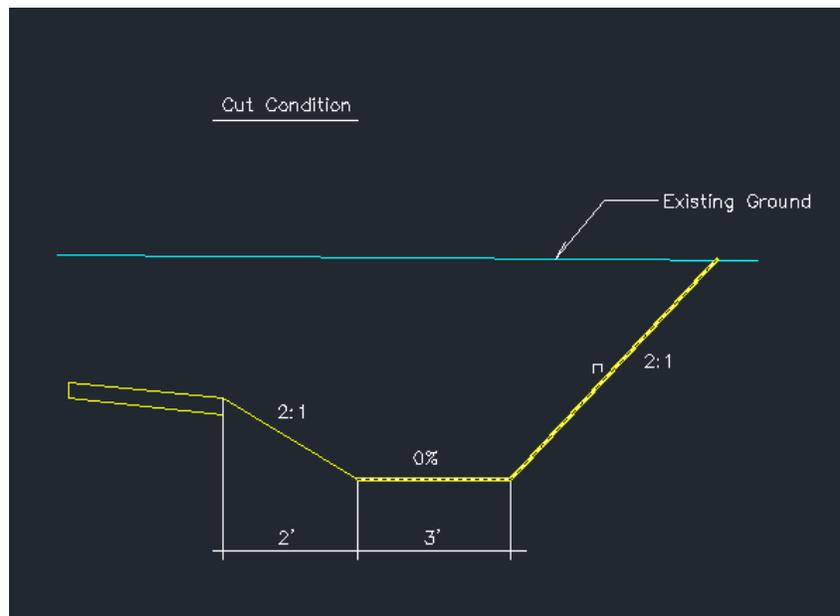
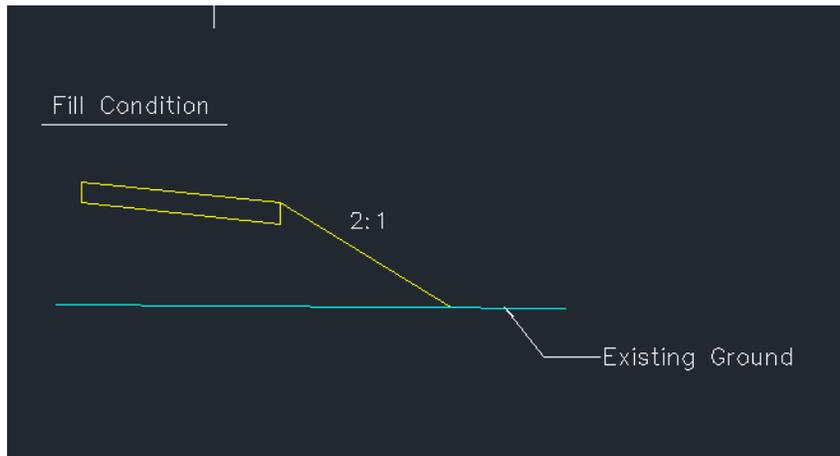


6 CUT & FILL CONDITIONS

CUT AND FILL CONDITIONS

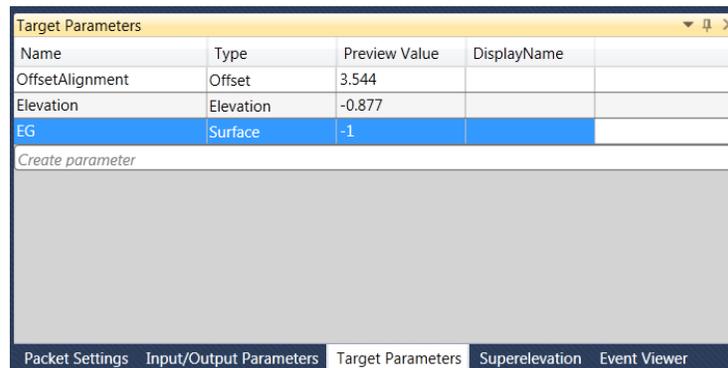
Cut and Fill conditions can be modeled in subassembly composer. In order to do so, a surface target must be defined under Target Parameters and an auxiliary point must be created from the last decision point with a zero Delta X from the last decision point and a Delta Y on the target surface.

Conditions modeled are as follows for both Cut and Fill:

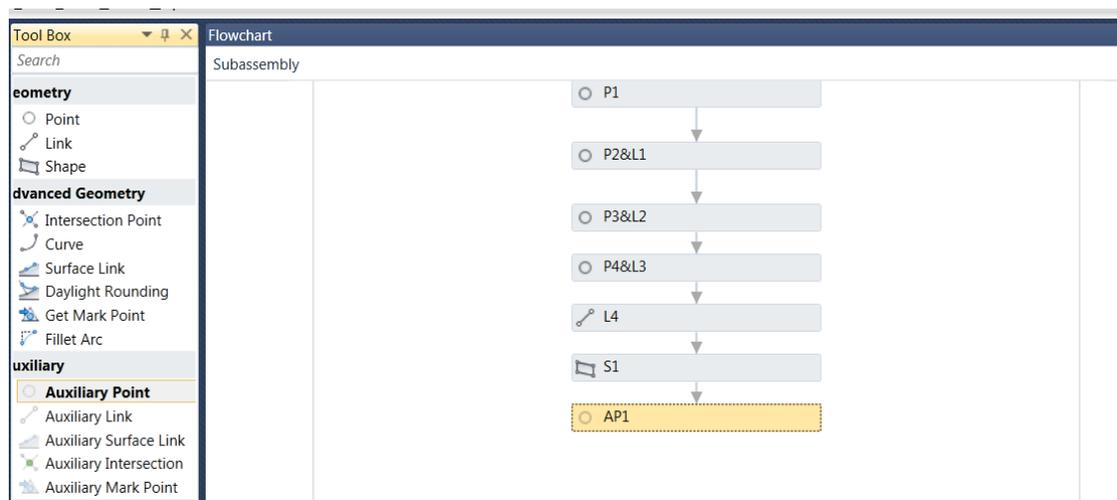


Continue working on the same file or open the file 6.0 - Cut Fill - Start.pkt from the C:\Civil 3D 2018 Projects\22049555201\Roadway folder

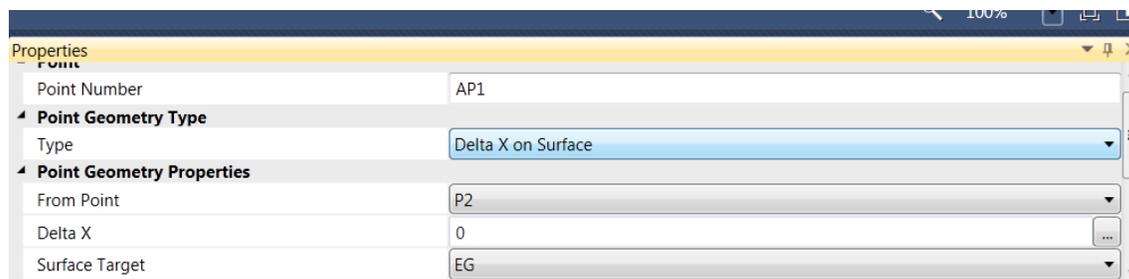
- 1 Under the Setting and Parameters window select the Target Parameters tab.
- 2 On the Target Parameters window, select the italic Create Parameter line. Rename TargetParameter3 to EG, change the Type to Surface and set Preview Value to -1.



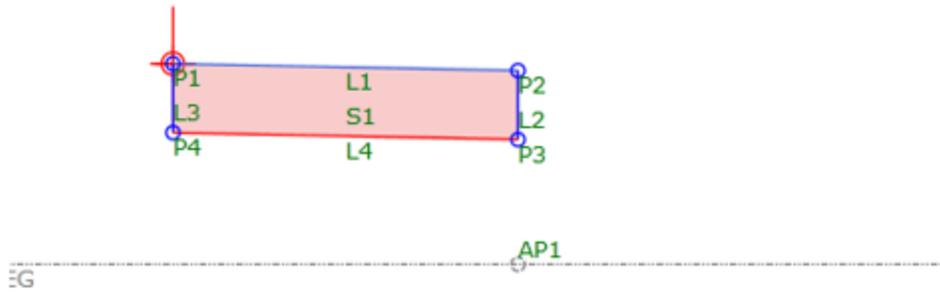
- 3 Drag an Auxiliary Point from the Auxiliary section on the Toolbox and drop it on the Flowchart panel:



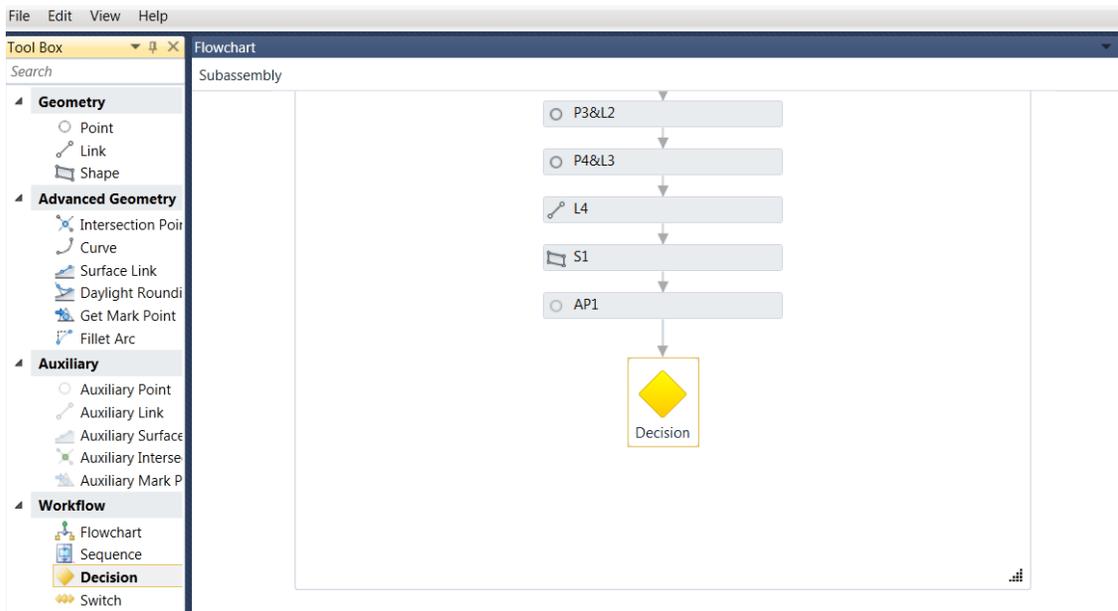
- 4 On the Properties panel, under Point Geometry Type, set Type to Delta X on Surface. Under Point Geometry Properties, select From Point P2 and Surface Target, EG:



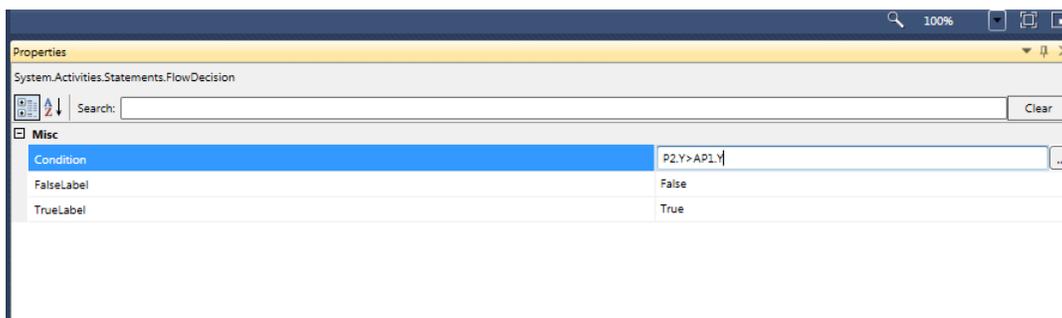
- 5 Select and drag the EG target surface on the Preview panel. The Auxiliary Point, AP1, is automatically updated:



- 6 Drag the Decision marker from the Workflow section under Toolbox and drop it on the Flowchart panel:

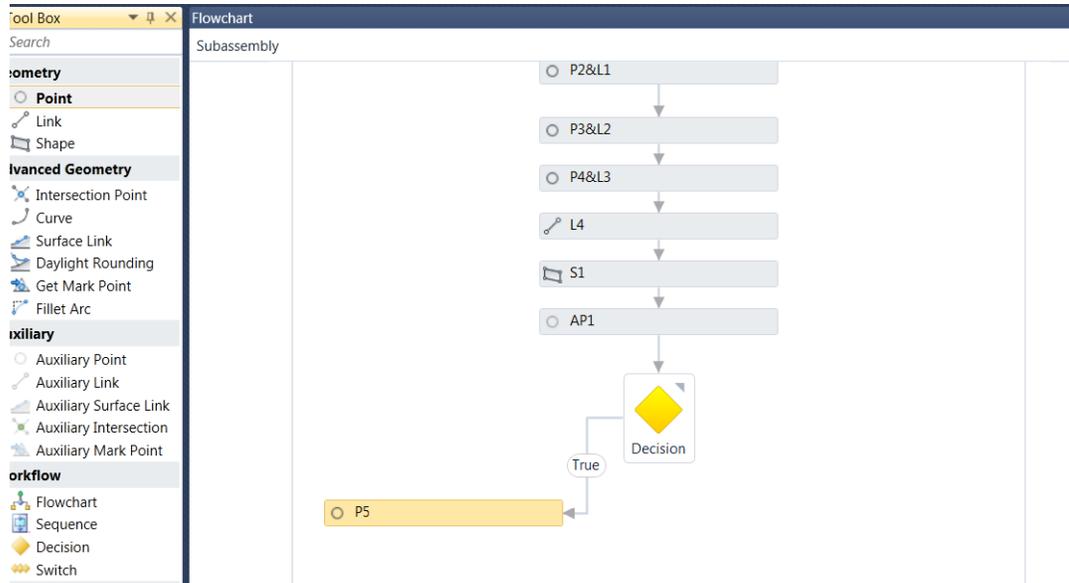


- 7 On the Properties panel , under Condition, type in $P2.Y > AP1.Y$

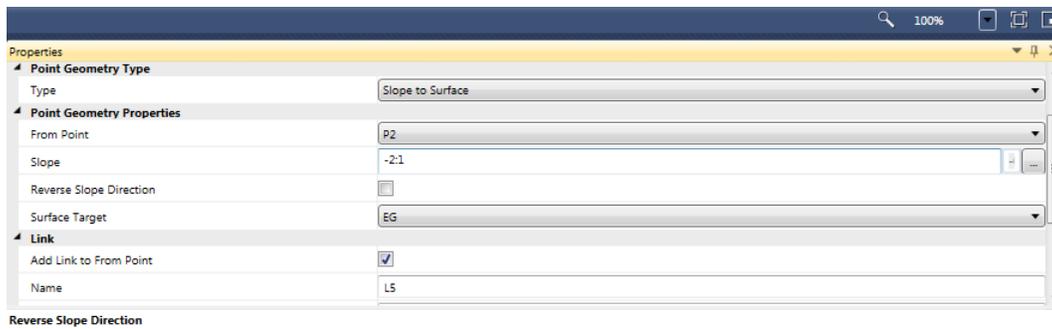


Note This condition rule will be true if point P2 is above the existing ground point, AP1 (Fill Condition)

