

Creating Superelevation (7-1-2013)

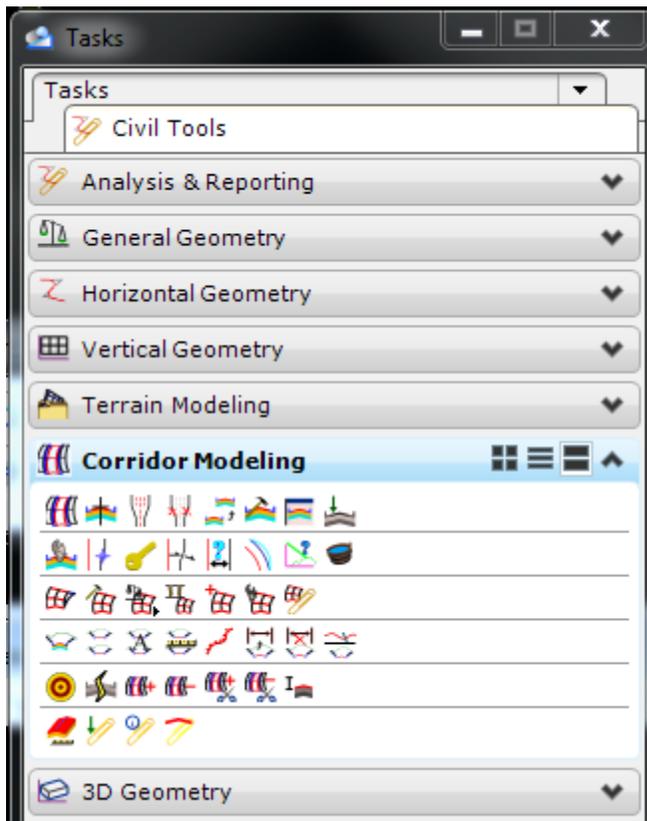
Prerequisites:

1. Digital Terrain Model (DTM)
2. Super DGN file for Alignment with Alignment referenced.
3. Edge of Pavement (if required)

Superelevation tools:



The superelevation tools are located in the Civil Tools menu under Corridor Modeling.



Creating Super Sections

In order to process super, we must first create super sections. We will be using the

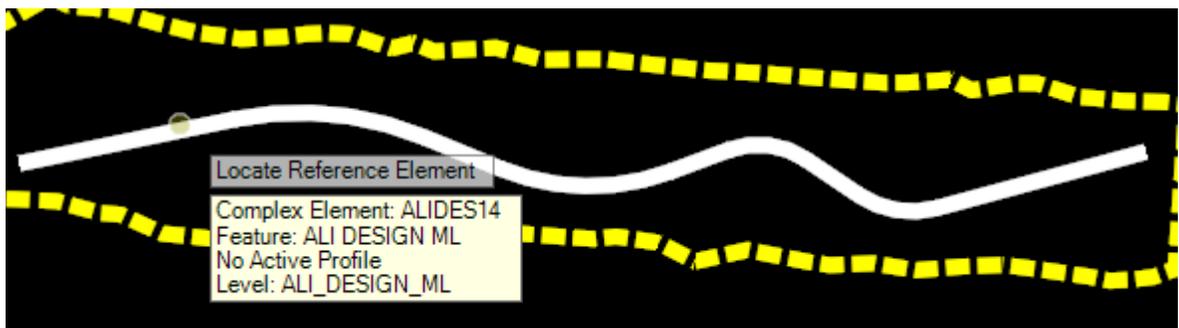
create super sections tool: 

Process:

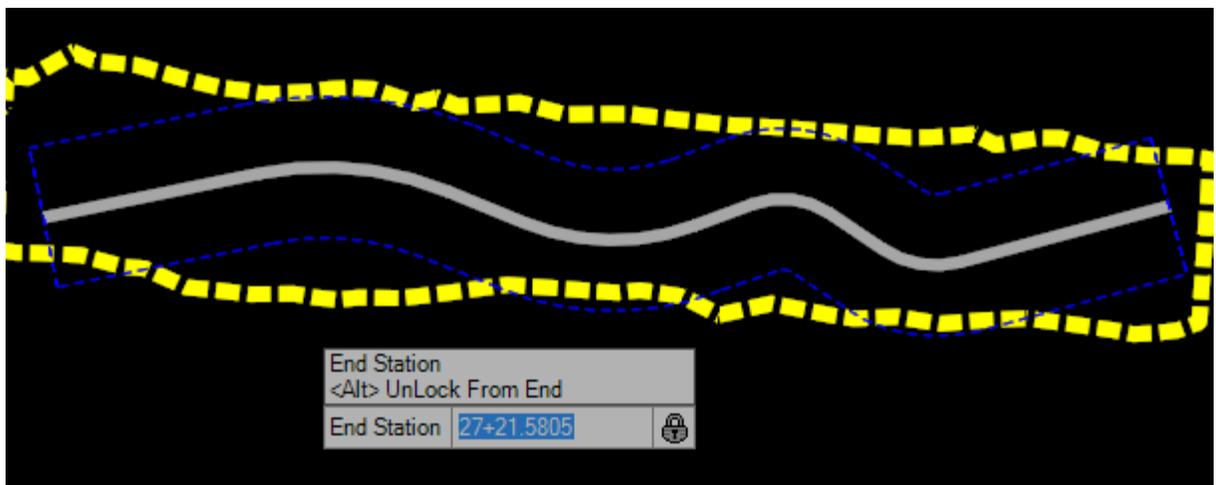
1. Select the “create super sections” tool
2. Type in the name (usually your alignment name) into the heads up prompt:

Name	
Name	Hwy80

3. Locate your reference element:



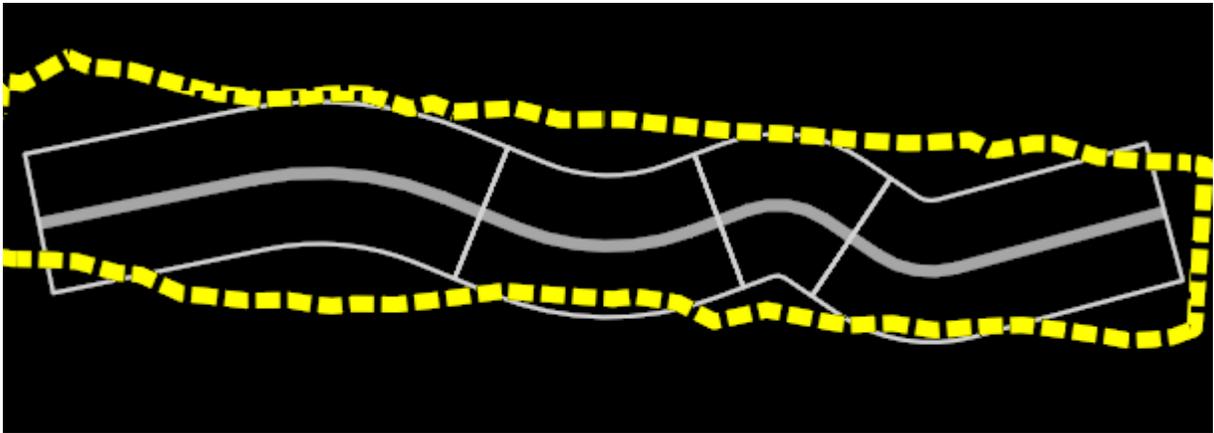
4. Select your start and stop stations (or hit alt to lock to the start and stop stations of the chain):



5. Enter the minimum tangent length. This is the minimum length of tangent between curves. GeoPak will use this to determine how many super sections to create. Example: The tangent distance between curve 1 and curve 2 is 100'. If 100' is inputted, GeoPak will create 2 sections, however if you input 50, GeoPak will only create 1 section. For this example, we will use 100.

Enter the minimum tangent length between curves	
Minimum Tangent Length	100.0000

Completed section:



Create Superelevation Lanes

This will create the lanes for super processing. We will use the create superelevation lanes

tool: 

Process (2-Lane)

1. Select the “create superelevation lanes” tool .
2. Locate the superelevation sections. You can do this one of two ways. You can select each section one at a time and then reset or you can zoom out, click and drag from the

upper left side of the screen to the bottom right and release. This will select all sections GeoPak created in the previous process.

3. Enter the lane name (RT for the right lane, LT for the left lane).

Enter Lane Name	
Name	RT

4. Choose the appropriate centerline side.

Select side of the centerline	
Side Of Centerline	Right

5. Enter the offset value for the inside edge. This is the distance from the centerline to lane start. This is 0 for this example.

Enter the offset value for the inside edge	
Inside Edge Offset	0.0000

6. Enter the lane width.

Enter the width	
Width	12.0000

7. Enter the normal cross slope (-2.00% for normal crown).

Normal Cross Slope	
Normal Cross Slope	-2.0000%

Calculate Superelevation

This will calculate the superelevation from the lanes created in the previous section. We will be using the calculate superelevation tool 

Process

1. Select the "calculate superelevation" tool from the task bar 

2. Select the superelevation sections like before (by using either the select method or the click and drag method).
3. Use the alt+down arrow to access the superelevation standards and select the appropriate one.

- _local_rd_40less.sep
- 09_local_rd_40less.sep
- 09rural_a_column.sep
- 09rural_b_column.sep
- 09urbn_45less_a.sep
- 09urbn_50_a.sep
- 09urbn_50_b.sep
- rural_a_column.sep
- rural_b_column.sep
- urbn_45less_a.sep
- urbn_45less_b.sep
- urbn_50_a.sep
- urbn_50_b.sep

4. Choose the appropriate e value.

Select e Selection	
e Selection	10%-55mph

5. Choose the L setting from the drop down.

Select l Selection	
L Selection	all cases

6. Choose the design speed.

Select a Design Speed	
Design Speed	55

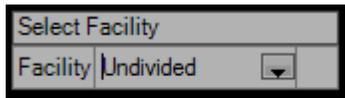
7. Choose linear transition.