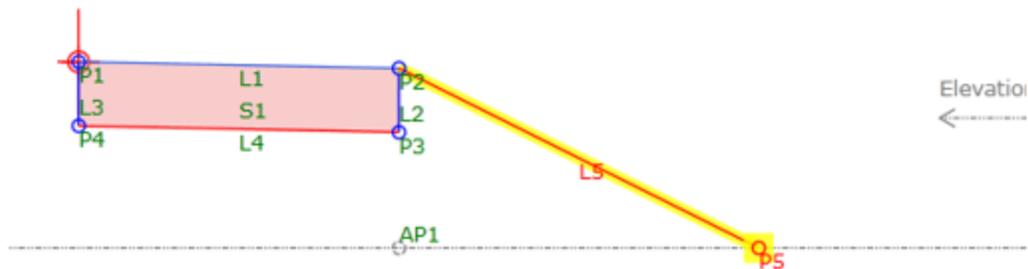
- 8 Drag a point from the Geometry section on the Toolbox and place it on the left side of the decision marker on the Flowchart panel:



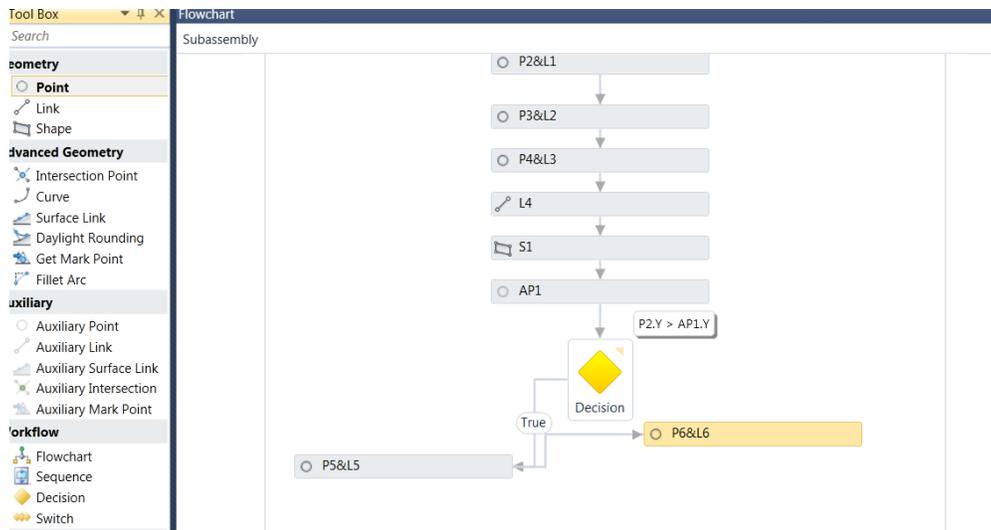
- On the Properties panel, under Point Geometry Type, select Type to Slope to Surface. Under Point Geometry Properties, select From Point to P2, type in a slope of -2:1. Select Surface Target to EG. Under Link turn on the Add Link to From Point box:



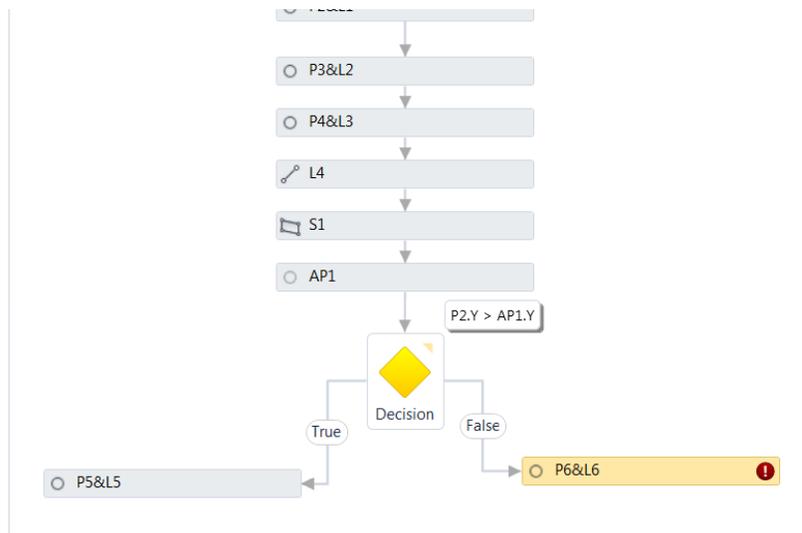
- The fill slope segment is placed when the condition value is true as seen in the Preview panel:



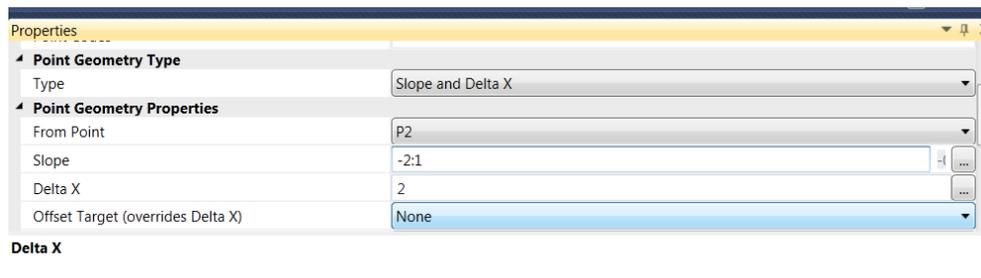
- Drag a Point from the Geometry section under Toolbox and place it on the Flowchart panel:



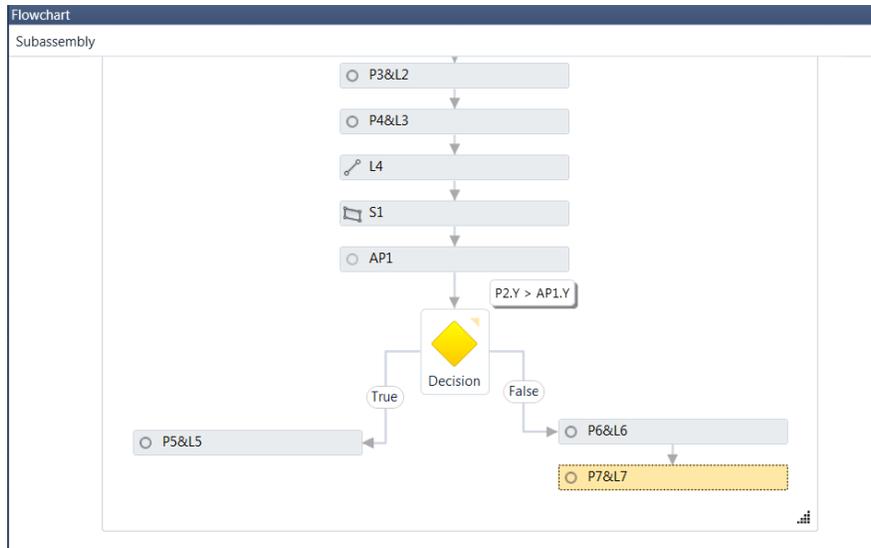
- The point is automatically added to the previous point. Grab the arrow attached to the new point rectangle attached to the previous rectangle and attach it to the right side of the Decision symbol so that it is placed at the False condition:



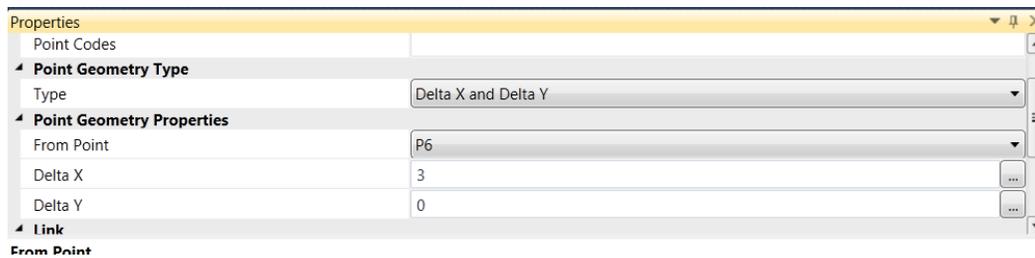
- On the Properties panel, under Point Geometry Type select the Type to Slope and Delta X. Under Point Geometry Properties, select From Point to P2, type in a slope of -2:1 and type in 2 for Delta X. Under Link turn on the Add Link to From Point box:



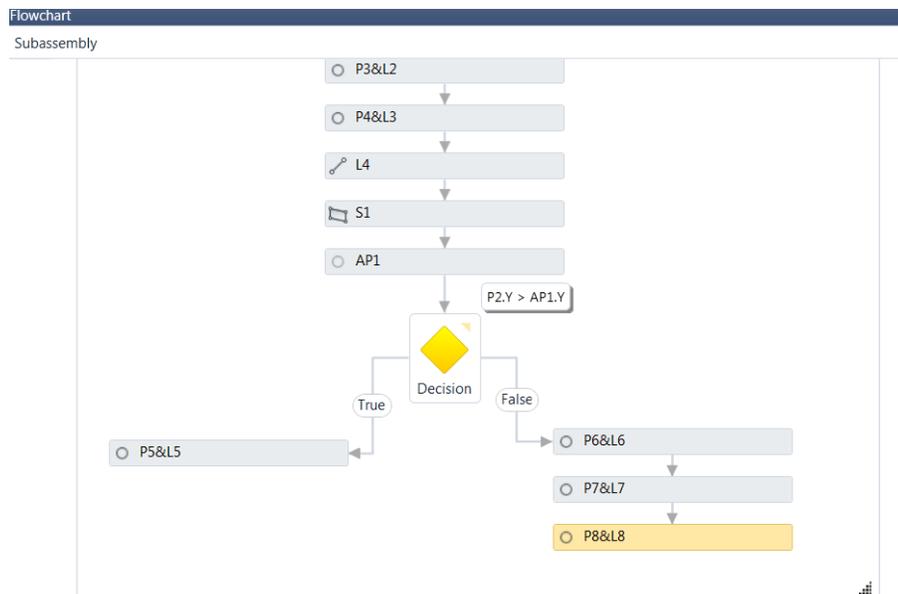
- Drag a point from the Geometry section and drop it under the previously created point and link on the workflow window:



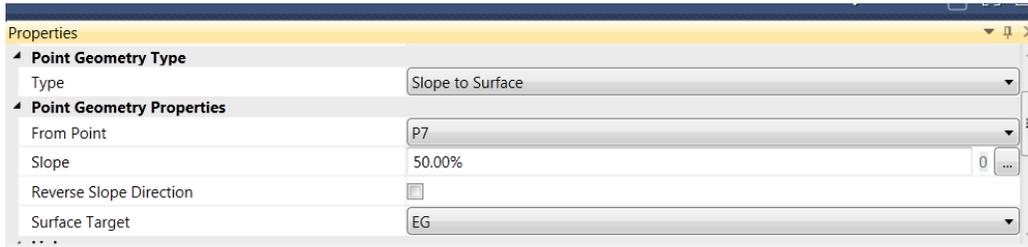
- On the Properties panel , under Point Geometry Type, select the Type to be Delta X and Delta Y. Under Point Geometry Properties, select From Point to P6 and type in a Delta X of 3 and a Delta Y of 0. Under Link turn on the Add Link to From Point box:



- Drag a point from the Geometry section and drop it under the previously created point and link on the workflow window:

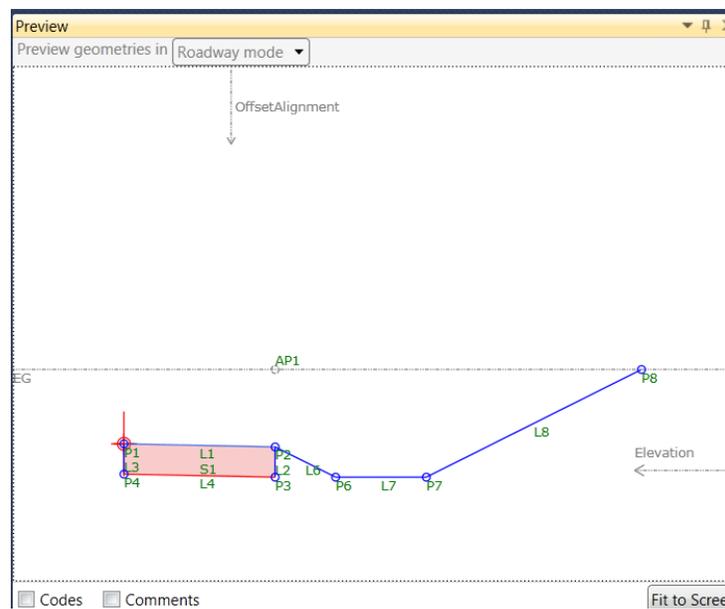


- 17 On the Properties panel , under Point Geometry Type, select the Type to be Slope to Surface. Under Point Geometry Properties, select From Point to P7, type in a slope of 2:1 and select the Surface Target to EG. Under Link turn on the Add Link to From Point box:



Slope

- 18 In order to test the False condition, move the EG target surface on the Preview panel to a cut condition and verify the behavior of the subassembly:



- 19 In order to have all the Cut & Fill slopes for links and points open for prompting when placed in the drawing, they will be created as Input/Output parameters.
- 20 Under the Setting and Parameters window select the Input/Output parameters tab.
- 21 On the Input/Output parameters window, select the italic Create Parameter line. Rename Parameter4 to CutSlope, change the Type to Slope, set the Direction to Input, and type in a Default Value of 2:1:

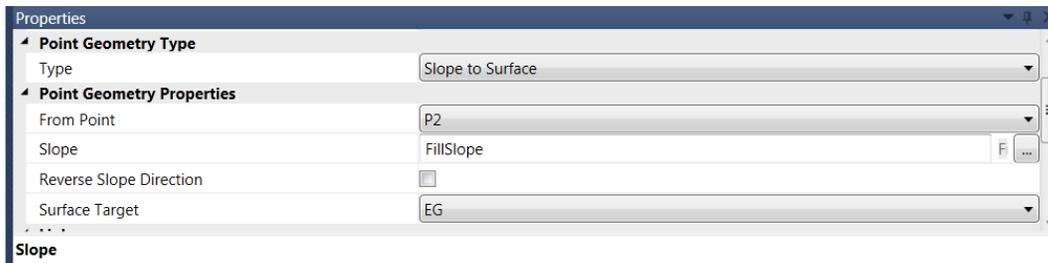
Input/Output Parameters					
Name	Type	Direction	Default Value	DisplayName	Description
Side	Side	Input	None		
Width	Double	Input	5		
Thickness	Double	Input	1		
<i>CutSlope</i>	Slope	Input	2.00:1		
<i>Create parameter</i>					

- 22 On the Input/Output parameters window, select the italic Create Parameter line. Rename Parameter5 to FillSlope, change the Type to Slope, set the Direction to Input , and type in a Default Value of - 2:1:

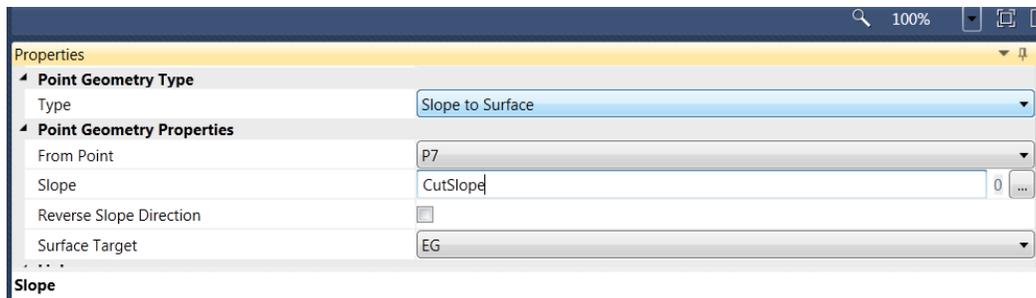
Input/Output Parameters					
Name	Type	Direction	Default Value	DisplayName	Description
Side	Side	Input	None		
Width	Double	Input	5		
Thickness	Double	Input	1		
CutSlope	Slope	Input	2.00:1		
FillSlope	Slope	Input	-2.00:1		

Create parameter

23 Highlight the P5 & L5 rectangle on the Flowchart panel. On the Properties panel , under Point Geometry Properties type in FillSlope for the Slope value:

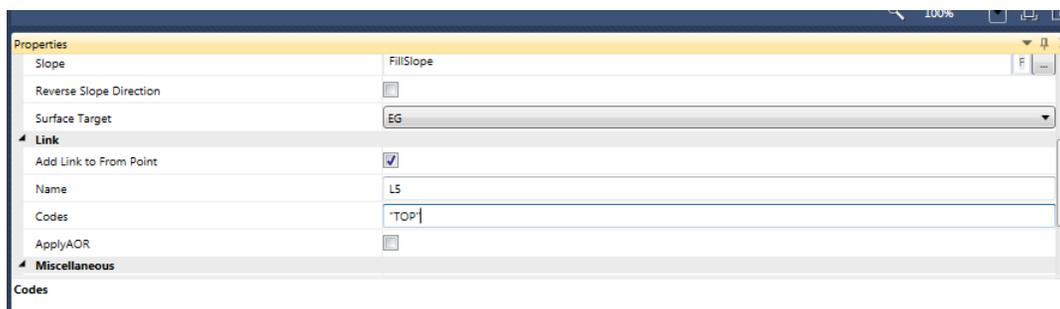


24 Highlight the P8& L8 rectangle on the Flowchart panel. On the Properties panel , under Point Geometry Properties type in CutSlope for the Slope value:



25 Change the Cut and Fill Slope Default Values on the Input/Output Parameters window and review the automatic updates on the Preview panel .

26 Highlight the P5 & L5 rectangle in the Flowchart panel. On the Properties panel , under Link assign “Top” under Codes to the current link:



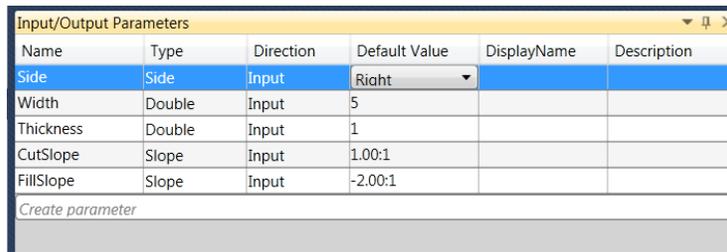
27 Repeat the same process of assigning the “Top” code to the L6, L7 and L8 links.

28 Under the Setting and Parameters window select the Input/Output parameters tab.

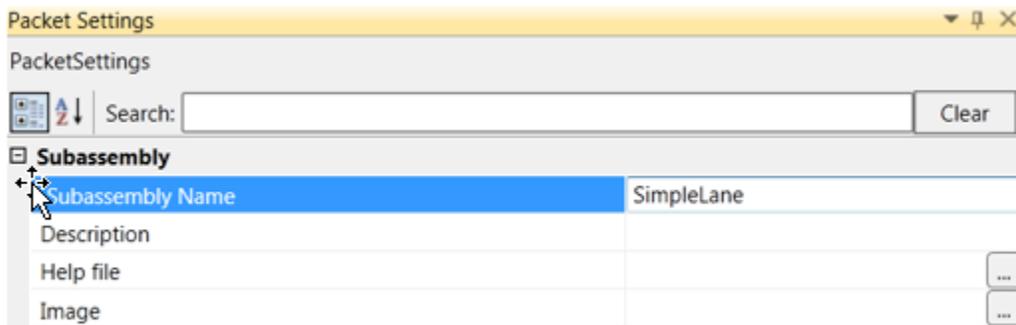
29 On the Input/Output Parameters window, set the Default Value on the Side parameter to Right.

30 On the Input/Output Parameters window, set the Default Value on the CutSlope to 1:1

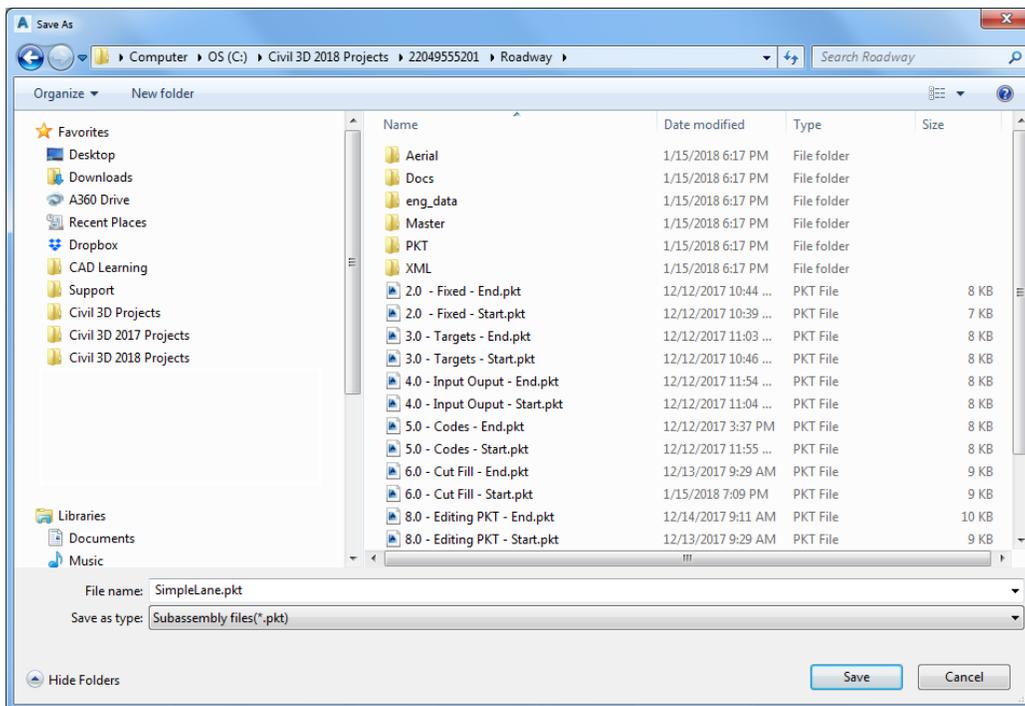
- 31 On the Input/Output Parameters window, set the Default Value on the FillSlope to -2:1



- 32 Under the Setting and Parameters window select the Packet Settings tab.
- 33 On the Packet Settings window and under Subassembly, type in SimpleLane (No spaces are accepted for names) for the Subassembly Name:



- 34 Save the Packet file by selecting File at the top left corner of Subassembly Composer and then selecting Save As. Name it SimpleLane.pkt and place it in C:\Civil 3D 2018 Projects\22049555201\Roadway folder:



- 35 Close subassembly composer (File > Exit)

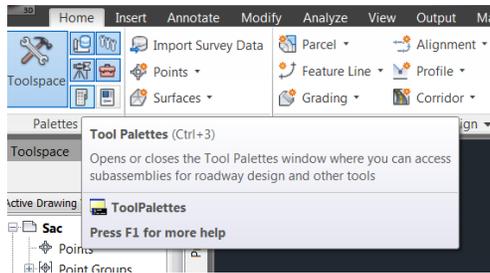
7 IMPORTING / Modeling PKT FILES

IMPORTING AND MODELING WITH PACKET FILES.

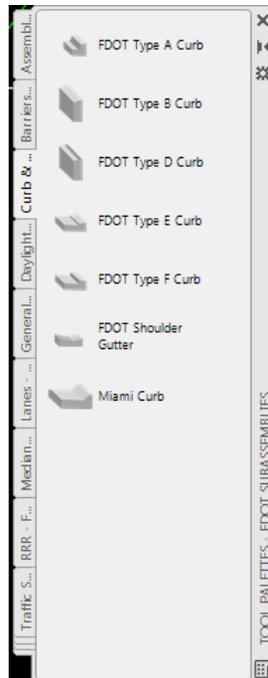
- 1 Open Civil 3D using the FDOT2018.C3D icon located on your desktop.



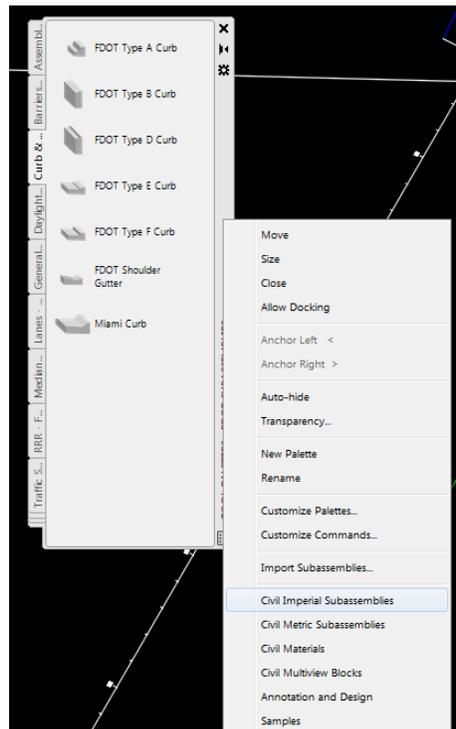
- 2 Open the drawing 7.0 - Importing Modeling PKT - Start.dwg from the C:\Civil 3D 2018 Projects\22049555201\Roadway folder
- 3 The file contains an existing surface, a design horizontal alignment and a profile design.
- 4 On the Home tab of the ribbon, under the Palettes section, select the Tool Palettes command:



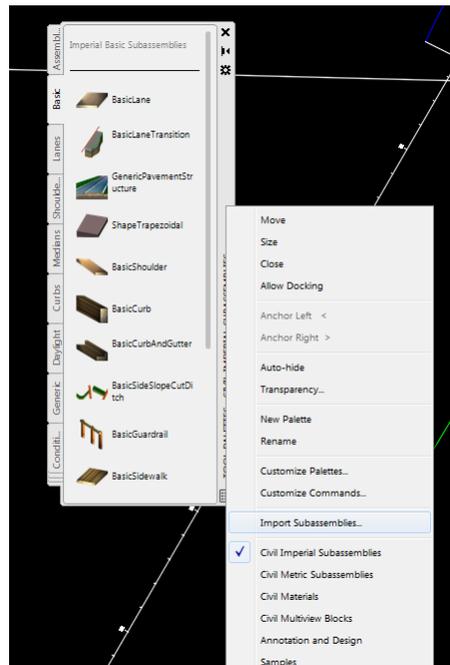
- 5 The current FDOT Subassemblies tool palette appears:



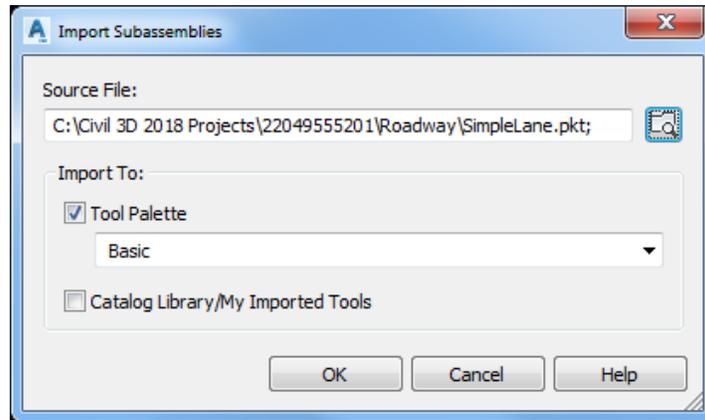
- Right click on the gray right side area of the tool palette (Tool Palettes – FDOT Subassemblies) and select Civil Imperial Subassemblies:



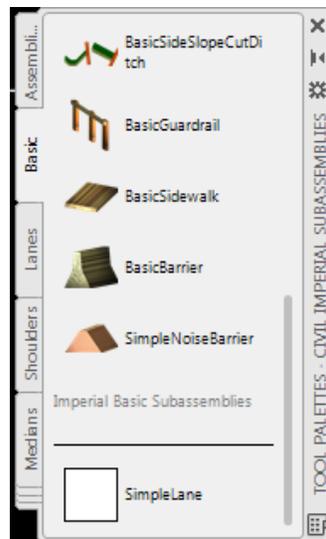
- Select the Basic tab
- Right click on the gray right side area of the tool palette (Tool Palettes – Civil Imperial Subassemblies) and select the Import Subassemblies option



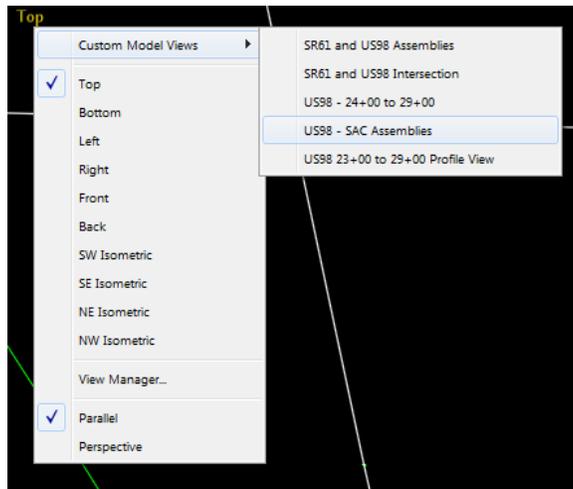
- 9 On the Import Subassemblies dialog box, select the folder icon, then select the SimpleLane.pkt file from the C:\Civil 3D 2018 Projects\22049555201\Roadway folder which was created using Subassembly Composer. Select Import to: Tool Palette, Basic. The subassembly created in Subassembly Composer will be placed on the Basic tab on the current Tool Palette:



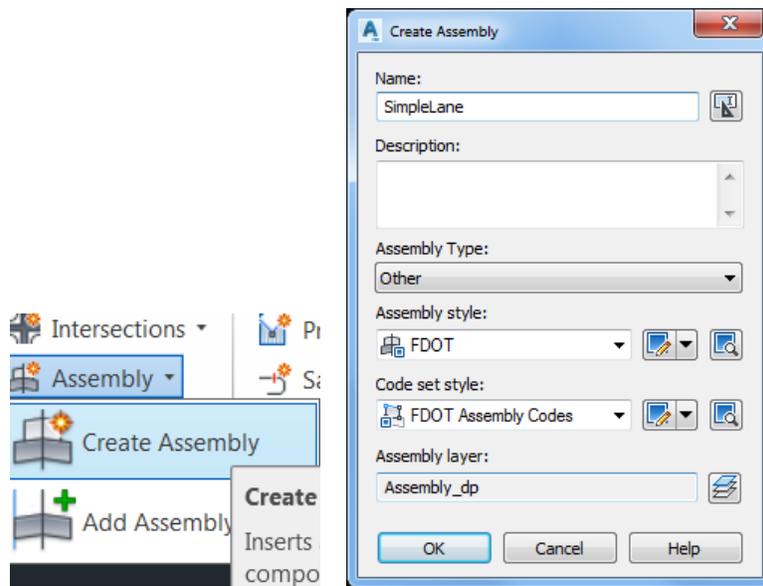
- 10 Scroll down on the Basic tab subassemblies. The subassembly SimpleLane will be placed at the bottom of the list:



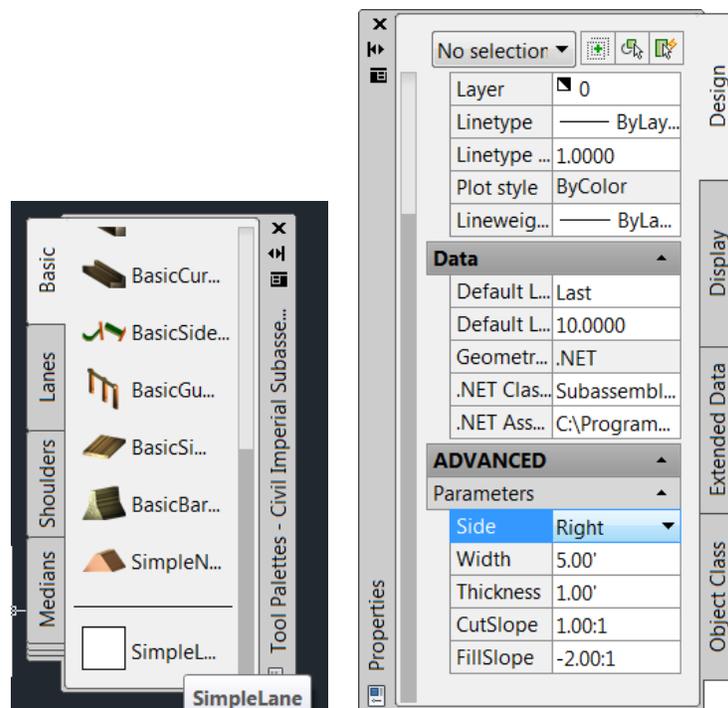
11 Restore custom model view: US98 SAC Assemblies using View Controls



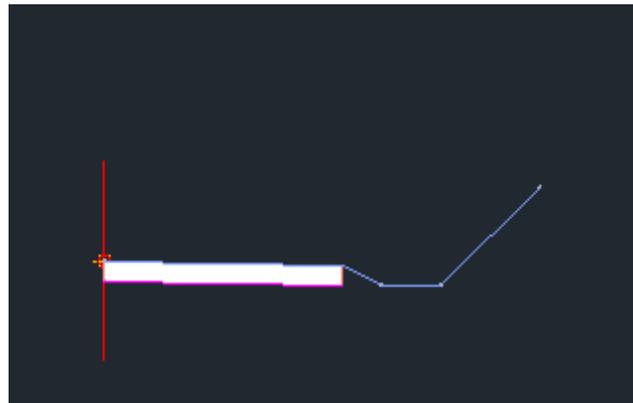
- 12 On the Ribbon Home tab, select Assembly, Create Assembly, name it SimpleLane and after selecting OK, place the Assembly marker in restored view US98 SAC Assemblies:



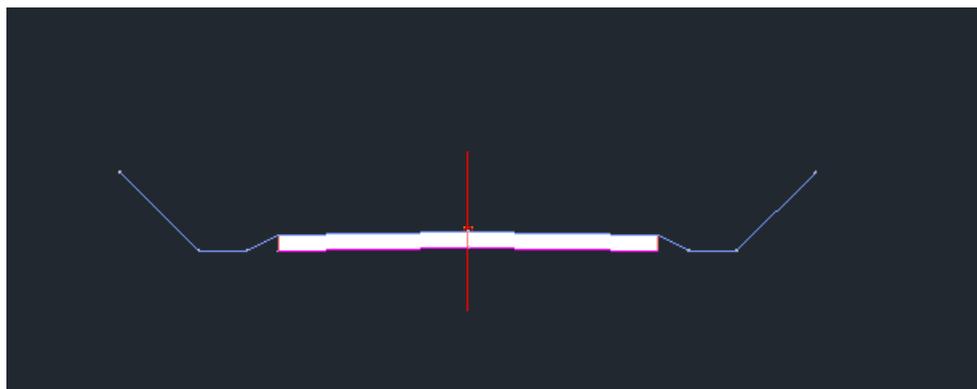
- 13 Select the SimpleLane subassembly from Basic tab. Notice by scrolling down the Advanced properties that the side, Width, Thickness, Cut and Fill Slopes are ready to be overwritten by the user:



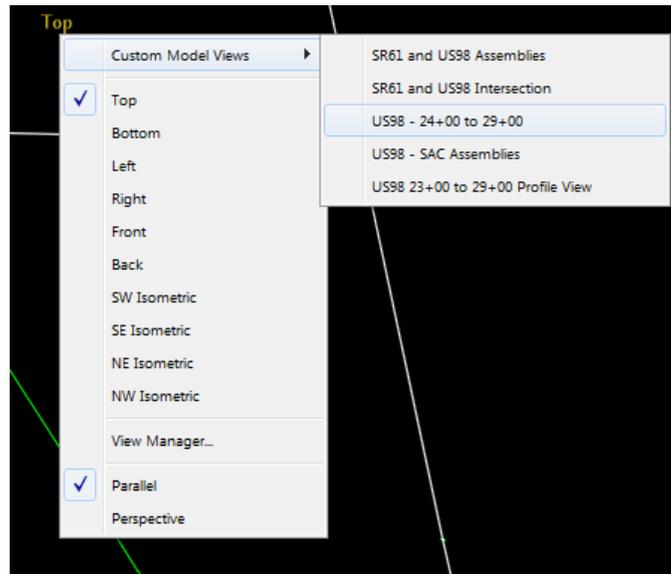
- 14 Change the Side to Right, and the Width to 12.00'. Verify that the CutSlope is 1:1 and that the FillSlope value is -2:1. Select the marker and place the subassembly:



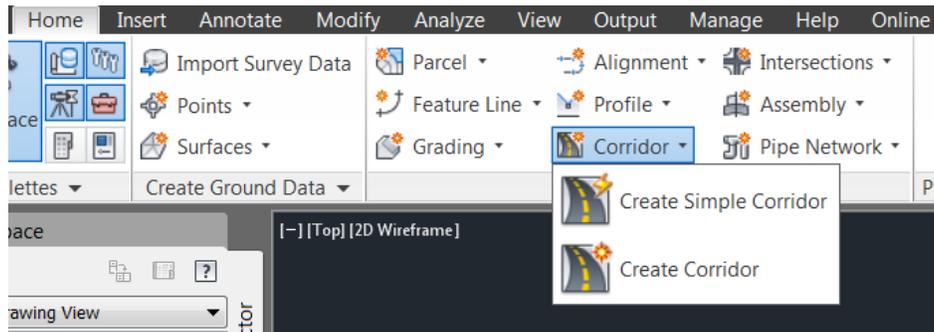
- 15 Change the Side to Left, identify the marker to complete the Assembly:



- 16 Select the Escape key to exit out of the Subassembly properties dialog box and Close the Tool Palettes containing all available subassemblies.
- 17 Restore custom model view: US98 - 24+00 to 29+00 using View Controls



- 18 On the Home tab of the ribbon, select Corridor > Create Corridor.



- 19 On the Create Corridor dialog enter the following values:

Name: Corridor - US98 - 24+00 to 29+00

Corridor style: FDOT

Corridor layer: Corridor_dp

Baseline type: Alignment and Profile

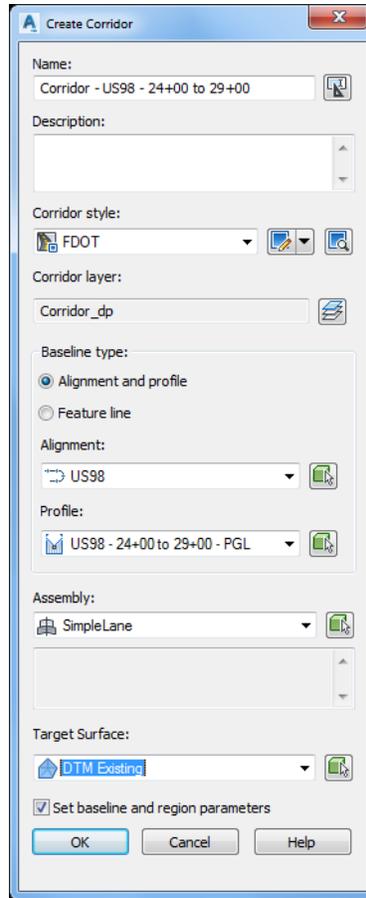
Alignment: US98

Profile: US98 - 24+00 - 29+00 - PGL

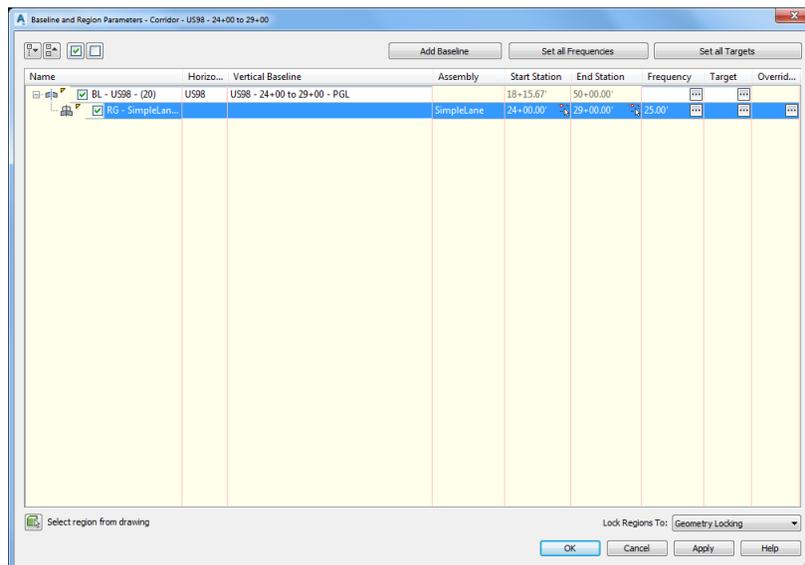
Assembly: SimpleLane

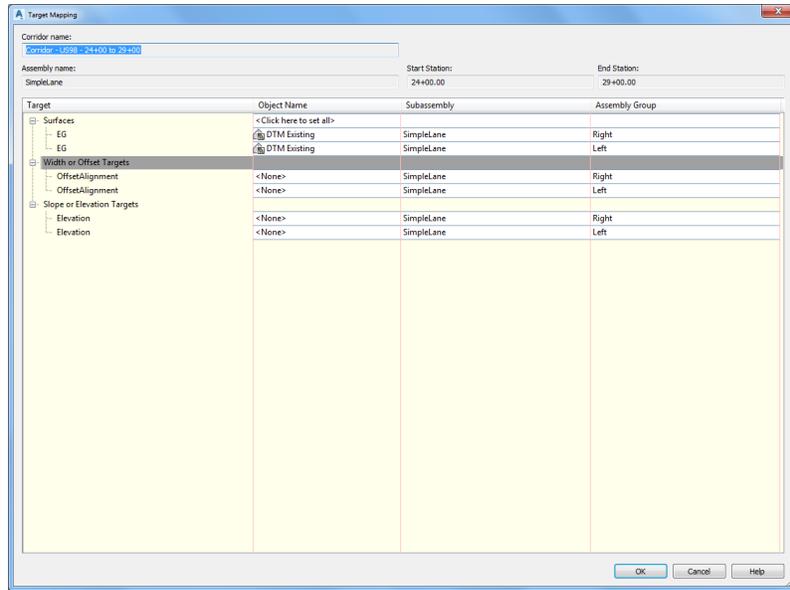
Target Surface: DTM Existing

Turn on Set baseline and region parameters

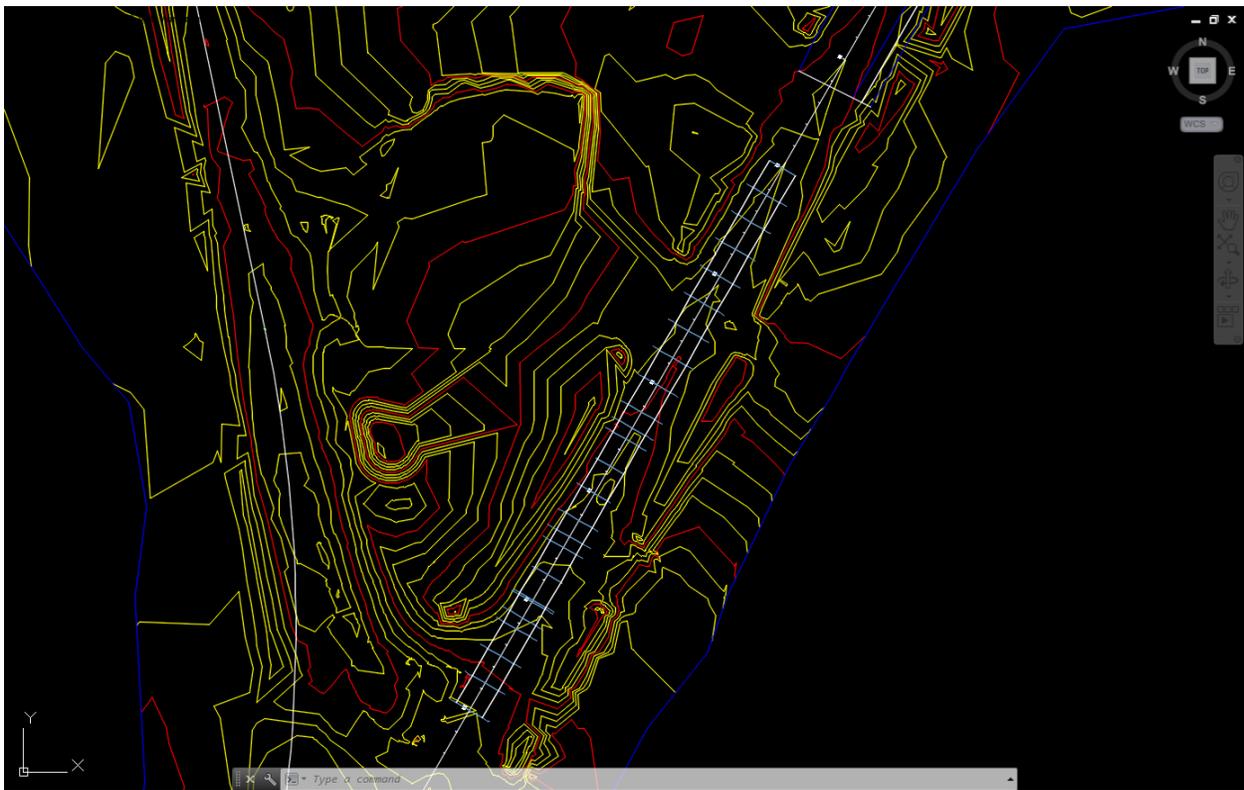


- 20 Select OK to accept the entered values.
- 21 On the Create Corridor dialog box, change the Start Station to 24+00 and the End Station to 29+00, select the Set all Targets option and under Surfaces, select the DTM Existing target surface for both the right and left sides of the assembly. Notice that the Width or Offset Targets and the Slope or Elevation Targets are available since these targets were defined and are now available from the Subassembly Composer SimpleLane assembly:

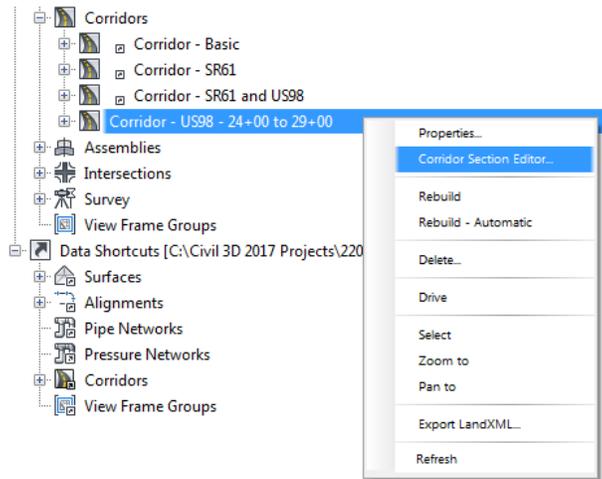




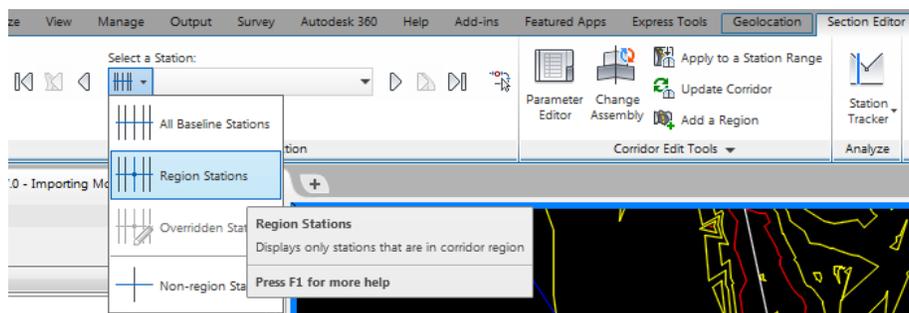
22 Select OK to dismiss the Target Mapping and select OK to run the Corridor. The corridor is modeled:



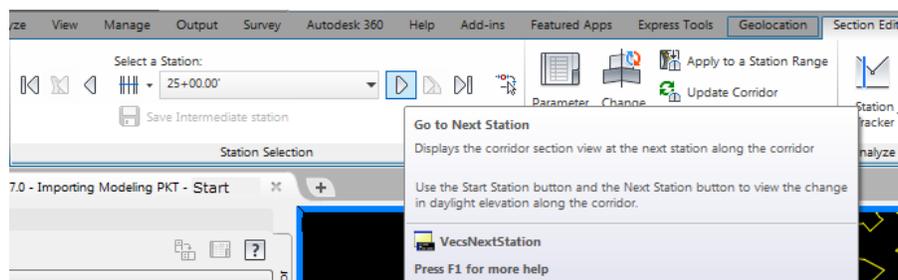
- On the Toolspace, Prospector tab, expand the Corridors, select Corridor - US98 - 24+00 to 29+00, then right click and select Cross Section Editor...