Select Transition ID	
Transition ID	Linear

8. Choose the number of lanes. (2 for a 2-lane section, 6 for a 5-lane section,

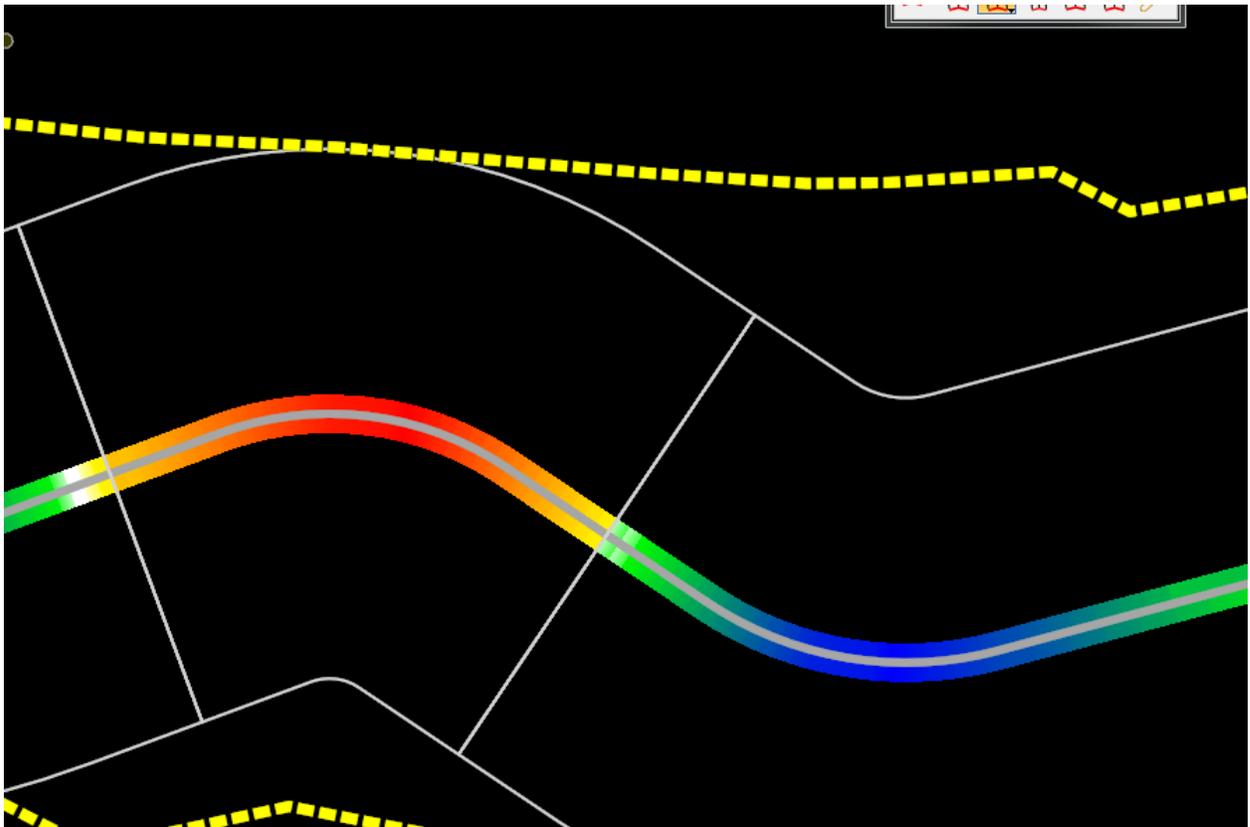
Select Number Of Lanes	
Number Of Lanes	2

9. Choose either divided or undivided.

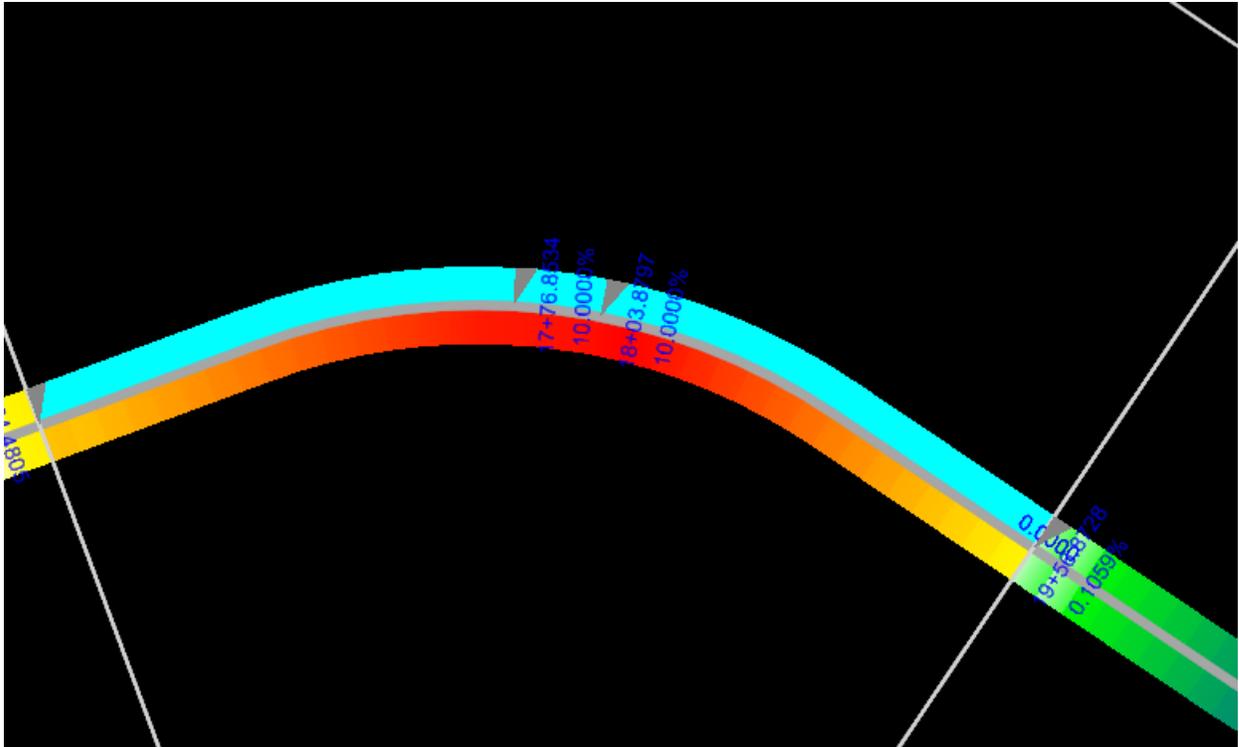


10. Choose whether or not you want to open the editor. If you choose no, you can open the editor later using the editor button. 