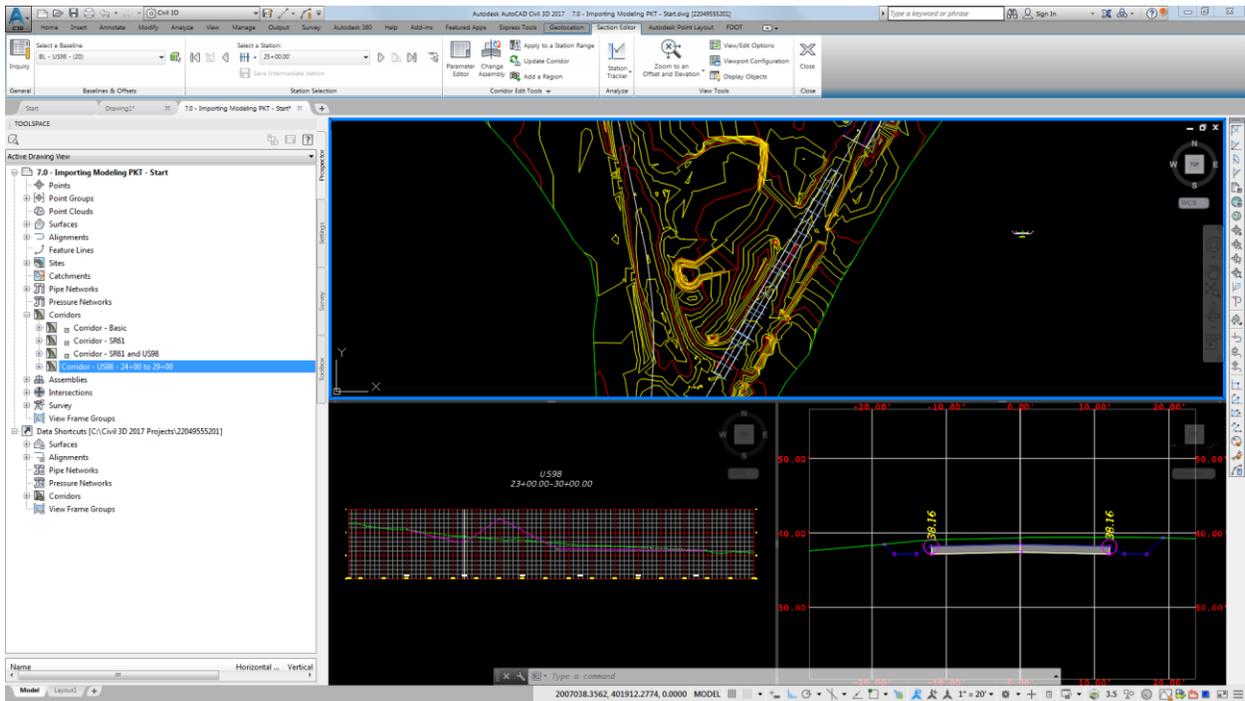
- From the Ribbon > Section Editor tab > Station Selection panel, set Select a Station to Region Station



- Review the Sections by selecting the forward or backwards arrows at the Ribbon under Station Selection panel. The assembly behavior is exactly what was created in Subassembly Composer.



26 Select the Close X mark on the Ribbon to exit the Corridor Section Editor upon review completion.



27 Restore custom model view: US98 - 24+00 to 29+00 using View Controls

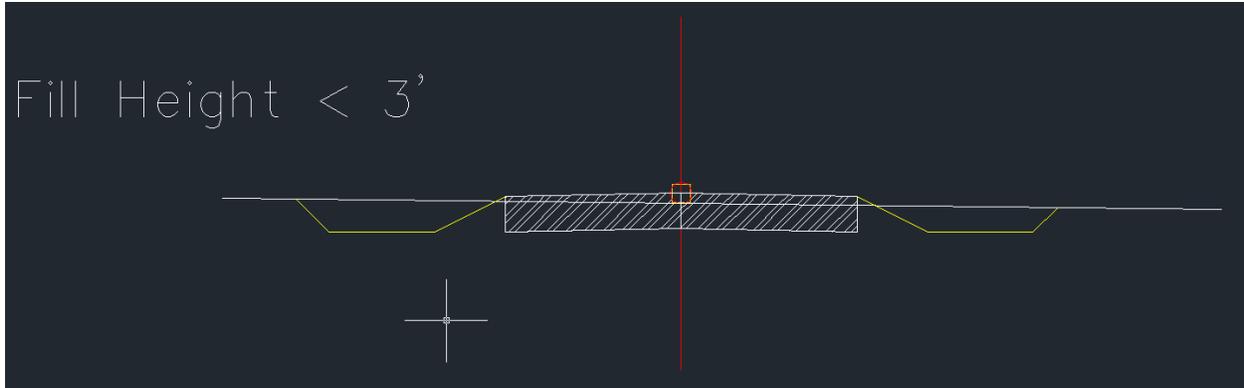
28 Save the drawing 7.0 - Importing Modeling PKT - Start.dwg to the C:\Civil 3D 2018 Projects\22049555201\Roadway folder

29 Close Civil 3D 2018

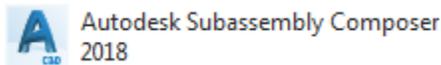
8 EDITING PKT FILES / MODEL UPDATE

MAKING CHANGES TO PACKET FILE AND UPDATING THE MODEL

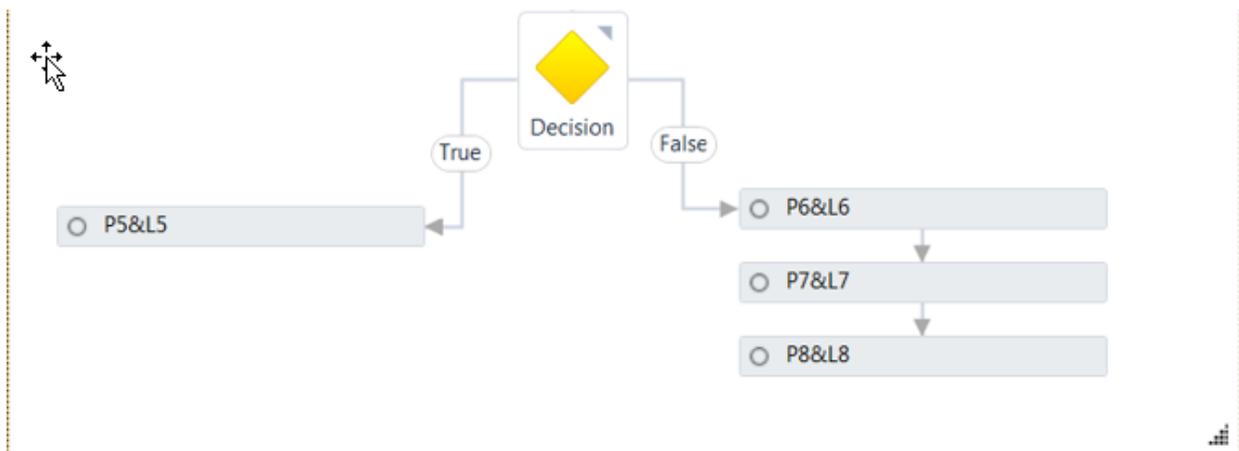
Now that everything has been modeled, let us now suppose that a fill ditch must be added if the fill height is less than 3 feet:



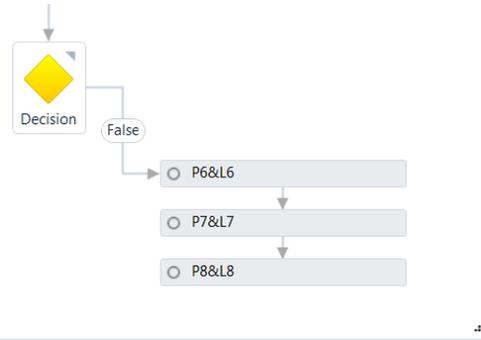
- 1 Open Autodesk Subassembly Composer from All programs > Autodesk > Autodesk Subassembly Composer 2018



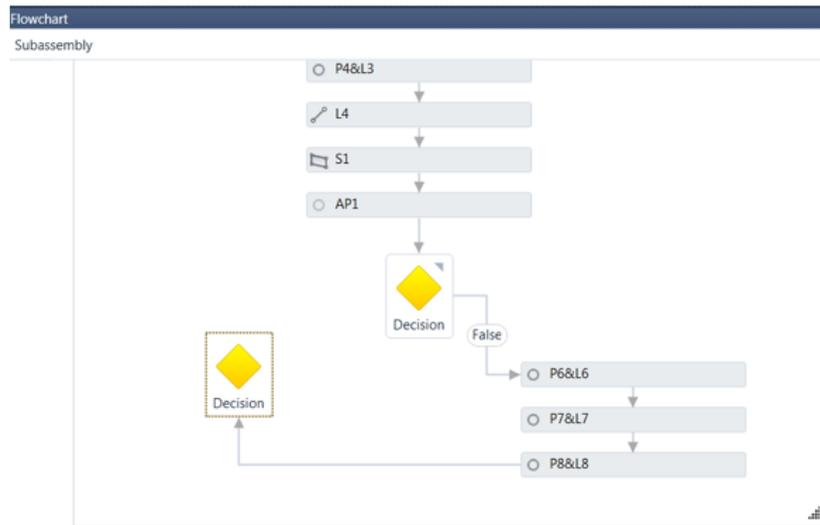
- 2 Select File > Open and open the 8.0 - Editing PKT - Start.pkt file from the C:\Civil 3D 2018 Projects\22049555201\Roadway folder.
- 3 Scroll down on the Flowchart panel to the Decision symbol. The left side (True) currently holds the geometry for the fill situation.



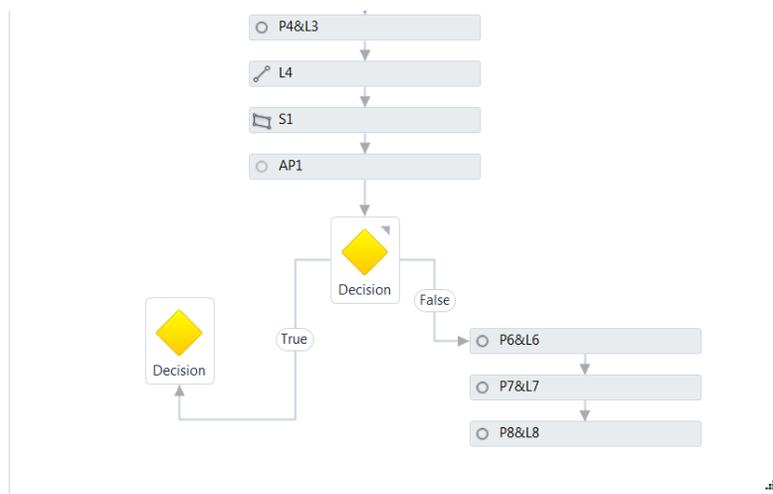
- 4 Delete the P5 & L5 rectangle by selecting it and pressing the delete key on the keyboard.