If you have fill turned on in the view (ctrl + b), turn it on. You can see the super lanes created with a rainbow of colors representing the amount of super in the curves.



You can edit the super by clicking on the lane.



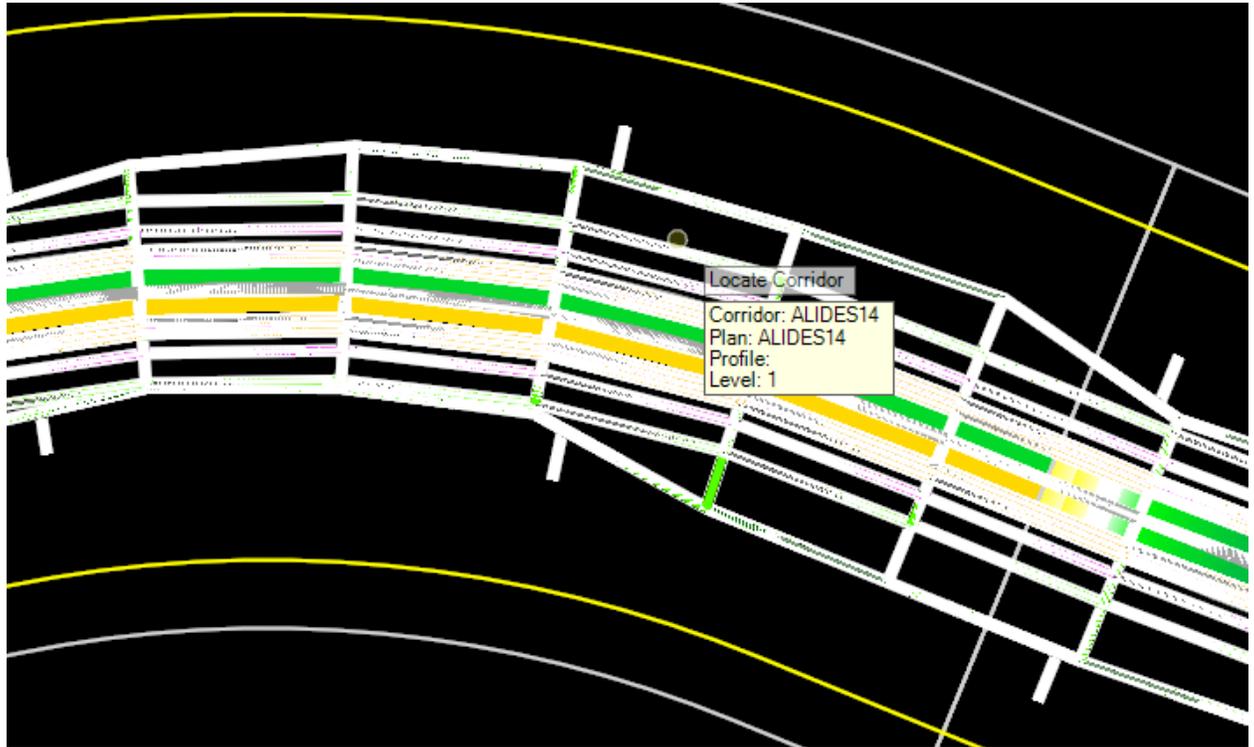
Assigning Superelevation to a Corridor

This will allow us to assign the super created in the previous process. 

Process

1. Select the “assign superelevation to corridor” tool 
2. Select the superelevation sections like before (by using either the select method or the click and drag method).

3. Locate the corridor.



4. Assign the superelevation points to the correct super object:

Associate Superelevation

	Superelevation Object	Superelev Point	Pivot Point	Start Station	Stop Station	Priority
	LT	EP-L	CL	0+00.0000	27+21.5805	1
	RT	EP-R	CL	0+00.0000	27+21.5805	1
*						

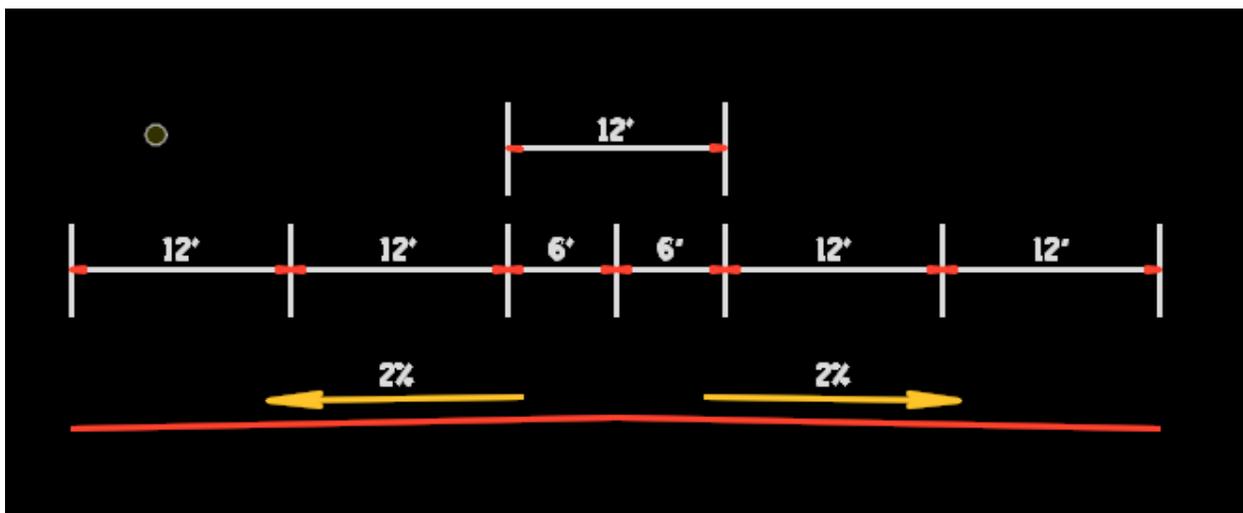
OK Cancel

Multiple Lanes (5-Lane)

General steps above can be followed for 5-Lane super but creation of lanes and Assign Super to Corridor are discussed below.

Create Lanes (5-Lane)

A 5-lane requires multiple lanes to be processed. 3 RT lanes (1@6', 2@12') and 3 LT lanes (1@6', 2@12') will need to be assigned.



1. Select the "create superelevation lanes" tool .
2. Locate the superelevation sections. You can do this one of two ways. You can select each section one at a time and then reset or you can zoom out, click and drag from the upper left side of the screen to the bottom right and release. This will select all sections GeoPak created in the previous process.
3. We will create multiple lanes for each side of the roadway.
 - A. Enter the lane name RT-1.

Enter Lane Name	
Name	RT-1

- B. In the drop down, choose Right.

Select side of the centerline	
Side Of Centerline	Right <input type="button" value="v"/>

- C. Enter 0 for the offset value.

Enter the offset value for the inside edge	
Inside Edge Offset	0.0000

- D. Enter 6 for the lane width.

Enter the width	
Width	6.0000

- E. Enter -2% from the normal cross slope (unless specified otherwise).

Normal Cross Slope	
Normal Cross Slope	-2.0000%

- F. Now, we will add a second lane to the right side. Enter the name RT-2.

Enter Lane Name	
Name	RT-2

- G. Choose the Right side of the centerline again.

- H. For the inside edge offset value we will want to use 6 this time. The first lane you created was a 0' offset from the centerline. This will offset the currently lane 6' from the centerline since our new lane needs to be created after the RT-1.

Enter the offset value for the inside edge	
Inside Edge Offset	6.0000

- I. For the lane width, we need to enter 12 since this is a full lane.

Enter the width	
Width	12.0000

- J. Enter -2% for the cross slope.

- K. Now we need to create our final right lane. Enter RT-3 for the name.

Enter Lane Name	
Name	RT-3

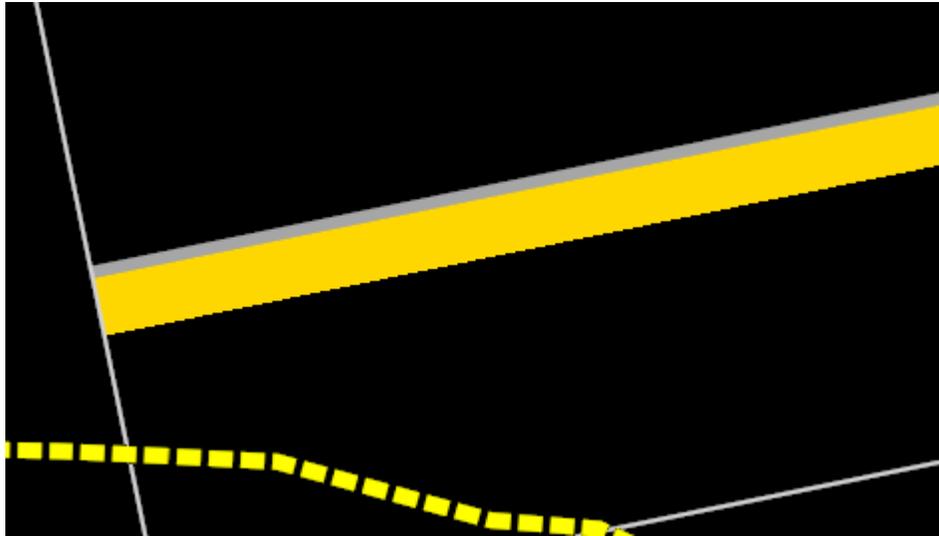
- L. Choose the right side of the centerline again.