- 5 Select the decision symbol from the Workflow section on the Toolbox and place it on the left side:

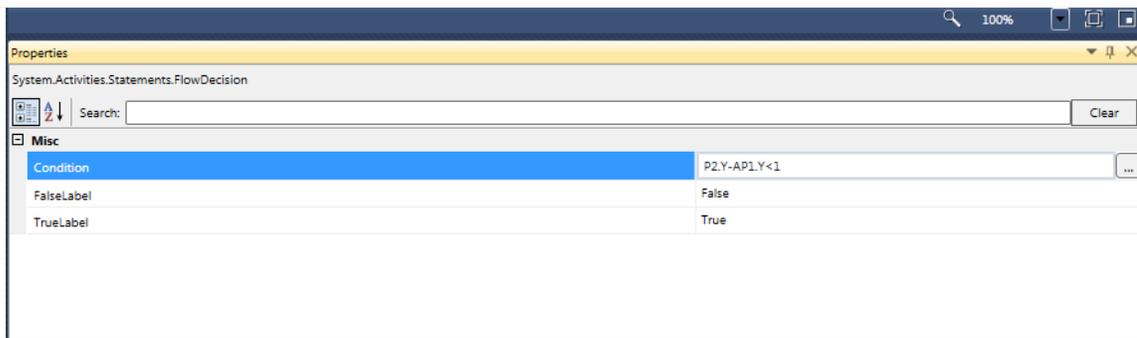
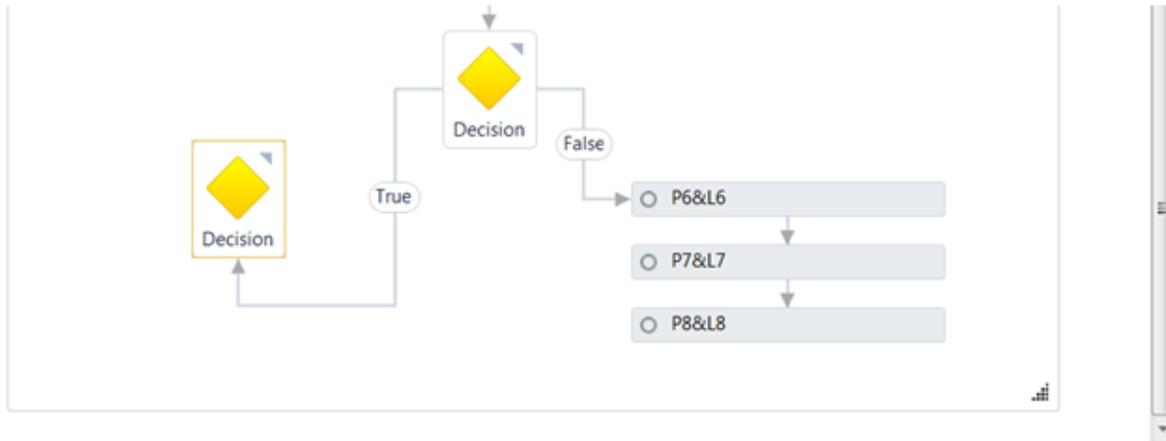


- 6 Select the line currently connecting the P8 & L8 rectangle to the decision symbol and move one of the ends so that it connects properly to the main decision symbol:

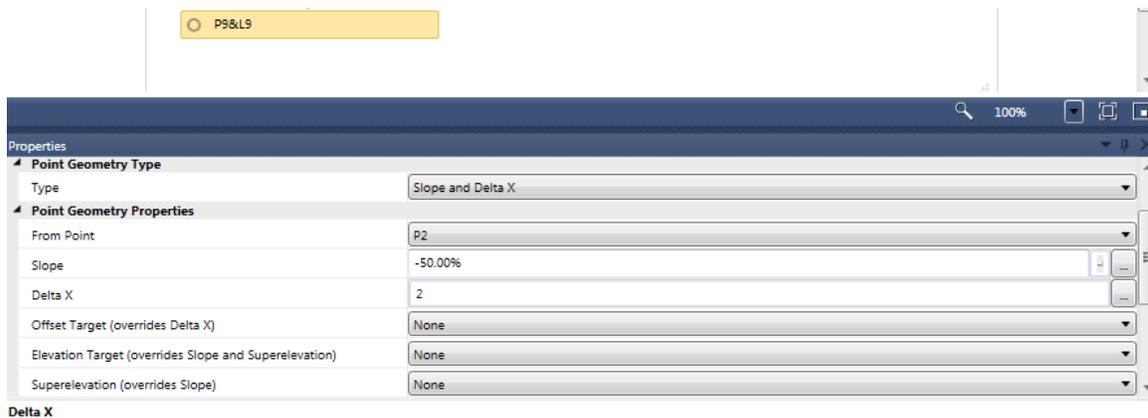


- 7 If the workflow instructions do not fit, the lower right corner symbol of the drawing allows the window to be resized.

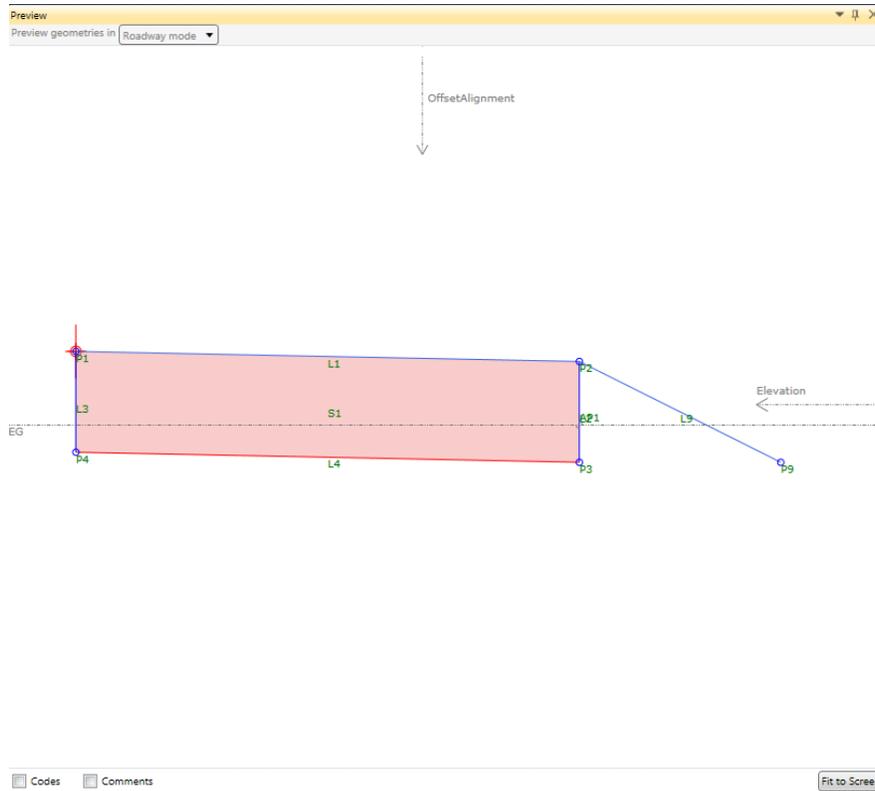
- 8 Click on the new Decision symbol and under the Properties panel , type under condition $P2.Y - AP1.Y < 1$
- 9 This condition will test true if the fill height is less than 1



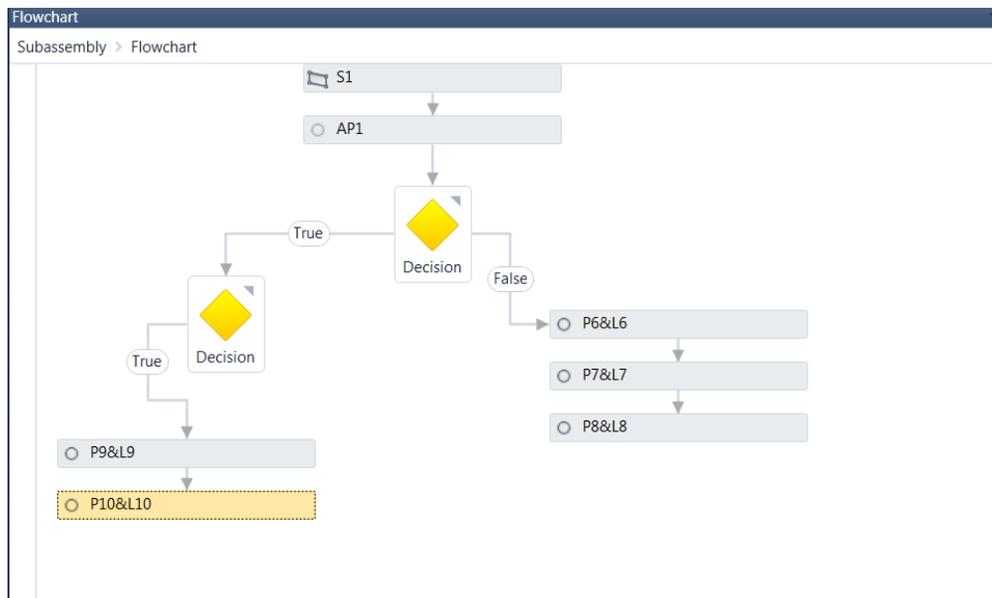
- 10 Drag and drop a Point from the Geometry section of the Toolbox. On the Properties panel , under Point Geometry Type set Type to Slope and Delta X, under Point Geometry Properties, select From Point P2, type in a Slope of -50%, type in a Delta X of 2 and turn on under Link, Add Link to From Point:



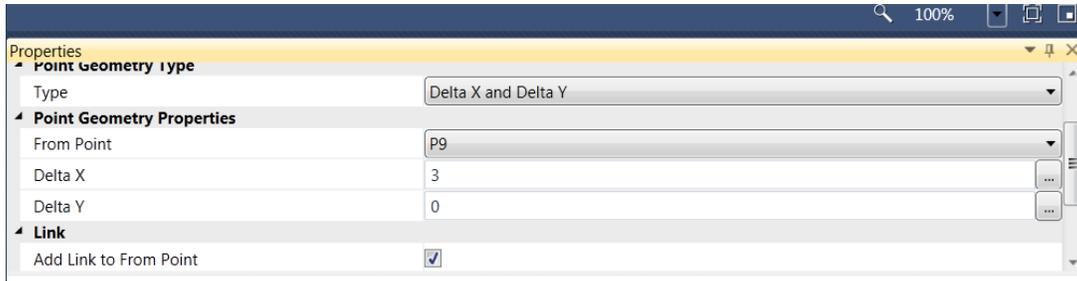
- 11 In order to test the behavior of the True condition, move the EG line close to P2 on the Preview panel and verify that the segment is placed.



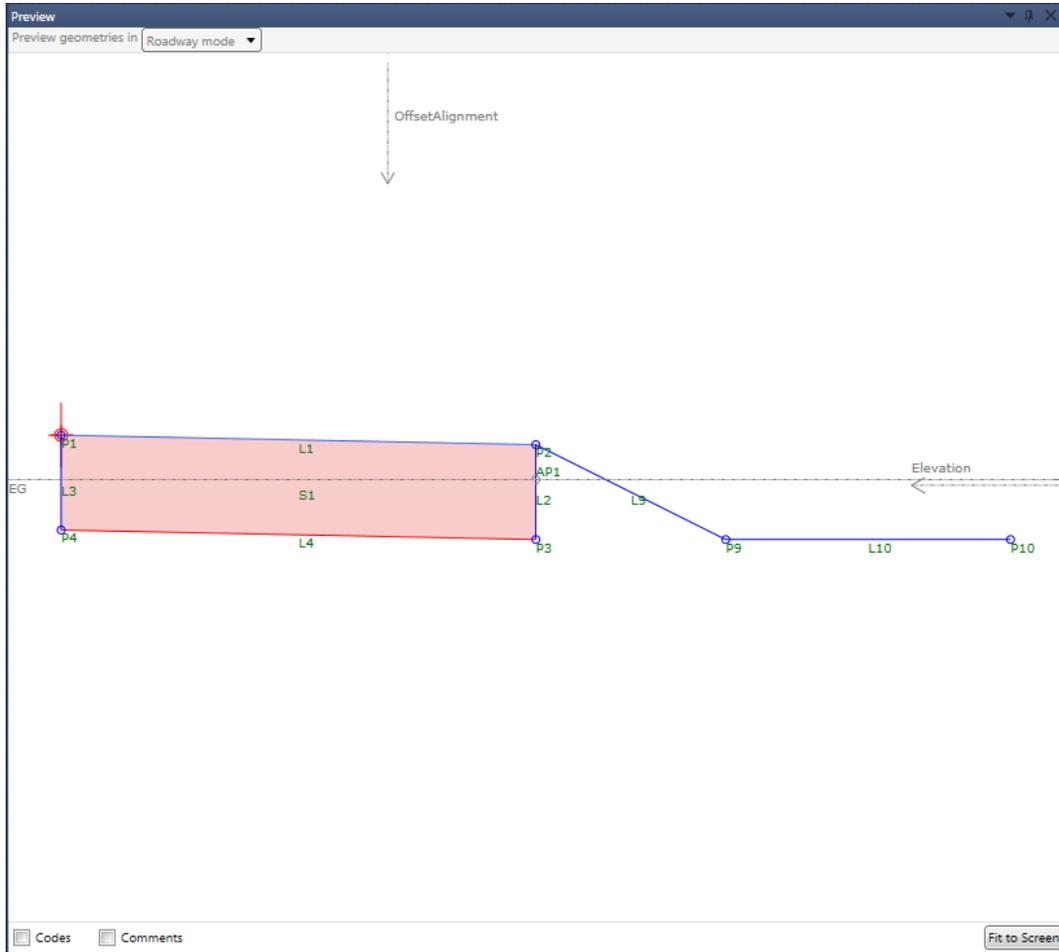
- 12 Drag and drop a Point from the Geometry section of the Toolbox and place it under the previously created point:



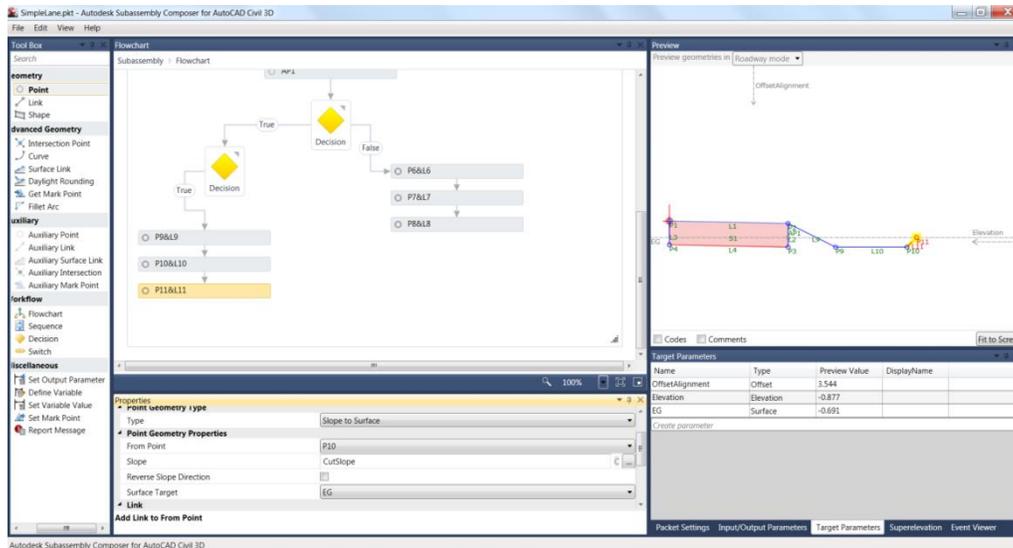
- 13 On the Properties panel , under Point Geometry Type, set the Type to Delta X and Delta Y. under Point Geometry Properties, select From Point P9, type in a Delta X of 3, type in a Delta Y of 0, and turn on under Link, Add Link to From Point:



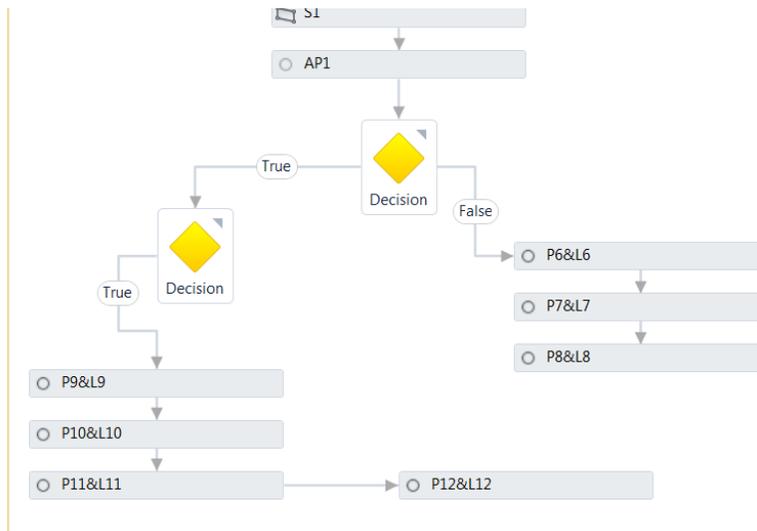
14 Verify the ditch on the Preview panel .



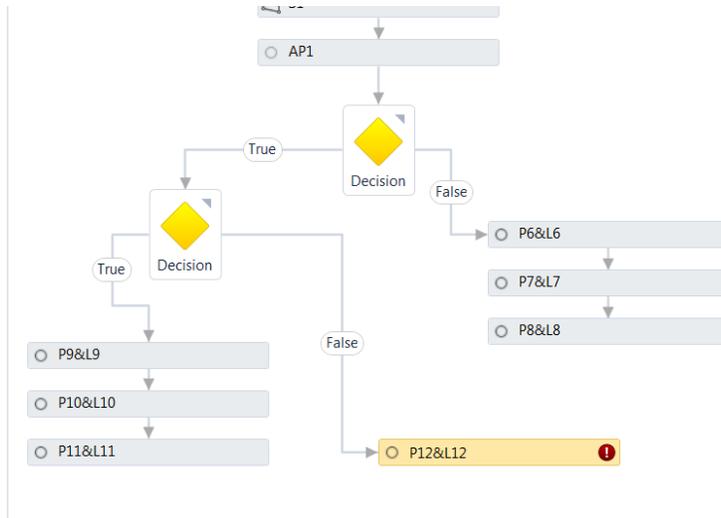
- Drag and drop a Point from the Geometry section on the Toolbox under the point and link previously created. On the Properties panel, under Point Geometry Type, select Slope to Surface. Under Point Geometry Properties, select From Point P10 and type in CutSlope for Slope, set the Surface Target to EG, and turn on under Link, Add Link to From Point:



- Finally, a Point and Link must be added when the Fill height is greater than 3 feet. Drag and drop a point next to the point and link previously created.



- Select the line currently connecting the P12 & L12 rectangle and add it to the decision symbol on its False Condition:

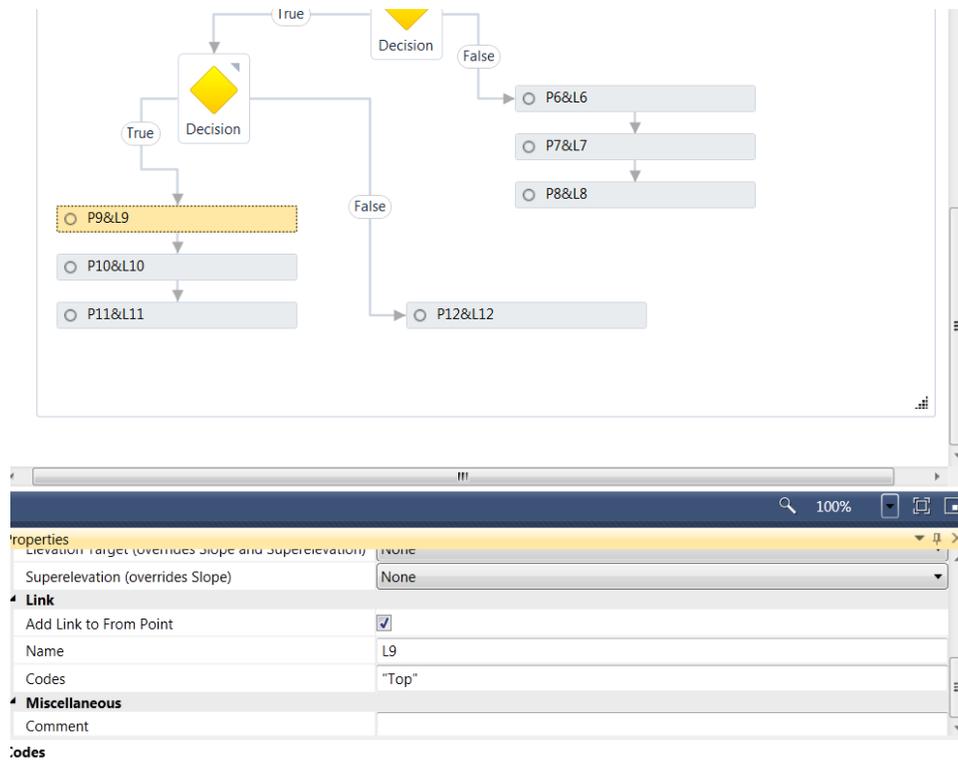


- 18 On the Properties panel , under Point Geometry Type, select Slope to Surface. Under Point Geometry Properties, select From Point P2, type in FillSlope for the Slope and set the Surface Target to EG, and turn on under Link, Add Link to From Point:
- 19 Move down EG on the Preview panel and to verify proper behavior.

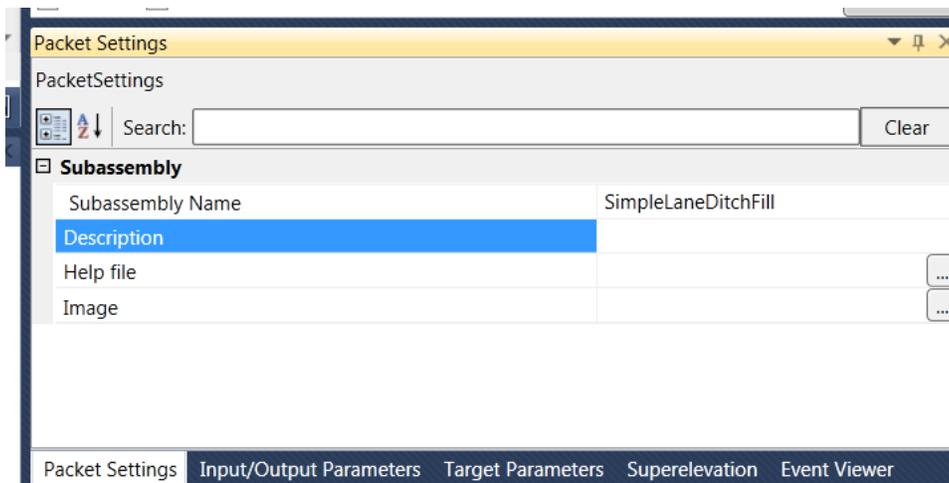
The screenshot displays the software interface with three main panels:

- Flowchart:** Shows the same flowchart as above, with the P12&L12 link highlighted in yellow.
- Properties:**
 - Point Geometry Type:** Type: Slope to Surface
 - Point Geometry Properties:** From Point: P2, Slope: FillSlope, Reverse Slope Direction: (unchecked), Surface Target: EG
 - Surface Target:** EG
- Preview:** Shows a 3D view of the road geometry. A yellow line (L9) connects point P2 to the surface target EG. The elevation at EG is shown as -0.877. The offset alignment is 3.544.

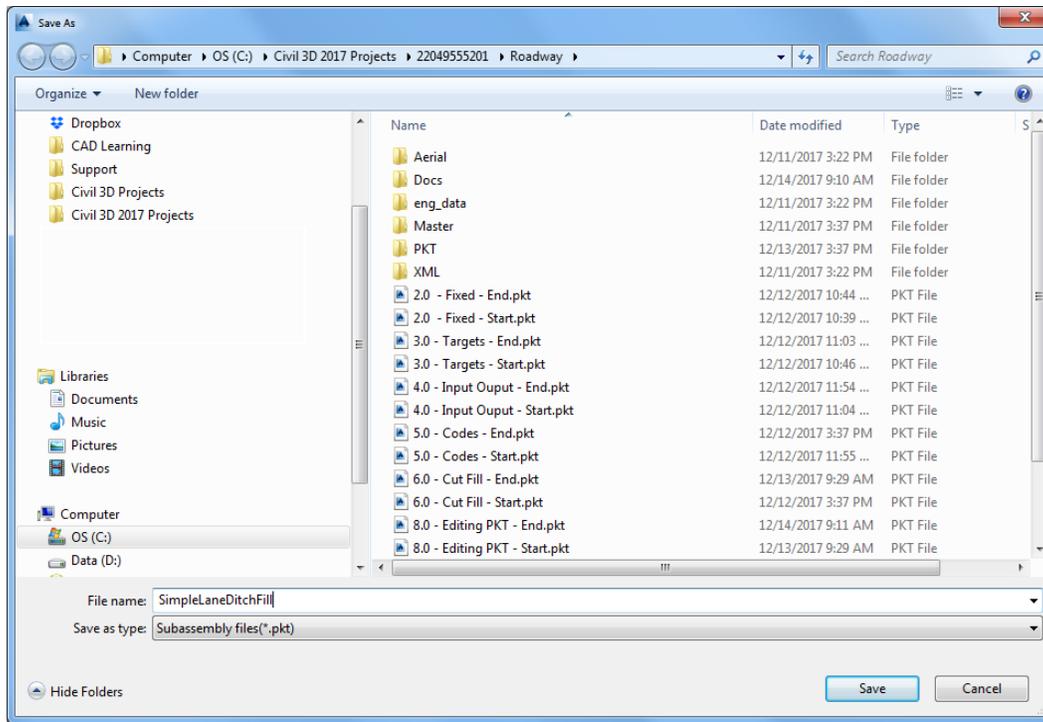
- 20 Highlight the new link L9 and under the Properties panel , type in under Link Codes “Top”. Repeat for the L10, L11 and L12 Link Codes. Verify Link Codes for L6, L7, and L8 are set to “Top”.



- 21 Under the Setting and Parameters window select the Packet Settings tab.
- 22 On the Packet Settings window and under Subassembly, type in SimpleLaneDitchFill (No spaces are accepted for names) for the Subassembly Name:



- 23 Save the Packet file by selecting File at the top left corner of Subassembly Composer and then selecting Save As. Name it SimpleLaneDitchFill.pkt and place it in C:\Civil 3D 2018 Projects\22049555201\Roadway folder:



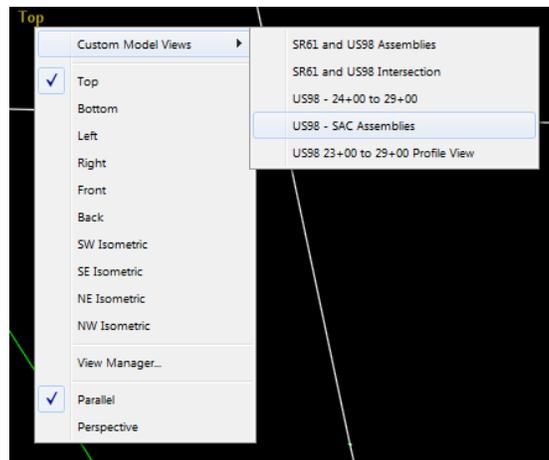
24 Close Subassembly Composer (File > Exit)

25 Open Civil 3D using the FDOT2018.C3D icon located on your desktop.

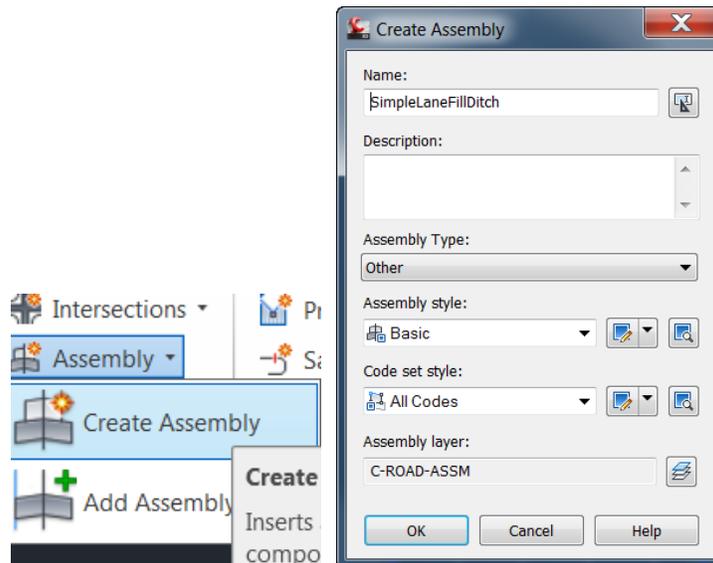


26 Open the drawing 8.0 - Editing PKT - Start.dwg from the C:\Civil 3D 2018 Projects\22049555201\Roadway folder

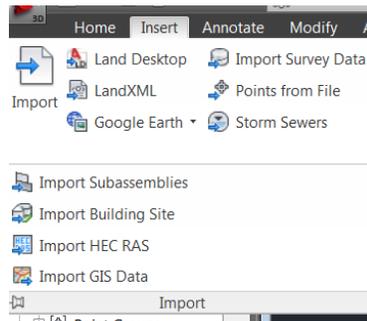
27 Restore custom model view: US98 SAC Assemblies using View Controls



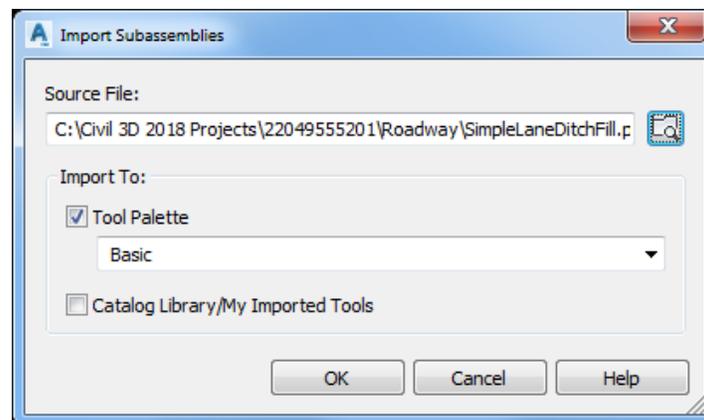
- 28 On the Ribbon Home tab, Create Design panel, select Assembly, Create Assembly, name it SimpleLaneFillDitch and select OK. Place the SimpleLaneFillDitch assembly marker under the SimpleLane assembly:



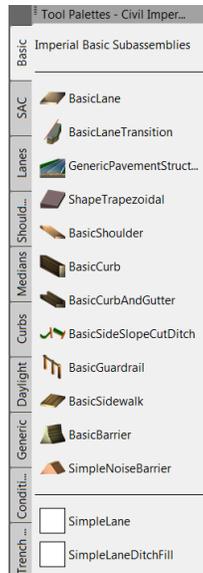
- 29 On the Ribbon, select the Insert tab and select Import, select Import Subassemblies (another alternate method to importing the pkt file):



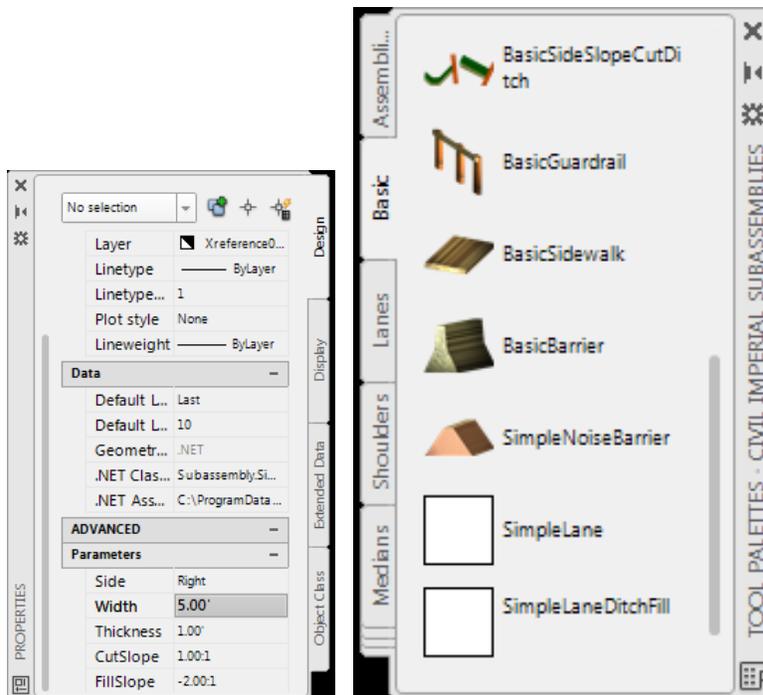
- 30 Select the SimpleLaneDitchFill pkt file located under the working directory and select OK. The subassembly is ready for placement on the imported Tool Palette.



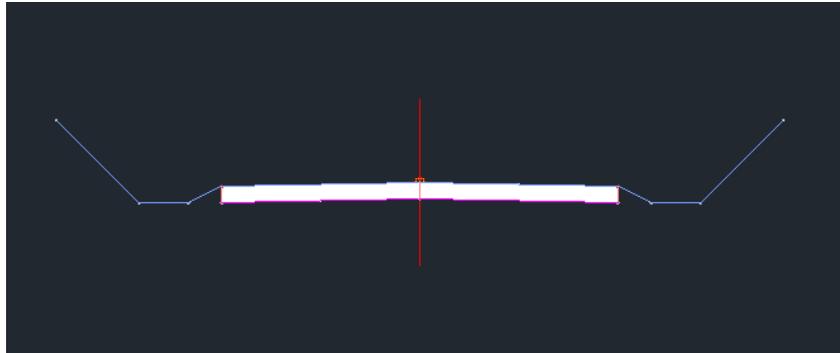
- 31 The SimpleLaneDitchFill subassembly is displayed on the Tool Palette:



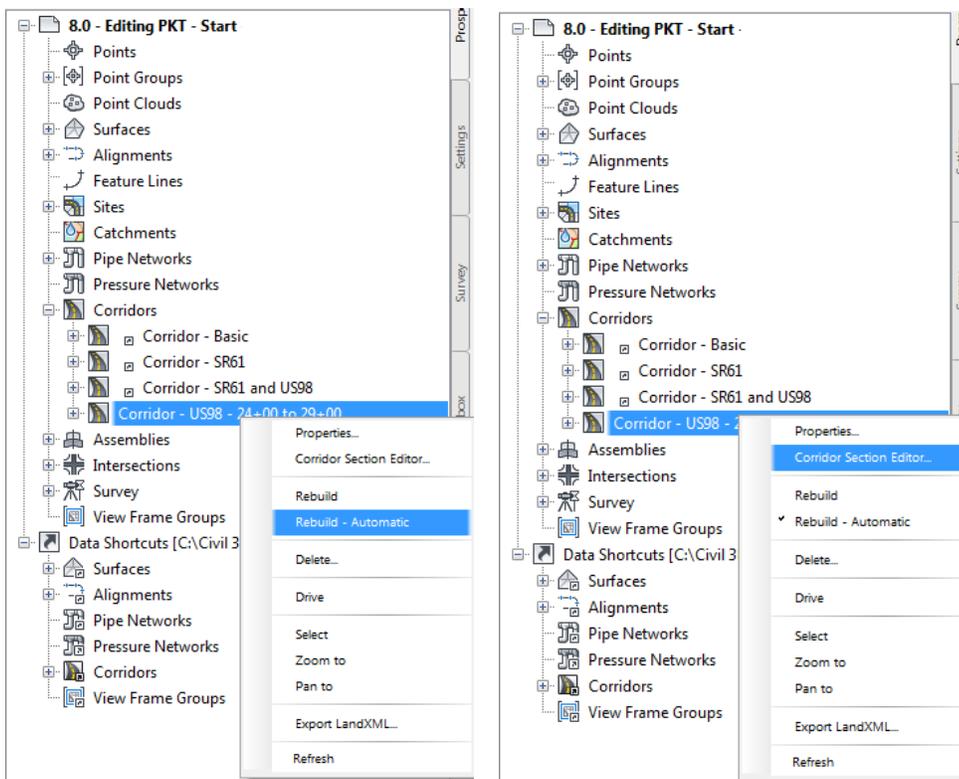
- 32 Select the SimpleLaneDitchFill subassembly from Basic tab. Notice by scrolling down the Advanced properties that the side, Width, Thickness, Cut and Fill Slopes are ready to be overwritten by the user:



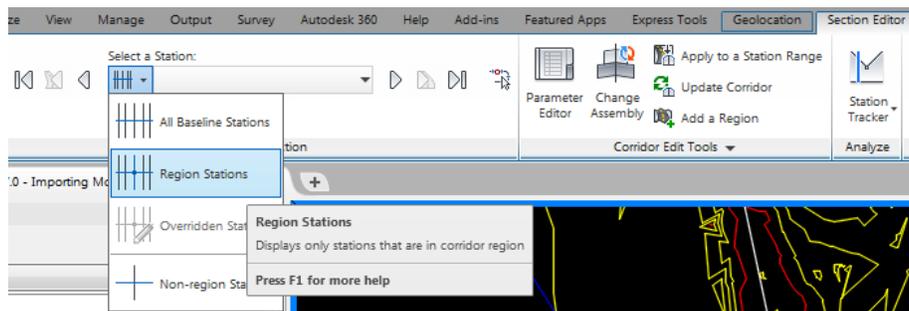
- 33 In the Properties Tool palette > Advanced Parameters , change the Side to Right, and set the Width to 12.00'. Verify that the CutSlope is 1:1 and that the FillSlope value is -2:1. Select the SimpleLaneDitchFill marker on the Right Side and place the subassembly
- 34 In the Properties Tool palette > Advanced Parameters , change the Side to Left, and the Width to 12.00'. Verify that the CutSlope is 1:1 and that the FillSlope value is -2:1. Select the SimpleLaneDitchFill marker on the Left Side and place the subassembly



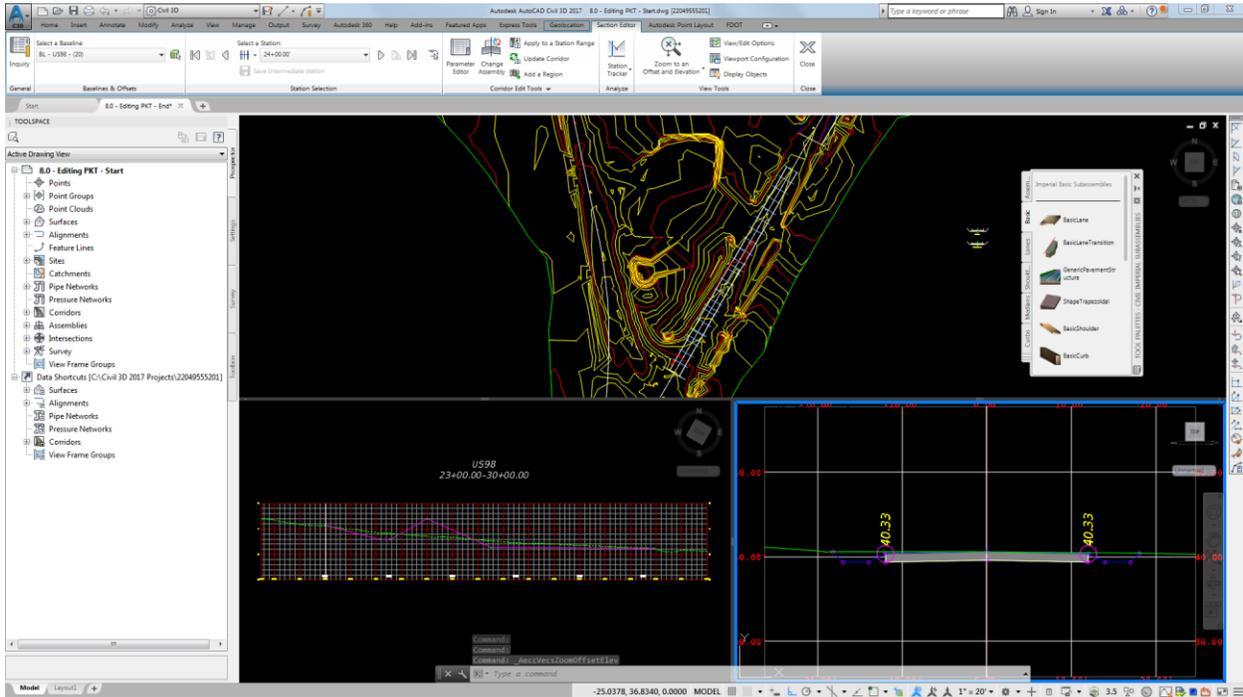
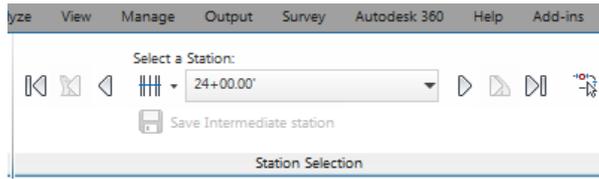
- 35 Restore custom model view: US98 - 24+00 to 29+00 using View Controls
- 36 Select the Corridor - US98 - 24+00 to 29+00 from the Prospector tab under Corridors, right click on it and select Rebuild Automatic. Right click on it again, and select Cross Section Editor...



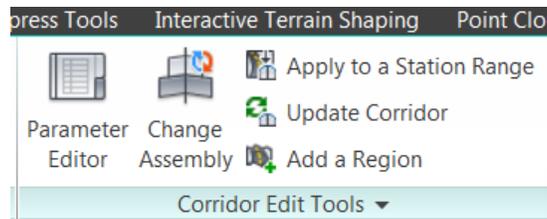
- 37 From the Ribbon > Section Editor tab > Station Selection panel, set Select a Station to Region Stations



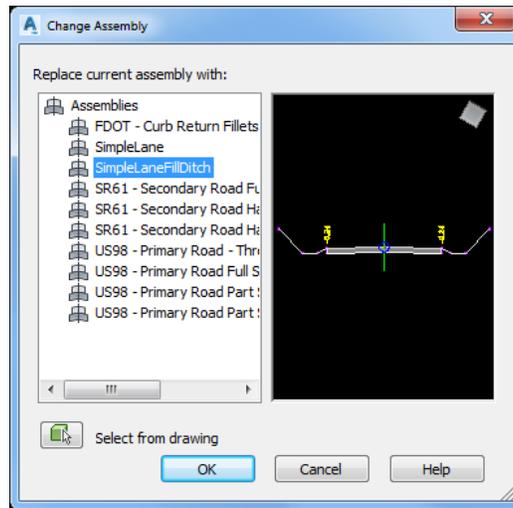
38 From the Ribbon > Section Editor tab > Station Selection panel, select the forward arrow and move to station 24+00



39 From the Ribbon > Section Editor tab > Corridor Editor Tools panel, select Change Assembly

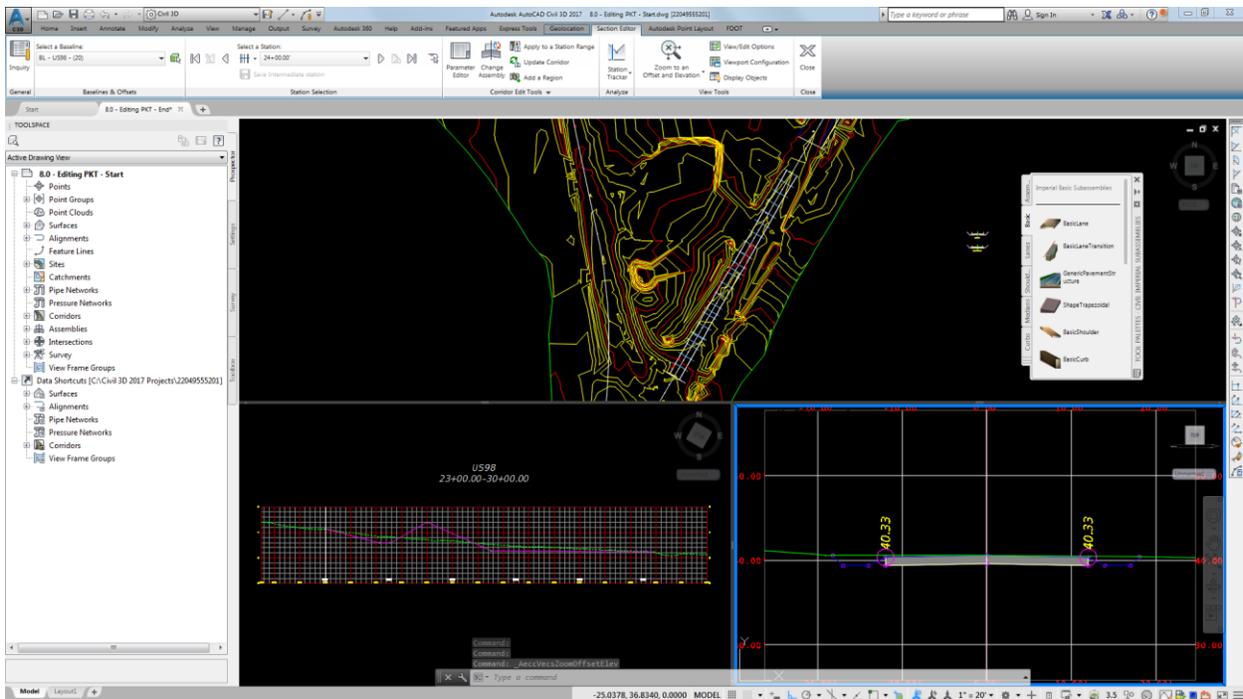


40 Select SimpleLaneFillDitch from list and select OK



41 Upon selecting OK, notice how the Corridor gets automatically rebuilt and all sections are automatically updated:

42 Select the Close X mark on the Ribbon to exit the Corridor Section Editor upon review completion.



43 Restore custom model view US98 - 24+00 to 29+00 using View Controls

44 Save the drawing 8.0 - Editing PKT - Start.dwg to the C:\Civil 3D 2018 Projects\22049555201\Roadway folder

45 Close Civil 3D.

9 Appendix A

Class Name	Function Name	Description
P1 (AP1) ... P1000(AP1000)	X	X is relative to Origin Point of Subassembly
	Y	Y is relative to Origin Point of Subassembly
	Offset	Offset is relative to Baseline
	Elevation	Elevation is relative to 0.0 height
	DistanceTo(point)	Get the distance to another point
	SlopeTo(point)	Get the slope to another point
L1(AL1) ... L1000(AL1000)	Slope	Link slope
	Length	Absolute length, always be positive
	Xlength	Length in horizontal direction, always be positive
	Ylength	Length in vertical direction, always be positive
	StartPoint	Get the start point of the link
	EndPoint	Get the end point of the link
	MaxY	Finds the max Y elevation from the points of the link
	MinY	Finds the min Y elevation from the points of the link
	MaxInterceptY(slope)	Lay a line at a slope on all the points on the link to determine the highest intercept at the start of the links.
	MinInterceptY(slope)	Lay a line at a slope on all the points on the link to determine the lowest intercept at the start of the links.
SE	LinearRegressionSlope	Do a linear regression on the points in the link to find the best fit slope between all of them.
	LinearRegressionInterceptY	Find the Y value of the linear regression line (at the start point of the link).
	HasLeftLI	Return true if has left lane inside SE
	HasLeftLO	Return true if has left lane outside SE
	HasLeftSI	Return true if has left shouder inside SE
	HasLeftSO	Return true if has left shouder inside SE
	HasRightLI	Return true if has right lane inside SE
	HasRightLO	Return true if has right lane outside SE
	HasRightSI	Return true if has right shouder inside SE
	HasRightSO	Return true if has right shouder inside SE
	LeftLI	Return left lane inside SE
	LeftLO	Return left lane outside SE
	LeftSI	Return left shouder inside SE
	LeftSO	Return left shouder inside SE
	RightLI	Return right lane inside SE
	RightLO	Return right lane outside SE
	RightSI	Return right shouder inside SE
	RightSO	Return right shouder inside SE
OffsetTarget	isValid	To judge if this target is assigned and it is valid to use
	Offset	Get the offset value of the target
ElevationTarget	isValid	To judge if this target is assigned and it is valid to use
	Elevation	Get the elevation value of the target
SurfaceTarget	isValid	To judge if this target is assigned and it is valid to use