M. Enter 18 for the offset value. (6+12=18)

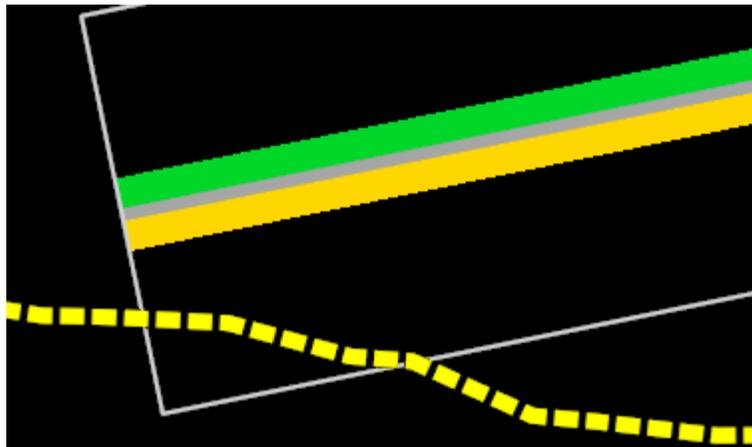
Enter the offset value for the inside edge	
Inside Edge Offset	18.0000

N. Enter 12 for the lane width.

O. Enter -2% for the cross slope. Once completed your final right side should look like the following:



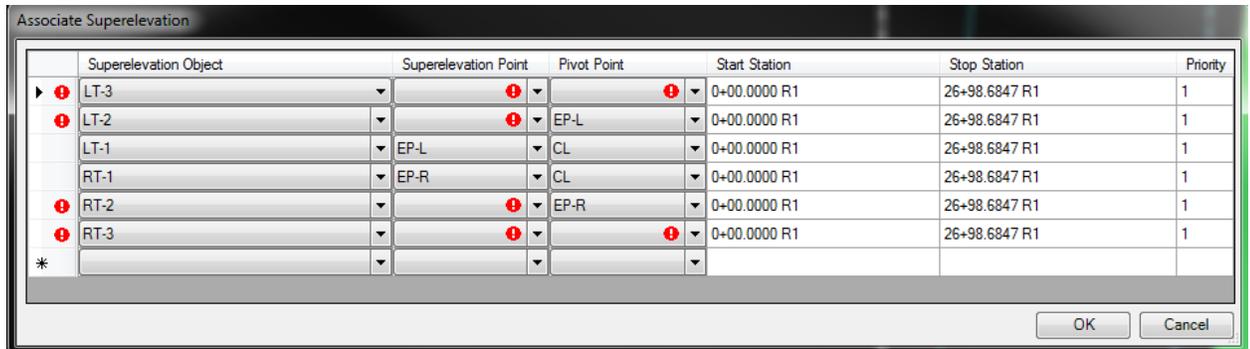
P. Repeat this process for the left side. The final section will look like this:



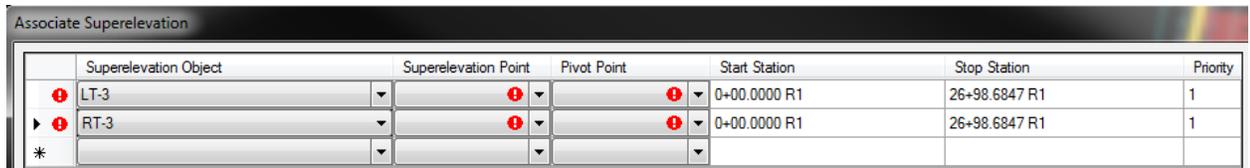
Assign 5-Lane to Corridor

5-Lane

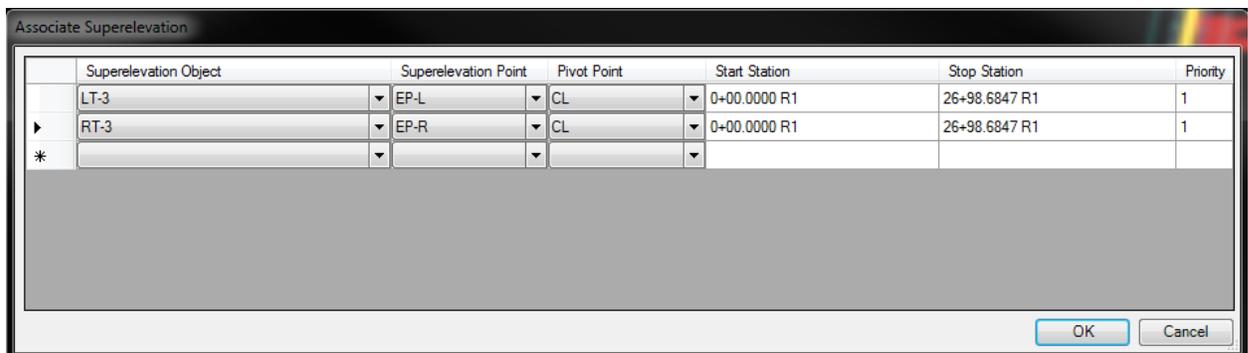
In order to properly assign super to corridor for a 5-lane section, you must assign the correct point controls. We created 6 lanes, however we will have to delete some of the point controls. The initial point control box will look like this:



When you get this dialog, you need to delete all of the super elevation objects except for LT-3 and RT-3. You do this by clicking on the far left box where the arrow is. Click on each one and delete them. The final box should look something like this:



Now you need to assign the superelevation point and the pivot point. The correct combination is as follows:



5. Scroll through the cross sections to make sure the super was applied properly.

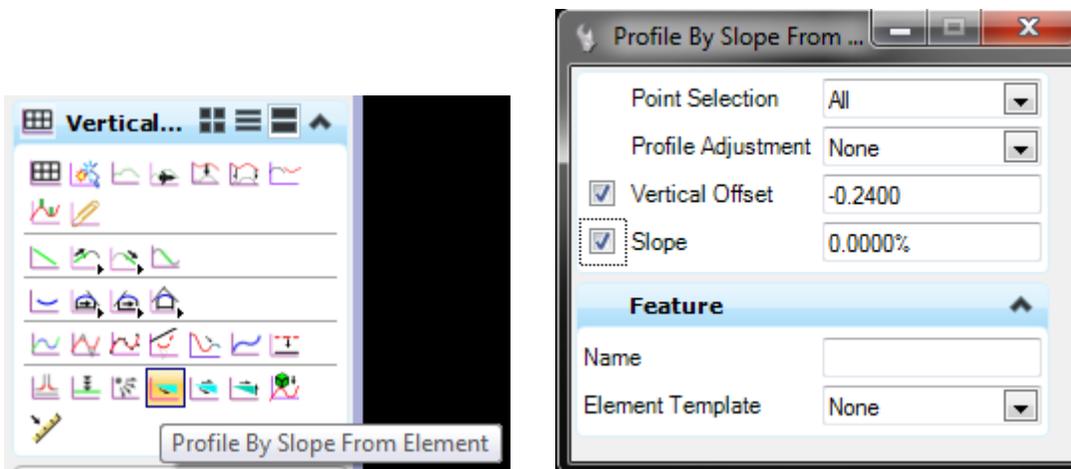
4-Lane Divided w/ Median Edge Rotation.

The same general steps discussed in the 2-lane example above can be followed for 4-Lane super but Creation of lanes and Assign Super to Corridor are discussed below.

Rotation about the median edge means Superelevation calculation about the Inside Edge of Pavement with GeoPak SS3 Civil Tools so you will need an EP created along each Median Edge that is a copy parallel of each CL roadway or a copy of the CL Median if it is a constant distance between lanes for the entirety of the project. Even if you have only one transition of median width, it is recommended you create alignments for each LT & RT lane for the entirety of the project and copy parallel these to create the EP's.

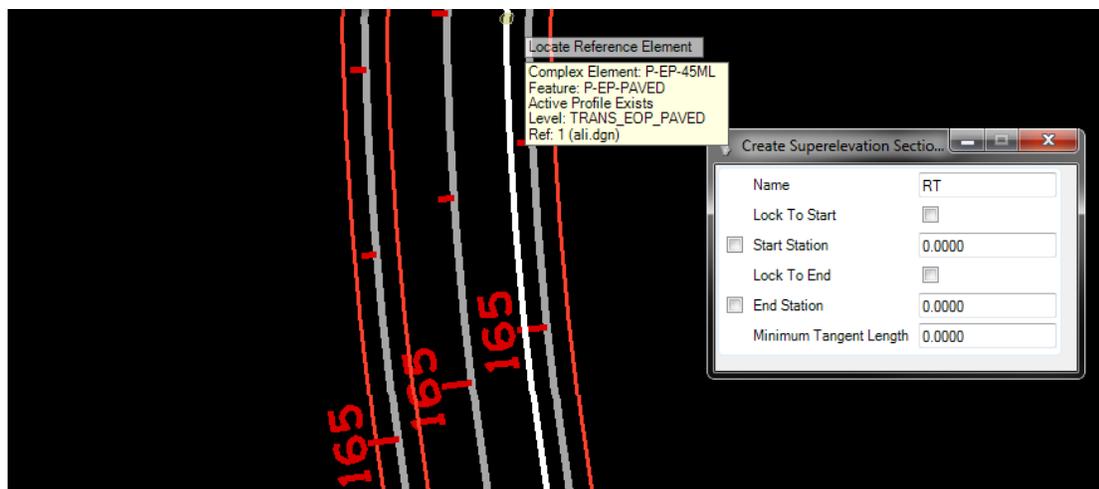
Establishing the EP profile.

Use the vertical command “Profile By Slope From Element” with a slope of 0% and a vertical offset of -0.24 to create the profile for the inside EP's. You'll choose the alignment that is profiled and then the Inside EP. Use this process twice for each lane if you have 2 independent profiles. This applies a rule so if the CL profile(s) change, the EP profile also changes.



Creating Superelevation Section for RTLNS

RTLNS



Create RTLN Lanes

RTLN Median Lane (ML)

The dialog box 'Create Superelevation' has the following settings:

Name	ML
Side Of Centerline	Right
Inside Edge Offset	0.0000
Width	12.0000
Normal Cross Slope	2.0000%

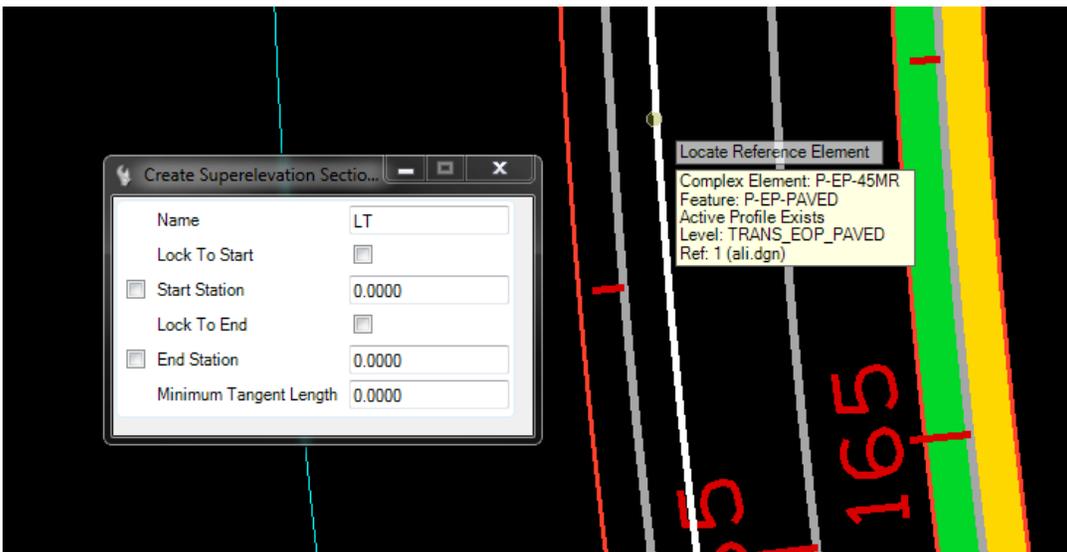
RTLN Outside Lane Right (R)

The dialog box 'Create Superelevation' has the following settings:

Name	R
Side Of Centerline	Right
Inside Edge Offset	12.0000
Width	12.0000
Normal Cross Slope	-2.0000%

Creating Superelevation Section for LTLNS

LTLN



Create LTLN Lanes

LTLN Median Lane (MR)

The dialog box 'Create Superelevation' has the following settings:

Name	MR
Side Of Centerline	Left
Inside Edge Offset	0.0000
Width	12.0000
Normal Cross Slope	2.0000%

LTLN Outside Lane (L)

The dialog box 'Create Superelevation' has the following settings:

Name	L
Side Of Centerline	Left
Inside Edge Offset	12.0000
Width	12.0000
Normal Cross Slope	-2.0000%

Calculate Super for RTLN's

After choosing RT LN Superelevation sections:

The dialog box 'Calculate Superelevation' has the following settings:

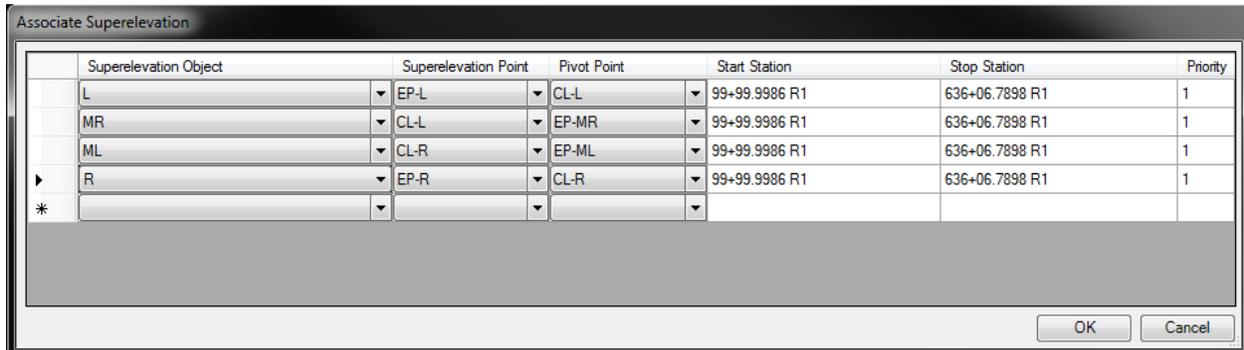
Standards File Name	T:\RWDDATA\input\09rural_a_column.se(...)
e Selection	10%-65mph
L Selection	all cases
Design Speed	65
Transition ID	Linear
Number Of Lanes	2
Facility	Undivided
Open Editor	<input checked="" type="checkbox"/>

Calculate Super for LTLN's

Assign Superelevation to Corridor

Enter the DGN file that contains your Corridor, reference the Superelevation DGN file, & select the Superelevation Sections.

Choose Assign Superelevation to Corridor. Make edits as shown below.



The screenshot shows a dialog box titled "Associate Superelevation". It contains a table with the following columns: Superelevation Object, Superelevation Point, Pivot Point, Start Station, Stop Station, and Priority. The table has five rows, with the first four rows containing data and the fifth row marked with an asterisk (*). The data in the table is as follows:

Superelevation Object	Superelevation Point	Pivot Point	Start Station	Stop Station	Priority
L	EP-L	CL-L	99+99.9986 R1	636+06.7898 R1	1
MR	CL-L	EP-MR	99+99.9986 R1	636+06.7898 R1	1
ML	CL-R	EP-ML	99+99.9986 R1	636+06.7898 R1	1
R	EP-R	CL-R	99+99.9986 R1	636+06.7898 R1	1
*					

At the bottom right of the dialog box, there are two buttons: "OK" and "Cancel".

Importing CSV Files

If you do hand calculations for your superelevation, the easiest way to import them is to use a CSV (comma delimited) file. You will still have to create super sections and lanes. The format for the file is as follows:

Lane Name, Station, Super (decimal value), Rotation side (defined RS for right side or LS for left side)

Example:

	A	B	C	D	E
1	LT	0+00	0.02	RS	
2	LT	5+00	0.04	RS	
3	LT	10+00	0.06	RS	
4	LT	15+00	0.1	RS	
5	LT	19+00	0.06	RS	
6	RT	0+00	-0.02	LS	
7	RT	5+00	-0.04	LS	
8	RT	10+00	-0.06	LS	
9	RT	15+00	-0.1	LS	
10	RT	19+00	-0.06	LS	
11					
12					
13					
14					
15					

You can import this file from one of two methods:

1. Context Menu Button 
2. Import button on the superelevation editor box:

