Module 8

Superelevation

February 2024

(This page intentionally left blank.)

About this Practice Workbook...

- **This Module is intended to function as a reference module that teaches the user the workflow of Superelevation on an ORD project. While every effort has been made to get all of the decisions made to set departmental standards and agree on suggested workflows for the move to ORD, there are portions of this module that will change and continue to change prompting re-releases of a new version of the module. Expect small changes to the** unhighlighted **text. Expect larger changes to the** yellow highlighted **text in this module once decision are made and pending problems are corrected.**

- This PDF file includes bookmarks providing an overview of the document. Click on the bookmark to quickly jump to any section in the file. You may have to turn on the bookmark function in your PDF viewer, such as Adobe Reader.

- The dataset used throughout this module uses English units and US Survey Feet.

- Each module in this series is self-contained. You can jump to any module and begin the exercises.

- This training module uses the **DOT-US North Carolina** WorkSpace and the **Training-RD_R-2635C** Workset installed. It is very important that you select the correct WorkSpace, WorkSet and Desktop Icon/Discipline/future Role **NCDOT_Roadway** when working the exercises in this course and to set the **NCDOT_USE_LOCAL_WORKSETS = (Load Value)** to be **L2** in the ***NCDOT_WorkSets.inp*** file on your desktop to be able to access this WorkSet.

- The tool tips and help were copied from the Bentley Online Help. See this link for the complete list of tools and common usage.

  OpenRoads Designer CONNECT Edition Help (bentley.com)

- This workbook was written with the release of OpenRoads Designer 10.09.00.91 (2020 Release 3 Update 9).

- This workbook has been updated for OpenRoads Designer 10.10.XX.XX (2021 Release 1 Update 10).

CHECK IF THIS LAST ONE TRUE AT THE END OF SUMMER

REVISIONS NEEDED

REVISE YELLOW HIGHLIGHTED

SPELLCHECK

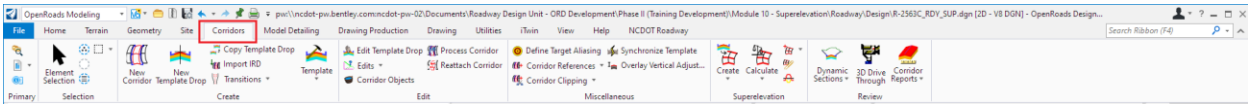
PAGE BREAKS FOR CLARITY

Table of Contents

Overview

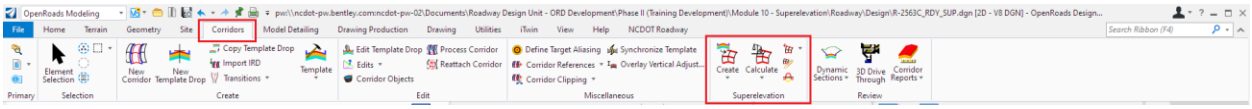
Open Roads Designer (ORD) provides the ability for the user to Create, Calculate, Review, and Edit superelevation for a given alignment which then can be Applied to an ORD corridor resulting in correctly superelevated cross sections. The Superelevation XML preference file controls how superelevation is calculated and is editable to calculate it as the user wishes. Editing the transitions with the Superelevation Table Editor allows the user to modify specific sections of the transitions to accommodate various design issues.

Corridors Ribbon



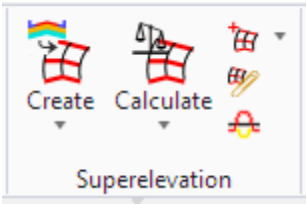
The *Corridors* Ribbon is broken into 7 tool groups and contains all the tools that the roadway designer needs to create a basic proposed linear terrain model and perform various analysis functions.

Superelevation Tool Group

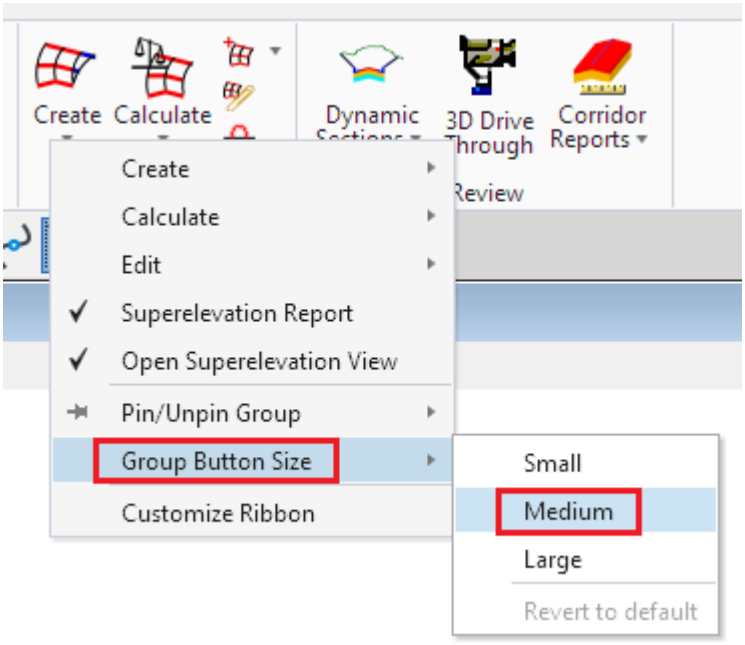


One of the 7 tool groups of the Corridors ribbon is the *Superelevation* Tool Group. It contains the tools the user needs to **Create, Calculate, Edit, Report**, and **View** superelevation for any given alignment.

The default view for the *Superelevation* Tool Group displays the buttons as shown below with the large **Create** and **Calculate** icons showing that last tool chosen under **Create** and **Calculate**.



Right clicking over the *Superelevation* Tool Group and choosing **Group Button Size → Medium** will display a tool label next to the tool that may help some to learn the function of the icons better.


Create
Calculate
Dynamic
3D Drive
Through
Corridor
Reports
Review
Create
Calculate
Edit
Superelevation Report
Open Superelevation View
Pin/Unpin Group
Group Button Size
Customize Ribbon
Small
Medium
Large
Revert to default


Create
Calculate
Edit
Superelevation Report
Open Superelevation View
Superelevation

(Table 7-1) Important Tools Used in Superelevation

Superelevation	
Setting	**Description**
Create	
 Create Superelevation Sections	Adds a superelevation sections (generally one per curve set) for the specified station range on the baseline reference.
 Create Superelevation Lanes	Creates color-filled lanes based on width and offsets from the baseline reference, as a precursor to superelevation calculations.
 Create Superelevation Lanes by Road Template	This is an alternate way to create superelevation lanes by using the widths and cross slopes of a specified template along with parameters specified in the Superelevation Rules File.
Calculate	
 Calculate Superelevation	Calculate Superelevation - Calculates station and superelevation transitions rates based on a rules file. The values are augmented to the superelevation lanes, and edit manipulators are created, and the color fill is recolored, based on the cross slopes.
 Edit Superelevation Rule File	Edit Superelevation Rule File - Edits the XML- formatted superelevation rules file.

 Import Superelevation	Import Superelevation - Imports superelevation values via a CSV file.
 Assign Superelevation to Corridor	Assign Superelevation to Corridor - Associates superelevation with a corridor, so the pavement reflects the superelevation stations / cross slopes, rather than the pavement cross slope defaults in the template.
Edit  Insert Superelevation Station/Cross Slope	Insert an individual station / superelevation transition (cross-slope) into a previously created and calculated superelevation lane.
 Superelevation Editor	Opens the superelevation editor.
Report  Superelevation Report	Creates a superelevation XML report and opens the Bentley Civil Report Browser.
View  Open Superelevation View	Opens the editable superelevation diagram in a MicroStation view.

Superelevation Workflow

For Each Alignment:

1. **Create a superelevation design file where all superelevation shapes will be drawn**
2. **Reference previously created horizontal alignment file**
3. **Reference previously created design file containing proposed edge of pavement**
4. **Determine data needed i.e., lane offsets & number of, cross slopes, pivot points**
5. **Decide how to break up into superelevation sections**

Method 1 (Manual method that teaches superelevation workflow)

6. **Create the superelevation sections in the superelevation file**
7. **Create superelevation lanes and draw in the superelevation file using the alignment**
8. **Calculate the superelevation transitions and draw into the superelevation file**
9. **Review superelevation transitions**
10. **Edit the superelevation transitions**
11. **Open corridor model files with templates previously dropped along alignment**
12. **Assign the superelevation transitions to the corridors**

Method 2 (Automated method to be used once workflow is learned)

7. **Reference the corridor model file to the superelevation file**
8. **Create section, lanes, and calculate transitions using the attached corridor model file**
9. **Review superelevation transitions**
10. **Edit the superelevation transitions**
11. **Open corridor model file with templates previously dropped along alignment**
12. **Assign the superelevation transitions to the corridor**

Files Needed

The following files are needed to Create, Calculate, Edit, Report, and View superelevation for any given alignment.

R-2635C_RDY_SUP.dgn	superelevation file where lane transitions are written
R-2635C_RDY_ALG.dgn	master ALG file where individual ALG files are referenced
R-2635C_RDY_ALG_L.dgn	individual alignment ALG files
R-2635C_RDY_CMD.dgn	master CMD file where individual CMD files are referenced
R-2635C_RDY_CMD_L.dgn	individual CMD files

Note: Since superelevation depends on the horizontal geometry reference file, you should never detach the horizontal geometry file. Doing so will break any rules and relationship that exist between the horizontal geometry and the superelevation data.

Once superelevation is created, calculated, and drawn into the SUP file, the following files are needed to apply the superelevation to the corridor

R-2635C_RDY_CMD.dgn	master CMD file where individual CMD files are referenced
R-2635C_RDY_CMD_L.dgn	individual alignment CMD file
R-2635C_RDY_SUP.dgn	superelevation file where lane transitions are written

Information Needed

The following information should be gathered about each alignment to properly calculate superelevation.

Basic information needed:

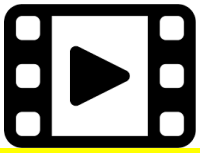
- *Median Width:* The width of the median if applicable to set the inside edge horizontal offset distance from the centerline.
- *Lane Width:* The width of each pavement lane that superelevation calculations will be applied to.
- *Total Number of Lanes:* The number of lanes that superelevation calculations will be applied to.
- *Normal Cross Slope Rate:* The normal crown cross slope rate without any superelevation applied.
- *Maximum Superelevation Rate:* The maximum cross slope allowed for any curve for a given design speed.
- *Design Speed:* The selected speed used to determine the various geometric design features of the roadway.
- *Pivot Method:* The point on the cross section that the superelevated lanes rotate about.

Determine Superelevation Sections

Since the calculation of superelevation is based on speed, roadway width, median widths, and maximum rate of superelevation for the type of facility, superelevation calculation may vary along the alignment as the typical section changes. The designer will need to break the superelevation calculation into **Sections** to accommodate these calculation changes. For example, the designer will want to break the superelevation calculations into different Sections as the template changes from a 60 mph design speed undivided two-lane shoulder section with 0.08 maximum superelevation rotated about the centerline to a 50 mph design speed raised median curb & gutter section with 0.04 maximum superelevation rotated about the centerline. The designer will also need to break the superelevation calculations into another **Section** as the template changes again from the curb & gutter section to a 60 mph design speed depressed median section with 0.08 maximum superelevation rotated about the inside edge of pavement. Before you begin calculations, investigate your alignment to determine if it should be broken into **Sections.**

Create Superelevation Sections

After Superelevation Sections have been determined for each of the alignments, they can be drawn into the SUP file. There are two ways to create superelevation sections in the file. The first is a manual, methodical method where an **alignment** is chosen and a superelevation section is placed along the alignment. It is important to learn this method for troubleshooting issues that will inevitably arise during superelevation calculations. The second is an automatic method where a **corridor** is chosen from an attached CMD file and ORD creates the sections, lanes and calculates superelevation in one step. This method will be described later on in the Module.



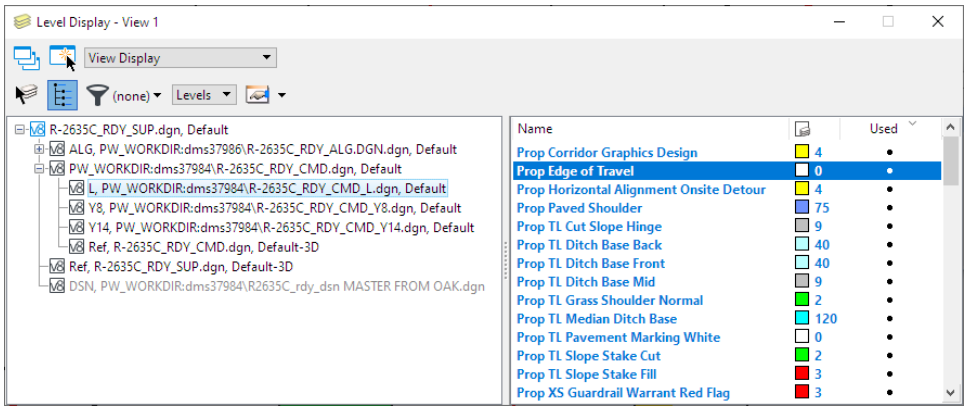
Video 10-1 Create Superelevation Sections
HTTP LINK PLACEHOLDER

1. **Create Superelevation Sections by Alignment**
   A. Follow the instructions in Module 1 for creating design files and create a 2D superelevation file named ***R-2635C_RDY_SUP.dgn*** in the *C:\NCDOT Training\Roadway\Module 8 - Superelevation\Roadway\Design* folder with a workspace of **DOT-US North Carolina**, and a WorkSet of **Training-RD_R-2635C** where ORD will draw the superelevation shapes into.

   B. Reference the master R-2635C_RDY_ALG.DGN file to the R-2635C_RDY_SUP.dgn file with a **Live Nesting of 1** to be able to see all of the individual alignment ALG files such as R-2635C_RDY_ALG_L.DGN.dgn and R-2635C_RDY_ALG_Y8.dgn, etc.

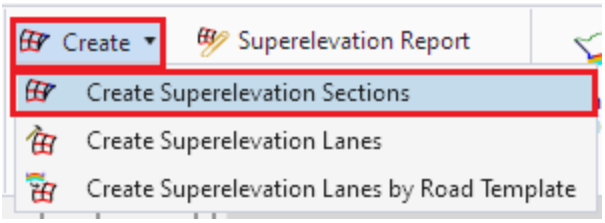
   C. Reference the master R-2635C_RDY_CMD.dgn file to the R-2635C_RDY_SUP.dgn file with a **Live Nesting of 1** to be able to see all of the individual CMD files such as R-2635C_RDY_CMD_L.dgn and R-2635C_RDY_CMD_Y8.dgn, etc. that contain the 2D design elements for your roadway such as the edge of pavement to check your superelevation shapes by.

   D. Turn off all levels except for **P_RDY_Edge_of_Travel** in each individual CMD file.

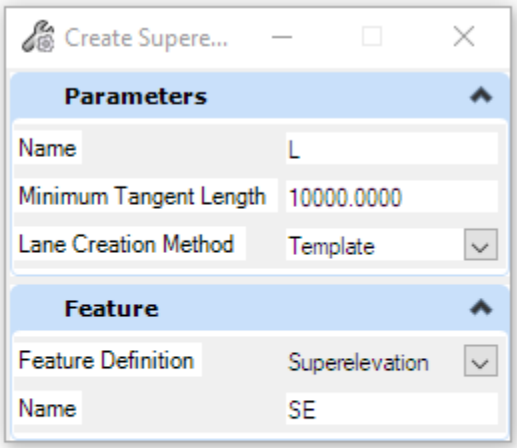


E. Under the *Corridors* ribbon, locate the *Superelevation* Tool Group

F. Choose the **Create Superelevation Sections** tool.

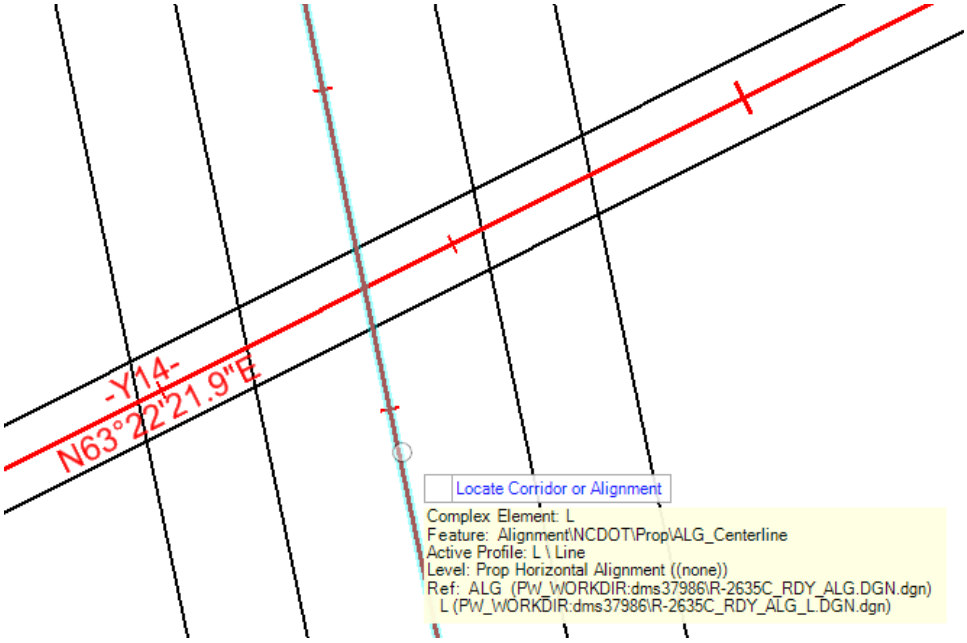


G. Assume the project Design Speed begins at 60 MPH and changes to 70 MPH at Y14 so we'll need to create two superelevation sections that split at Y14 to accommodate the speed change. Fill in the superelevation section name in the **Create Superelevation Sections** dialog box with values as indicated and accept the values in the heads-up display by choosing a data point in the view.



Section Name = L
ORD will **automatically** assign suffix numbers to superelevation sections such as **L-1, L-2**.

H. Choose the L alignment when prompted to Locate Corridor or Alignment.



I. Fill in the remaining data fields in the **Create Superelevation Section** dialog box as indicated and accept the values in the heads-up display by choosing a data point in the view.

Minimum Tangent Length = 10000
If the tangent distance between two adjacent curves is less than the specified value, the two curves and adjacent tangent are included in a single superelevation section. If the tangent distance between two adjacent curves is greater than the specified value, each curve set is included into a separate superelevation section. Enter a value larger than the longest tangent length to create a single superelevation section for the entire alignment. A Value of 0 will create a separate superelevation section for each curve set.

Lane Creation Method = Template
Obtains the offset value and total lane width for the chosen template

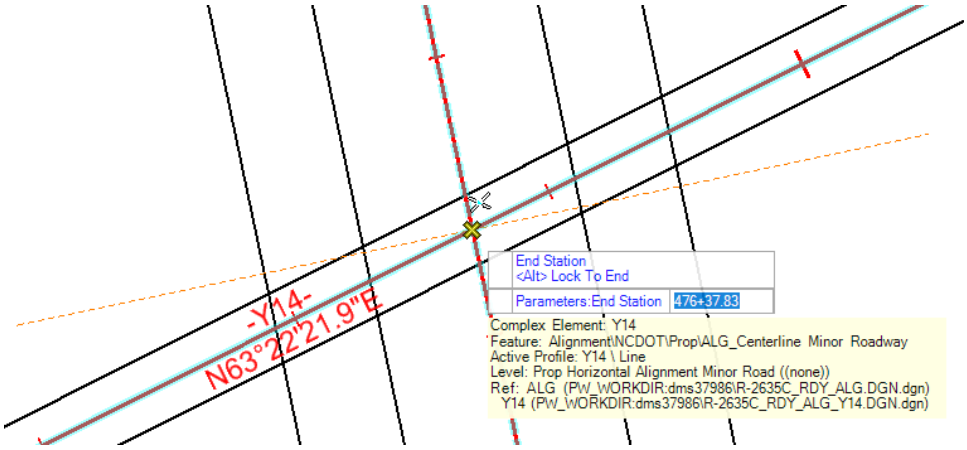
Feature Definition = Superelevation → NCDOT → Superelevation
Assigns the correct Feature Definition to the superelevation shapes

Feature Name = SE

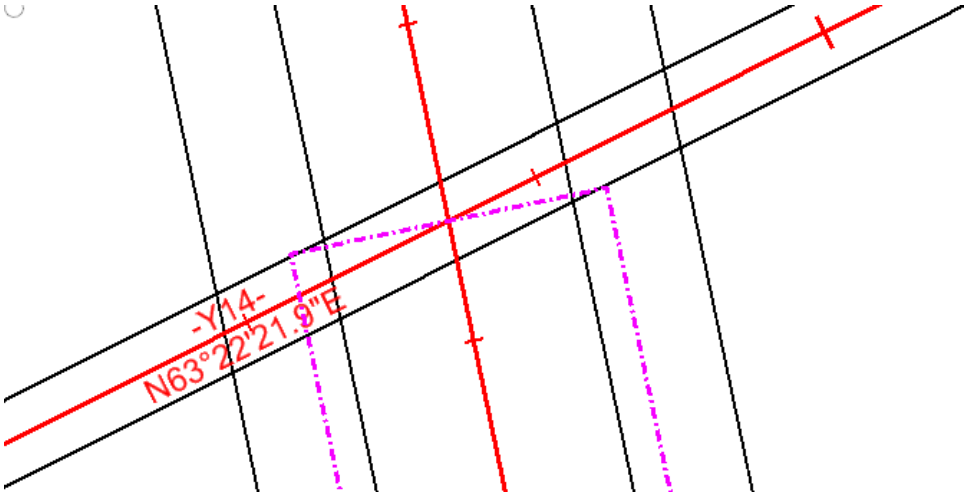
Start Station = Check the Lock to Start box or choose Alt to lock station to the Beginning of the Alignment

J. *Stop Station* = Using an intersection snap,

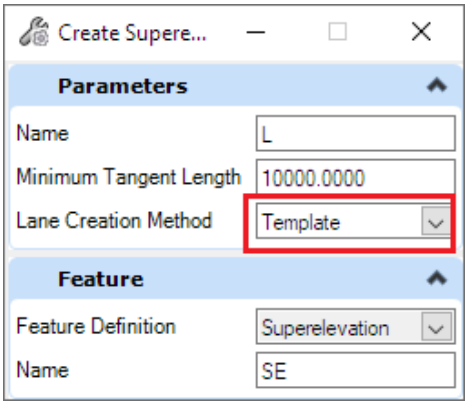
select the intersection of **L** and **Y14** alignments to specify the end station of the first superelevation section where the speed changes from 60 MPH to 70 MPH.



K. Accept the station to create the first superelevation section by choosing a data point in the view.

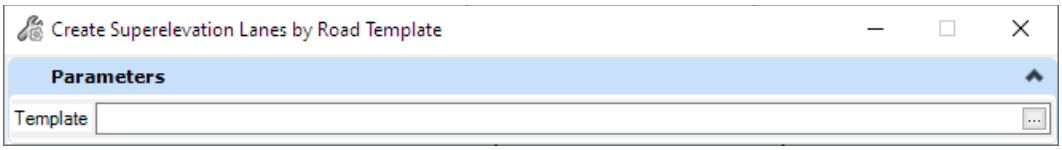


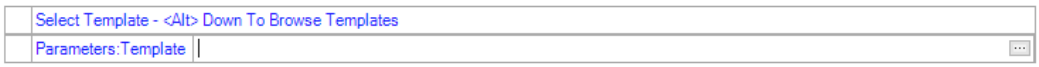
L. ORD will automatically launch the **Create Superelevation Lanes** tool.



Create Superelevation Lanes

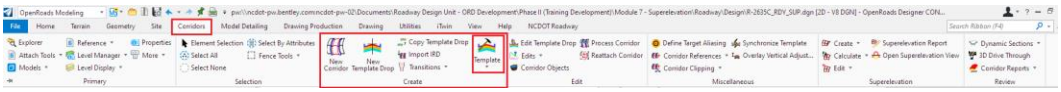
Superelevation Lanes can be created a few different ways. If the user is **continuing** from a **Create Superelevation Sections** command and the *Lane Creation Method = Template*, the Create Superelevation Lanes by Road Template dialog box will launch so that the lane location and width can be determined by an NCDOT superelevation cross section template.

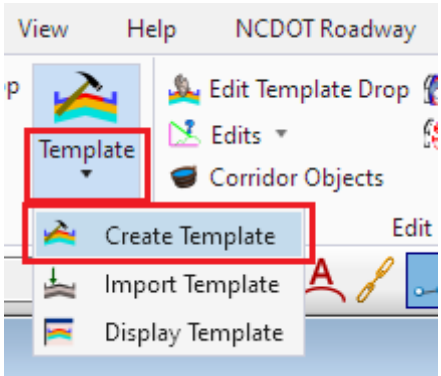




Video 10-2 Create Superelevation Lanes
HTTP LINK PLACEHOLDER

A. Under the *Corridors* Tab → *Create* tool group → **Template Tool** dropdown, choose the **Create Template** tool to access the template libraries. Choosing the correct template library now will ensure that a template in that library is available to choose later.

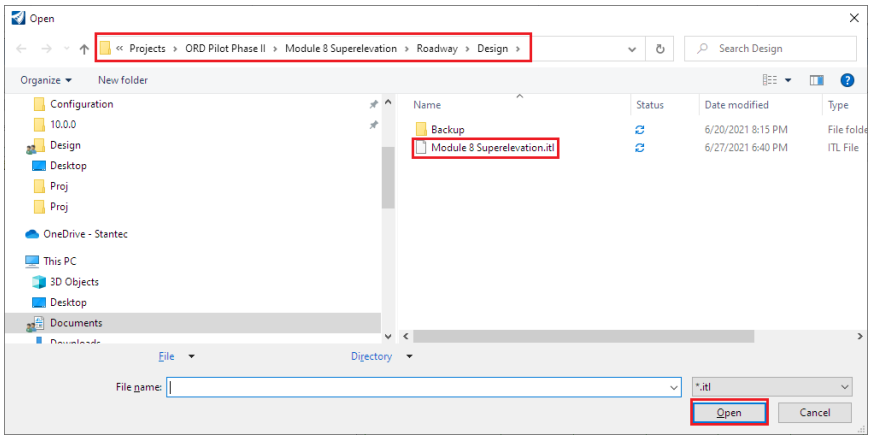




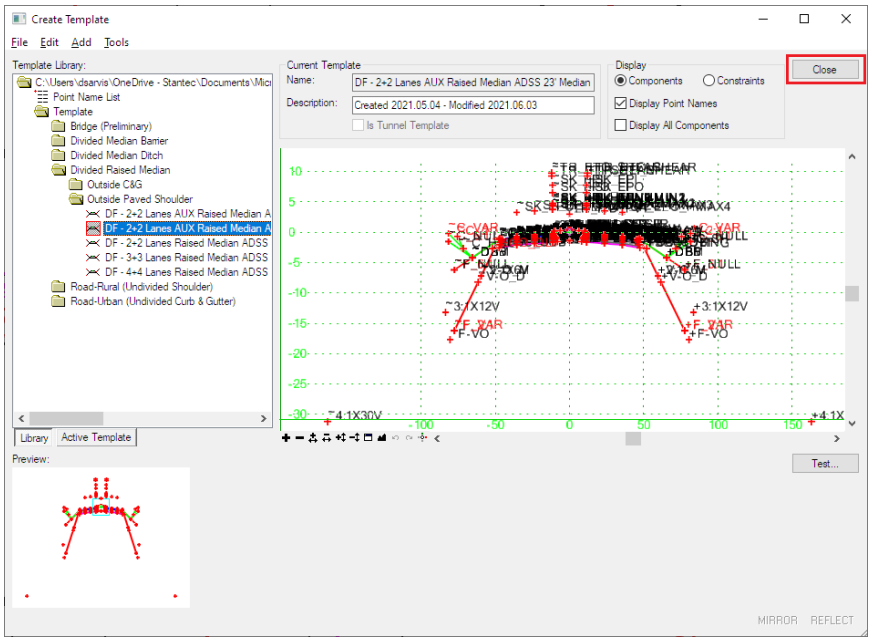
B. When working on actual projects, the template libraries will be located here if you are working in ProjectWise
pw:\\ncdot-pw.bentley.com:ncdot-pw-02\Documents\Administration\MICROSTATION_CONNECT_WORKSPACE\Configuration\Organization-Civil\Disciplines\NCDOT_Roadway\Standards\Template Library

C. When working on actual projects but you are working outside of ProjectWise, the template libraries will be located here
C:\MICROSTATION_CONNECT_WORKSPACE\Configuration\Organization-Civil\Disciplines\NCDOT_Roadway\Standards\Template Library

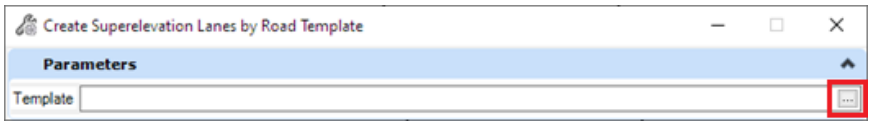
D. For this training module, the template library will be called ***Module 8 Superelevation.itl*** and it will be located wherever you copy the module to and under this subdirectory \Module 8 Superelevation\Roadway\Design. Choose this .itl file so a superelevation template can be chosen.



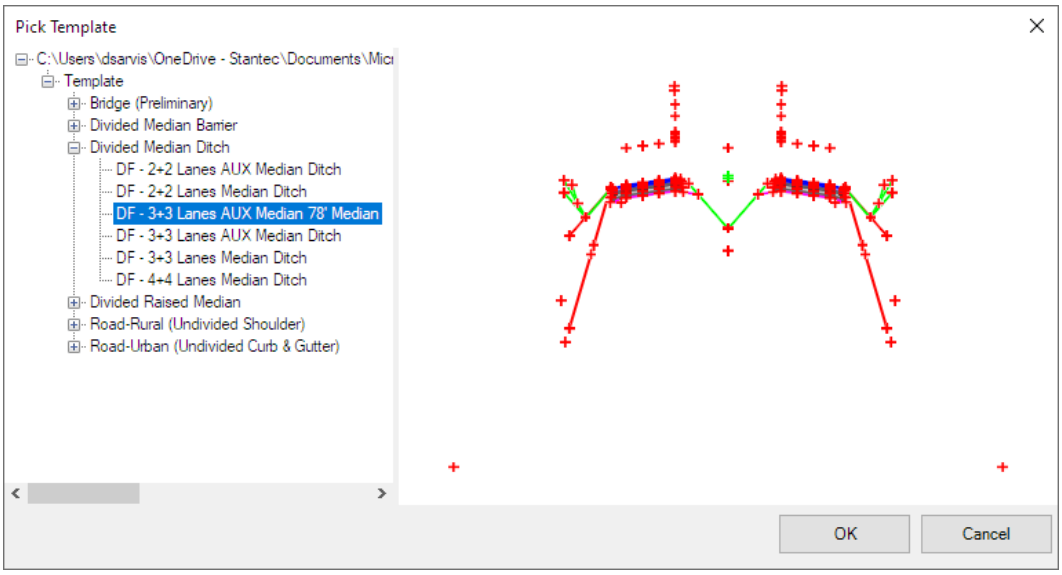
E. When the Create Template dialog launches, **close** it. Choosing the template from this dialog box will not activate it for use with Superelevation.



F. Choose the pick box in the Create Superelevation Lanes By Road Template dialog box to launch the Pick Template dialog box.



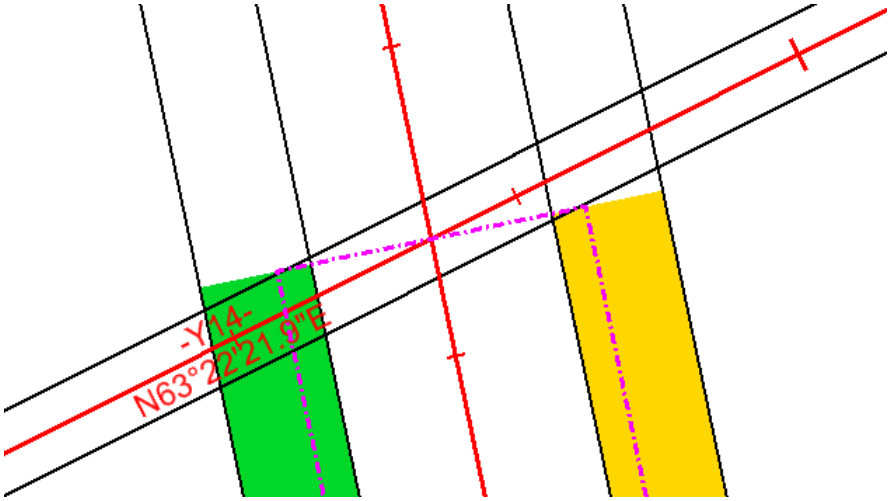
G. A custom template was created to accommodate the 78’ depressed median of this project. Under Divided Median Ditch, choose the DF - 3+3 Lanes AUX Median 78' Median template that was used to create the corridor in the CMD file. Double click the template and confirm it is active by viewing it in the graphical display.



H. Accept the template selection in the heads-up display by choosing a data point in the view.

Note : If the heads-up display is not visible, the user can choose the **Create >> Create Superelevation Lanes by Road Template** command to relaunch.

I. The Superelevation Lanes will be created. Note how the lanes match the edge of pavements that were created previously by the template and referenced in from the CMD 2D Model.



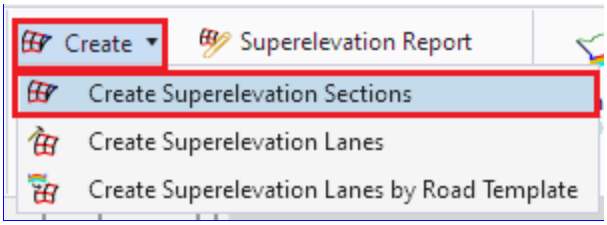
Create Superelevation Lanes (Manual)

If Superelevation Lanes were not created when the Superelevation Section was created, choose The **Create Superelevation Lanes** tool functions to assign them. With this choice, the superelevation lanes must be created manually.

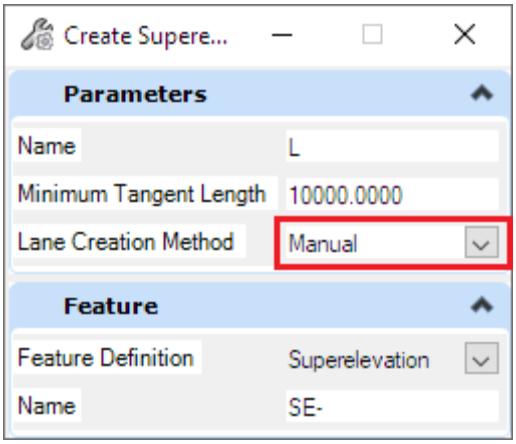
Video 10-3 Create Superelevation Lanes (Manual)
HTTP LINK PLACEHOLDER

1. Create a Superelevation Section along L north of Y14 to the end of the project using the instructions above except specify the Lane Creation Method to be Manual.

A. Create the superelevation section along L north of Y14 using the **Create Superelevation Sections** tool.



B. Change the Lane Creation Method to **Manual** and accept the section name from the heads-up display.

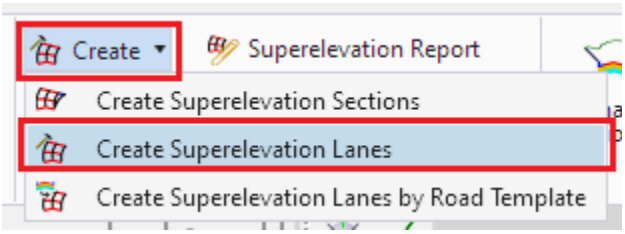


C. Locate the Corridor or Alignment as done previously by choosing the alignment.
D. Locate the Start Station as done previously by using the intersection snap at the intersection of L and Y14 alignments where the speed changes from 60 MPH to 70 MPH.
E. Locate the End Station as done previously by choosing ALT.
F. Accept the rest of the values in the heads-up display as done previously.
G. Once the Section is created, choose reset on the mouse to exit the **Create Superelevation Sections** tool

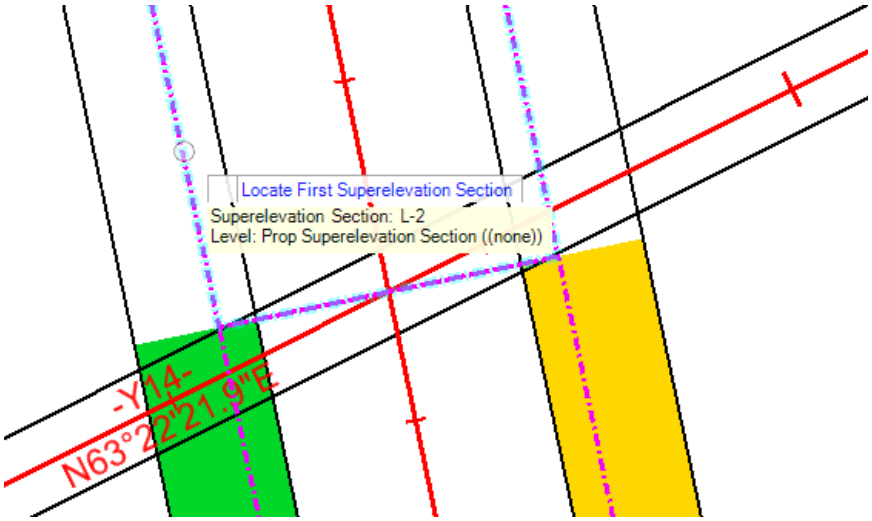
2. Create Superelevation Lanes (Manual)

A. Under the *Corridors* ribbon, locate the *Superelevation* Tool Group

B. Choose the **Create Superelevation Lanes** tool.

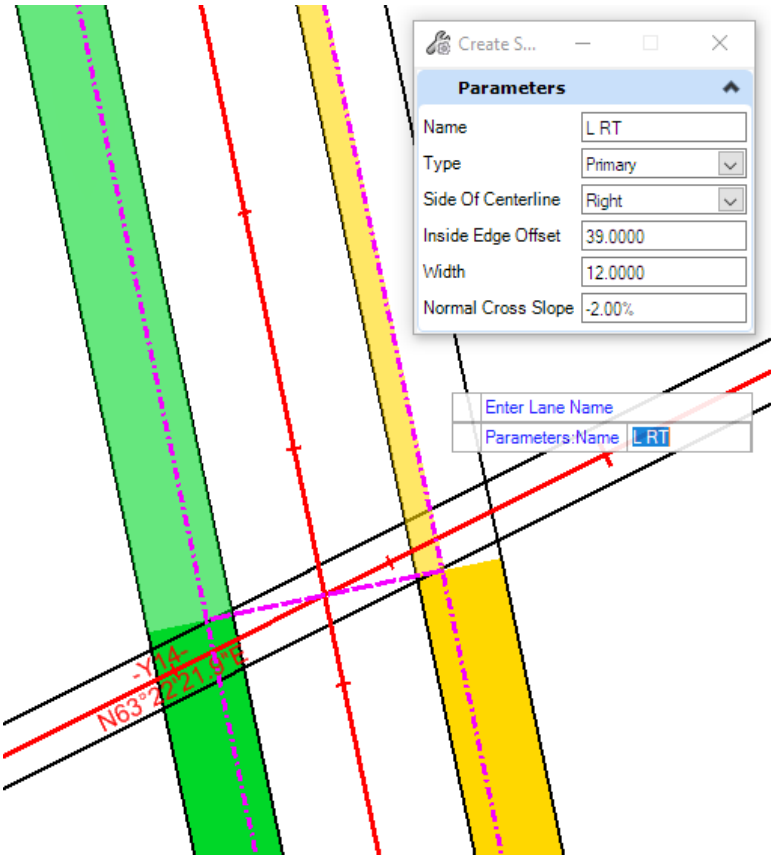


C. Locate and accept the **L-2** superelevation **Section** and **Reset** to accept.



D. Fill in the superelevation lane name in the **Create Superelevation Lanes** dialog box as indicated and choose a data point in the view to accept the value in the heads-up display first for the left-side lanes and then for the right-side lanes.

Note that a separate shape will need to be created for each lane in order for superelevation transitions to calculate correctly. Create three 12 foot wide shapes on each side with different inside edge offsets.

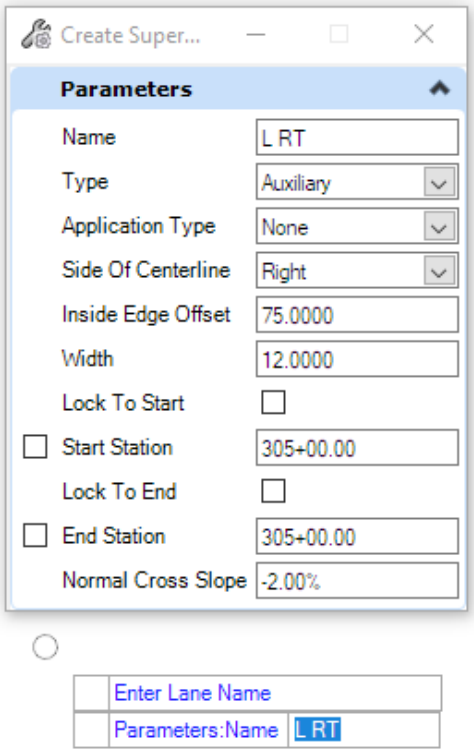


Lane Name = L LT, L RT
The name reflects the side of the proposed centerline the lane is located.

Type = Primary

Primary Lanes - a normal cross slope is specified when the lane is defined and then the cross slope is calculated from the e Selection and L selection tables or from AASHTO Relative Gradient formulas. Primary lanes are typically the through lanes which extend the entire length of a superelevation section.

Auxiliary lanes - the cross slope is either a user-specified fixed value or is automatically set to match an adjacent superelevation lane. Auxiliary lanes have a user-specified begin and end station but **must be contained within a single superelevation section**. Auxiliary lanes are lanes that are added and dropped along the alignment such as turn lanes or auxiliary lanes connecting interchanges on an interstate. When the Type is set to Auxiliary, the dialog is adjusted to reflect the parameters shown below:



Application Type - used to define how the cross slope of the auxiliary lane will be defined.

None - No cross slopes are assigned. Use this option if the cross slopes will be defined by importing a CSV file with the superelevation values.

Constant - Fixed slope of specified value utilizing the value in the Normal Cross Slope field. If lane is in transition, use this option and modify one end in the editor or graphically after creation.

Follow Adjacent – This option projects cross slopes from the adjacent lane to the auxiliary lane.

Side Of Centerline = Left, Right
Designates which side of the centerline the lane is located

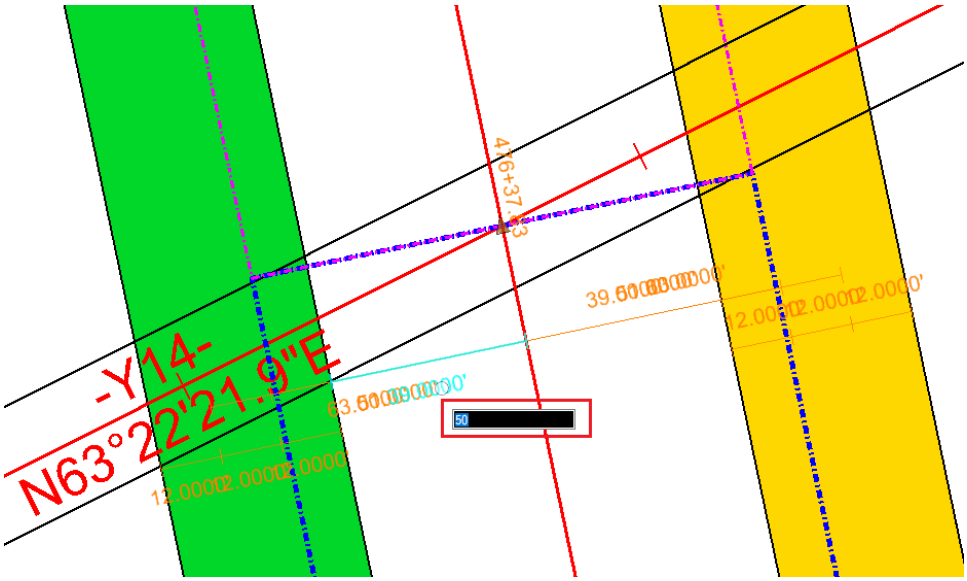
Inside Edge Offset = 39, 51, 63
Distance from centerline to edge of shape

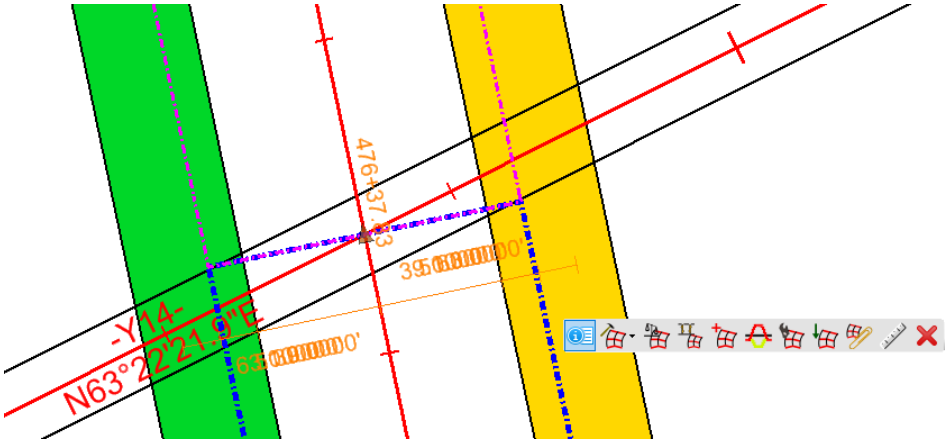
Width = 12
Width of Primary lane

Normal Cross Slope = -2.00%
Designated Normal Crown of the alignment

E. Once all of the head-up data has been accepted, left and right lanes will be created and they will be displayed as green and yellow shapes. Note how the lanes match the lane lines that were created by the template and referenced in from the CMD 2D Model. Green shapes slope down to the left and yellow shapes slope down to the right. Since superelevation has not been calculated yet, these shapes continue through the spirals and curves as normal crown.

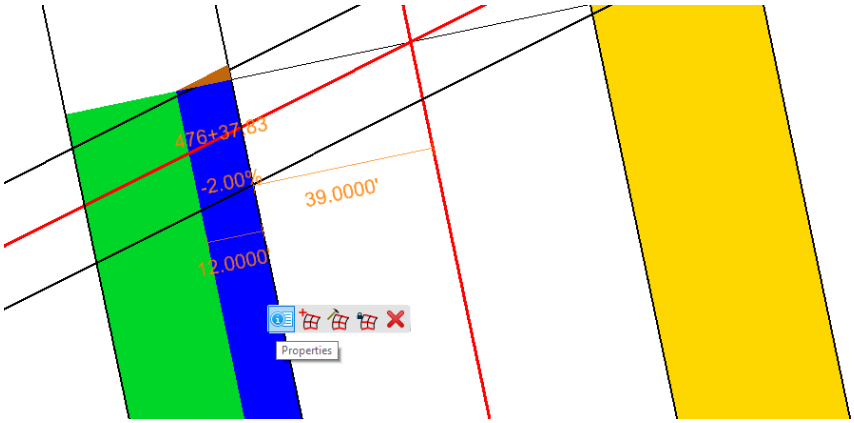
F. Shapes can be edited in many ways:
   - Using the element select tool, the user can select either the individual shape or the superelevation section, select the value to change, edit the value, and accept it in the heads-up display. Choosing the superelevation **Section** allows the user to change properties directly from the displayed values or from the Properties pop-up from the context-sensitive menu.





Feature Definition	**Superelevation**
Feature Name	**L-1**
Name	**L-1**
Horizontal Name	**L**
Start Station	**305+00.00**
End Station	**476+37.83**

G. Choosing the superelevation **Shape** allows the user to change properties directly from the displayed values or from the Properties pop-up from the context-sensitive menu.



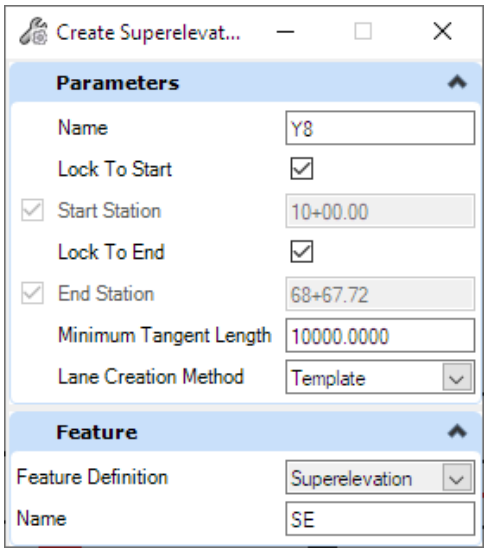
Name	L LT
Side Of Centerline	Left
Inside Edge Offset	39.0000'
Width	12.0000'
Normal Cross Slope	-2.00%
Type	Primary

3. Return to the Create Superelevation Sections **tool and create superelevation sections and lanes using the template method for Y8 and Y14.**

A. Y8 Alignment

- Under the **Create Template** tool, open the ***Module 8 Superelevation.itl*** file. Choose the ***DF - 2+2 Lanes AUX Raised Median ADSS 23' Median*** template for this alignment.

B. Use the values below for the section and lane creation.

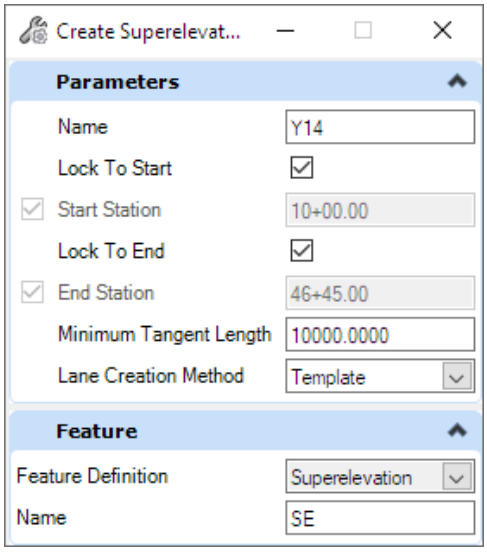


C. Superelevation lanes should look like this.

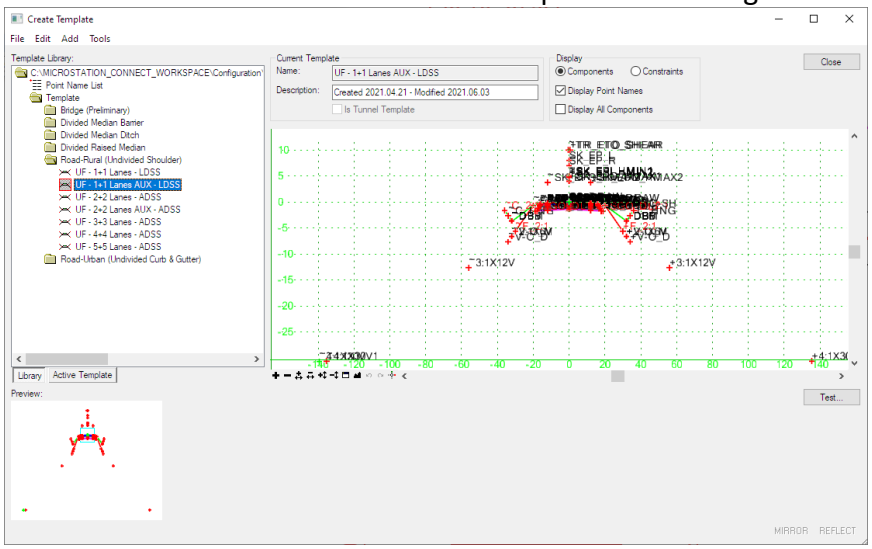
CURRENTLY ORD IS FILLING IN THE MEDIAN WITH A LANE AND COUNTING THAT LANE IN THE SUPERELEVATION CALCULATIONS RESULTING IN INCORRECT SUPERELEVATION CALCULATIONS. THIS ISSUE IS BEING INVESTIGATED BY NCDOT AND BENTLEY.

D. Y14 Alignment

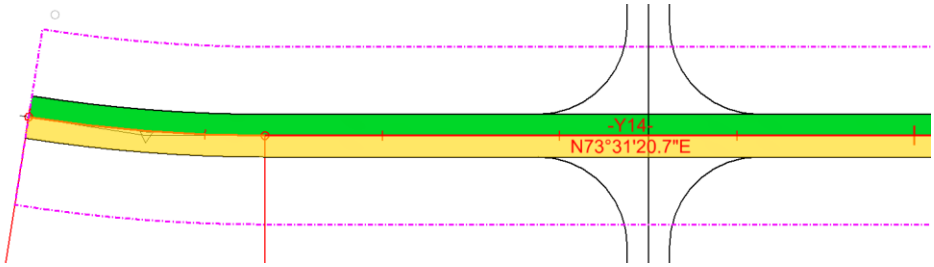
- Use the values below for the section and lane creation.



E. When the Create Superelevation Lanes By Road Template dialog box appears, choose the **UF - 1+1 Lanes AUX – LDSS** template for this alignment.

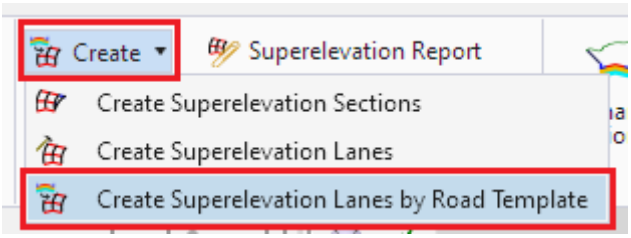


F. Superelevation lanes should look like this.



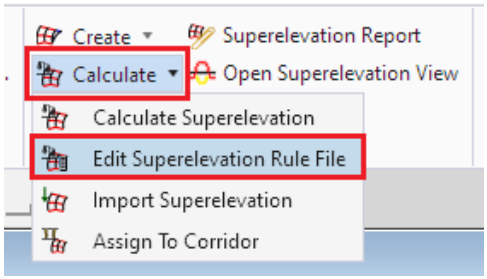
Create Superelevation Lanes by Road Template

The **Create Superelevation Lanes by Road Template** tool functions just as the **Create Superelevation Sections** tool does when the ***Lane Creation Method = Template*** chosen. This method is described above. A superelevation section must be present before this command can be initiated.



Edit Superelevation Rule File

The **Edit Superelevation Rule File** tool allows a user to customize the rules file that ORD uses to compute superelevation.



A default rules file is provided in ORD and contains the tables, equations, and customizable variables which allows organizations to customize automatic superelevation calculations according to their standards. ORD's default superelevation speed tables are embedded in the rules file but they only accommodate up to 2 lanes rotated and requires the user to choose the AASHTO Relative Gradient formula for calculating beyond 2 lanes wide. NCDOT has customized the rules file and provides the ***AASHTO_2018_English-NCDOT.xml*** file located at:

ProjectWise
pw:\\ncdot-pw.bentley.com:ncdot-pw-02\Documents\Administration\MICROSTATION_CONNECT_WORKSPACE\Configuration\Organization-Civil\Disciplines\NCDOT_Roadway\Standards\Superelevation

Local Drive
C:\MICROSTATION_CONNECT_WORKSPACE\Configuration\Organization-Civil\Disciplines\NCDOT_Roadway\Standards\Superelevation

to use for superelevation computation. This rules file contains speed tables that allow the user to choose the L Selection **Speed Table** option for calculating even superelevation transitions for up to 5 lanes rotated. It also rounds station values to the nearest 0.01 and cross slope increment rounded up to the nearest 1% . Important values such as percent on tangent have also been set to NCDOT standards.

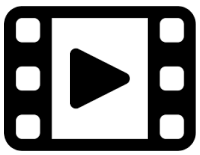
CURRENTLY ORD IS NOT ROUNDING VALUES **UP** TO THE NEAREST 1%. IT IS ROUNDING TO THE **NEAREST** 1%. THIS ISSUE IS BEING INVESTIGATED BY NCDOT AND BENTLEY.

The Bentley delivered ***AASHTO_2018_English.xml*** file or the NCDOT customized ***AASHTO_2018_English-NCDOT.xml*** files can also be edited by the user to suit their superelevation computational needs.

A description of the settings to aid the user in editing can be found on Bentley's website here:

Edit Superelevation Rule File (bentley.com)

An excellent video providing instructions for editing an .xml rules file can be found here.



Video 10-4 NCLUG Tech Talk Oct 7 Customizing Superelevation Rule Files

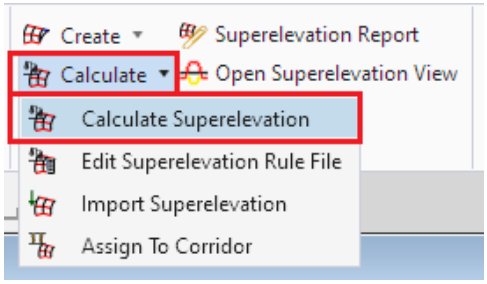
HTTP LINK PLACEHOLDER

Calculate Superelevation

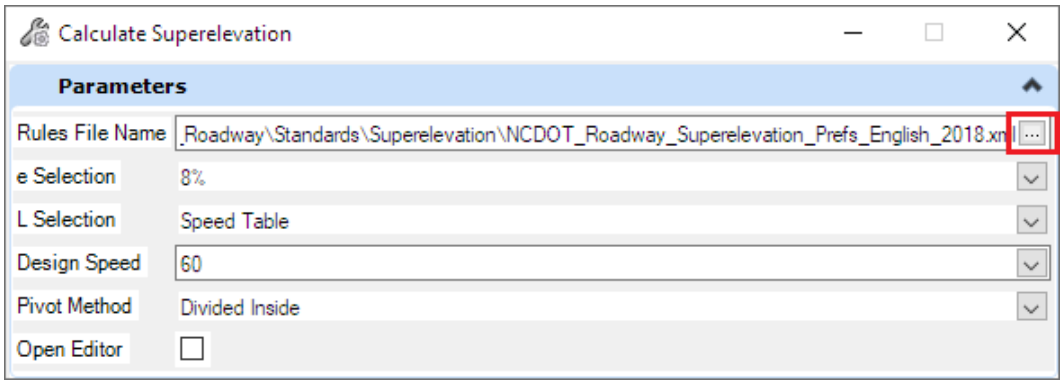
The **Calculate Superelevation** tool is used to call superelevation calculation standards set by NCDOT to draw superelevation shapes in the SUP file. Since the template that was used to draw the superelevation shapes into the file draws a separate shape for each lane, ORD is able to calculate the superelevation transitions correctly.

Video 10-5 Calculate Superelevation
HTTP LINK PLACEHOLDER

1. **Calculate Superelevation for L Alignment**
   A. Under the *Corridors* Tab → *Superelevation* tool group → **Calculate** pulldown, choose the **Calculate Superelevation** tool.



   B. Choose the pull down for the Rules File Name and navigate to the path that contains the superelevation rules .xml file.



ProjectWise
pw:\\ncdot-pw.bentley.com:ncdot-pw-02\Documents\Administration\MICROSTATION_CONNECT_WORKSPACE\Configuration\Organization-Civil\Disciplines\NCDOT_Roadway\Standards\Superelevation

Local Drive
C:\MICROSTATION_CONNECT_WORKSPACE\Configuration\Organization-Civil\Disciplines\NCDOT_Roadway\Standards\Superelevation

C. Choose the ***AASHTO_2018_English-NCDOT.xml*** file to calculate superelevation using the customizations that NCDOT provides.

D. Choose the **e Selection** to be **8%** which is appropriate for the L line freeway section.

E. Choose the **L Selection** to be **Speed Table** to use the customized speed tables that NCDOT produced.

Note: NCDOT's speed tables are built to provide **even Runoff and Runout distances, superelevation rates rounded up to the nearest whole increment, and assumes 12 feet wide lanes.** If your superelevation lane widths are anything other than 12 feet wide, choose the **AASHTO Relative Gradient** L selection and allow ORD to calculate the superelevation transitions based on the AASHTO MRG formula and not NCDOT's speed tables. Using this method however will result in **non-rounded** values for the Runoff and Runout **distances** but the superelevation **rate** will be rounded up to an even whole percent.

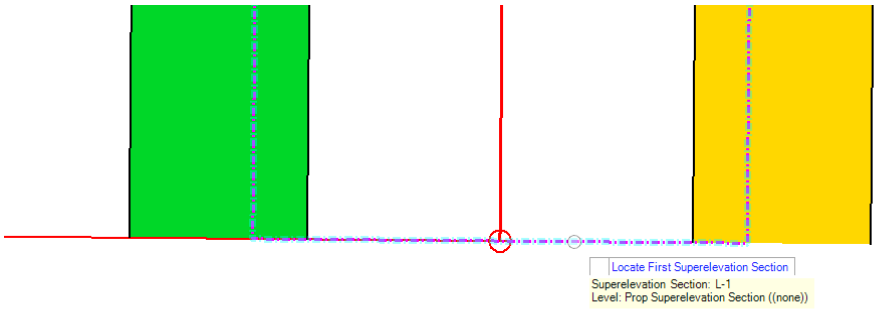
CURRENTLY ORD IS NOT ROUNDING VALUES **UP** TO THE NEAREST 1%. IT IS ROUNDING TO THE **NEAREST** 1%. THIS ISSUE IS BEING INVESTIGATED BY NCDOT AND BENTLEY.

F. Choose the **Design Speed** to be **60 mph** for the southern section of L up to Y14.

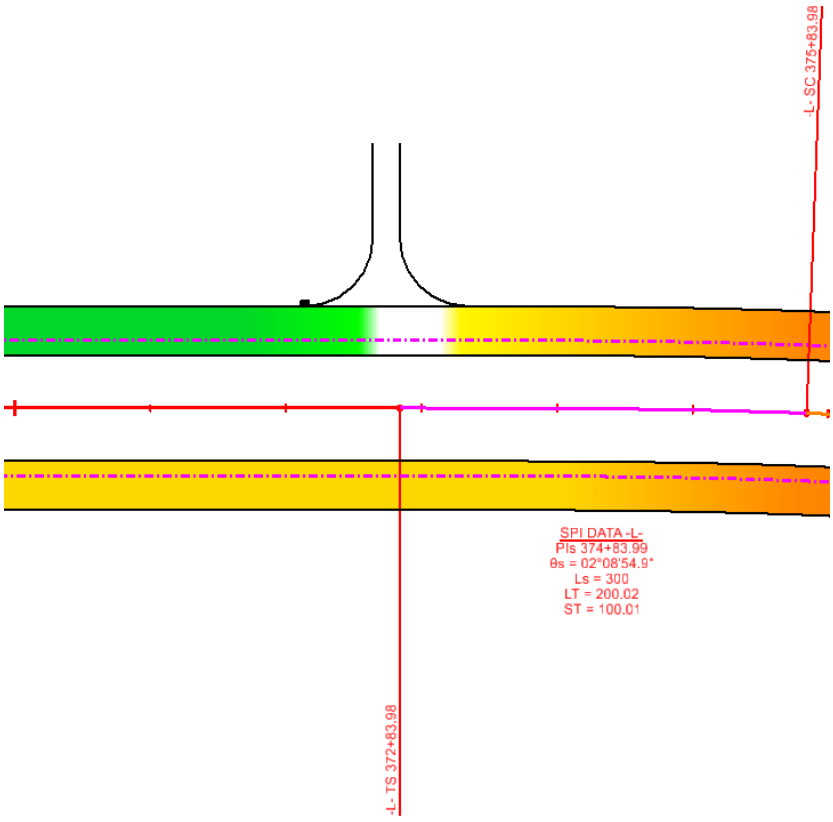
G. Choose the **Pivot Method** to be **Divided Inside** which is appropriate for the L line freeway section.

H. Checking the **Open Editor** box can launch the Superelevation Editor that allows you to manually modify the computed superelevation. For this exercise, **do not check** the Open Editor box. Editing will be explained later in the Module and you can make the choice in the future whether you'd like for the editor to launch once you determine your personal superelevation workflow.

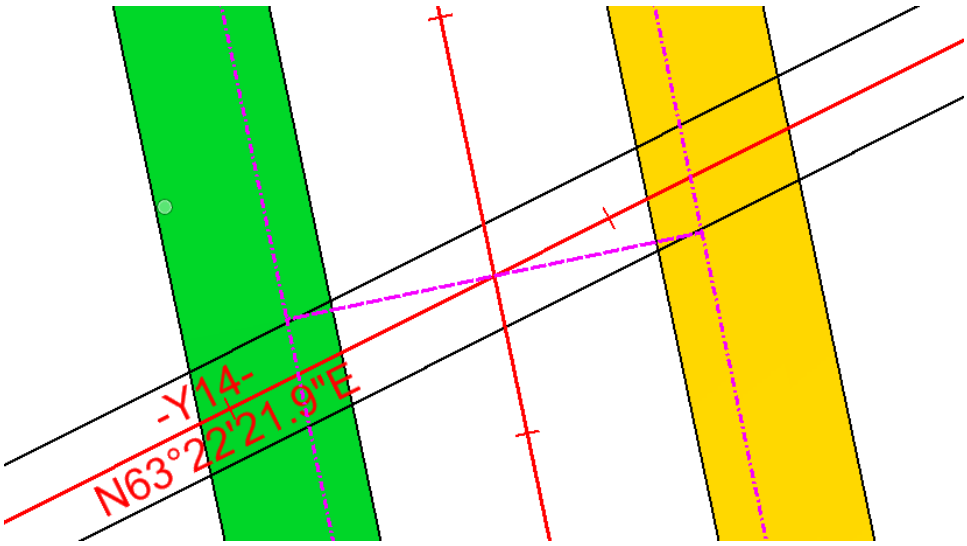
I. When prompted to **Locate First Superelevation Section**, zoom in to the beginning of the L alignment and choose the **L-1** section and press **reset** to accept the heads-up display.



J. Accept the rest of the heads-up displays with data points on the screen to calculate the superelevation transitions for each lane. After all values have been accepted and a brief delay, the superelevation transitions will be calculated for the **L-1** superelevation section and the shape's colors in the curves will change.

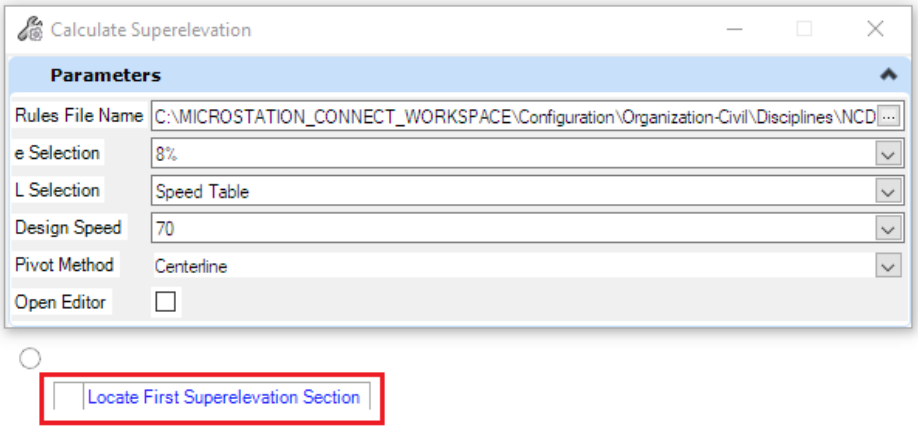


K. Locate the divide between the **L-1** and **L-2** superelevation sections.

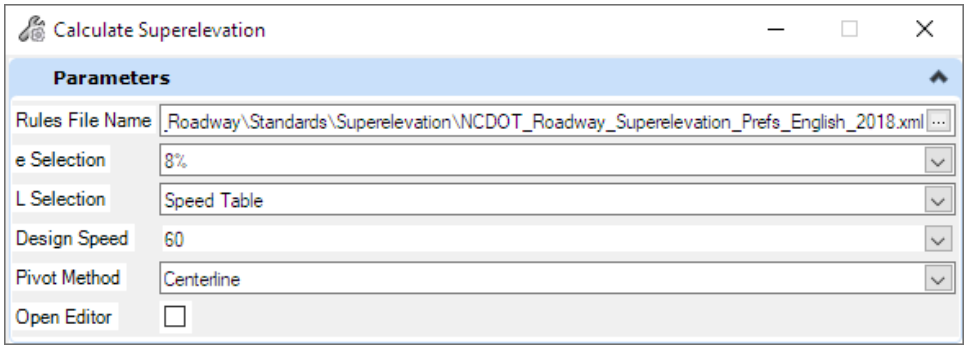


L. Use the **Calculate Superelevation** tool for the **L-2** section applying the settings below and noting that the speed changes from 60 mph to 70 mph. When the prompt asks to Locate **First** Superelevation Section, **don't** choose section **L-1**, choose section **L-2** since this is the first section you want to calculate in this new run of the **Calculate Superelevation** tool.

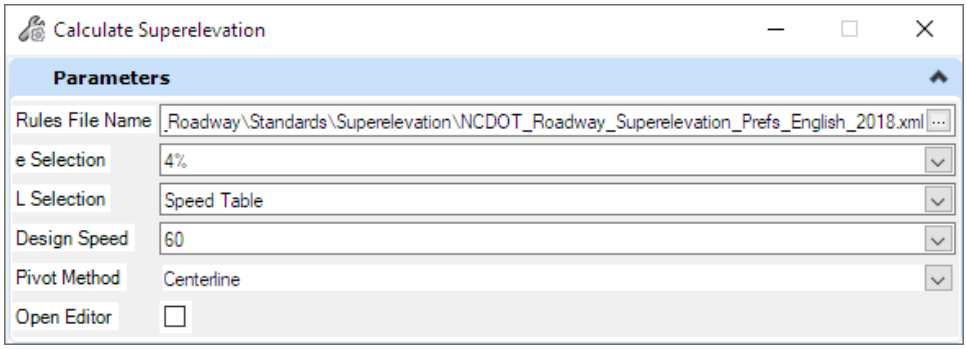
Note Centerline pivot method always uses the base alignment radius to calculate eRate. All other methods use the radius +/- the offset of the pivot to calculate eRate.



M. Use the **Calculate Superelevation** tool for the one superelevation section on the **Y8** alignment named **Y8-1** applying the settings below. Note that the only curve on this alignment has a radius of 11,500 feet which only warrants a **normal crown** cross slope so there will be no color change of the superelevation shapes.



N. Locate the Y14 alignment and use the **Calculate Superelevation** tool for the one superelevation section on the **Y14** alignment named **Y14-1** applying the settings below.



Create Superelevation Sections by Corridor

The second method for creation of superelevation lanes is an automatic method where a **corridor,** instead of an alignment, is chosen from an attached CMD file and ORD gathers the information from the selected corridor and creates the superelevation sections, creates the lanes, and calculates superelevation in one step thereby combining the three separate steps that the user has just learned in this Module.

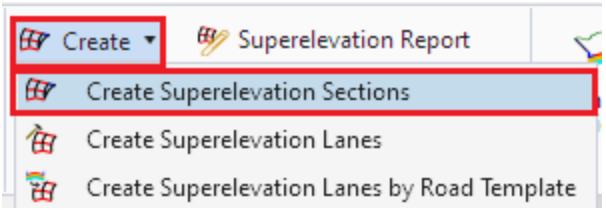
IN NORMAL SITUATIONS THE FOLLOING PROCEDURE WILL WORK AS DESIGNED. FOR CORRIDOR USING TEMPLATES WITH AUXILARY LANES (AUX) THE CALCULATIONS MAY PRODUCE UNDESIRED RESULTS. CORRIDORS USING AUX TEMPLATES CAN USE THE MANUAL METHOD TO CREATING SECTIONS AND LANES. NCDOT AND BENTLEY ARE WORKING TO RESOLVE THIS ISSUE. ONCE RESOLVED IT WILL BE THE PREFERRED METHOD OF SUPERELVATION CALCULATION.

2. Create Superelevation by Corridor

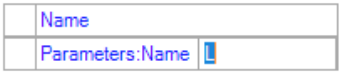
A. Open the ***R-2635C_RDY_SUP_BY CORRIDOR.dgn*** file.

B. As before, attach the master R-2635C_RDY_CMD.dgn file to the newly created R-2635C_RDY_SUP_BY CORRIDOR.dgn file with a **Live Nesting of 1** to be able to see all of the individual alignment's CMD files. The nested CMD files contain not only the 2D design elements for your roadway such as the edge of pavement to check your superelevation shape width by, but they also contain the corridor for each alignment and all of the information that is associated with that corridor. Previously, we turned off all of the levels except for the edge of pavement so that we could compare our shape widths and offsets to the roadway design. In this exercise, we will leave all of the levels on to be able to select them when prompted.

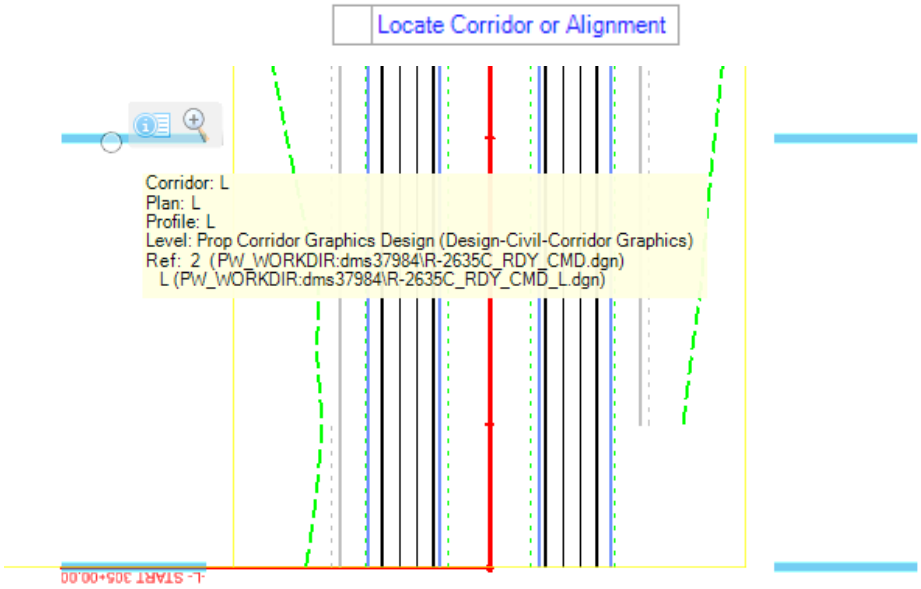
C. Under the *Corridors* Tab → *Superelevation* tool group → **Create** pulldown, choose the **Create Superelevation Sections** tool.



D. When the Parameters Name dialog appears, Enter **L** for the mainline corridor and accept with a data point on the screen.



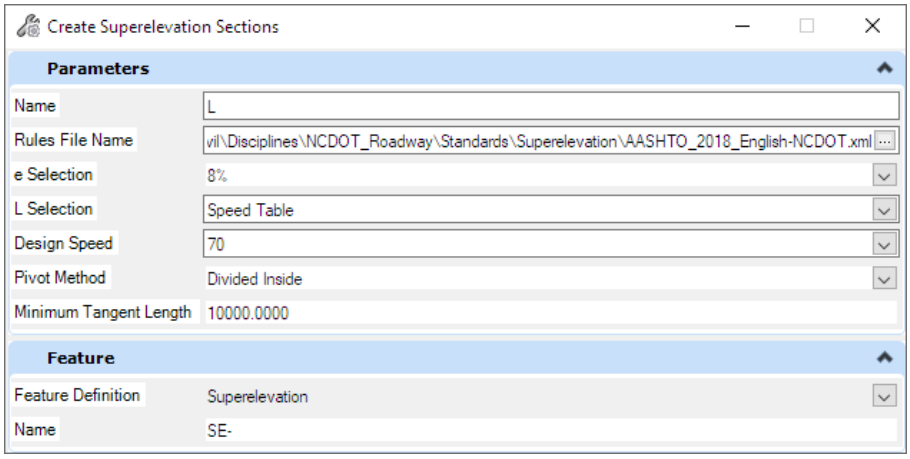
E. When the Locate Corridor or Alignment prompt appears, select a yellow handle on the **L** corridor that was referenced from the CMD file and accept with a data point on the screen.



F. When the Create Superelevation Sections dialog box appears, ensure that you have chosen the NCDOT customized rules file ***AASHTO_2018_English-NCDOT.xml*** This rules file contains speed tables that allow the user to choose the L Selection **Speed Table** option for calculating even superelevation transitions for up to 5 lanes rotated. It also rounds station values to the nearest 0.01 and cross slope increment rounded up to the nearest 1% .

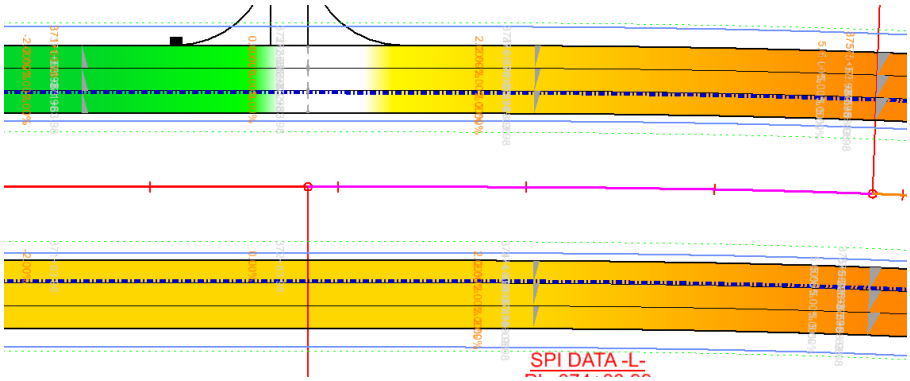
CURRENTLY ORD IS NOT ROUNDING VALUES **UP** TO THE NEAREST 1%. IT IS ROUNDING TO THE **NEAREST** 1%. THIS ISSUE IS BEING INVESTIGATED BY NCDOT AND BENTLEY.

Important values such as percent on tangent have also been set to NCDOT standards. Complete the dialog box with the values shown below.



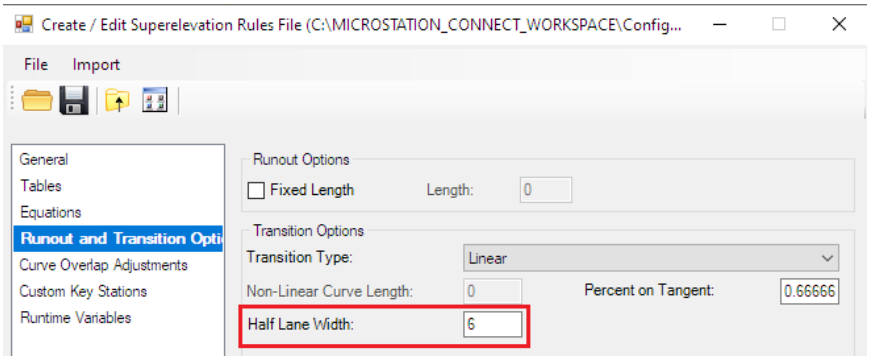
G. Accept the minimum tangent length value to initiate the superelevation creation process.

H. Note that ORD creates the superelevation section, creates the superelevation lanes, calculates the superelevation transitions, and applies the transitions to the lanes with one command making this the preferred method of obtaining superelevation for any of the user's corridors. As with other methods of superelevation calculations, the user will need to initiate an **Assign to Corridor** command to apply these transitions to the corridor. This command is described later in the module.



I. Note that the **Create Superelevation Sections** by Corridor uses the configuration of the corridor template as it is stored in the template library. No parametric constraints or point controls will be applied when creating the superelevation lanes. To accurately depict the corridor, copy the default template and modify template level parametric constraints for variables such as median width, lane width, and cross slope such as 2.5% east of I-95 for each corridor. This should be a workflow that the user typically does anyway.

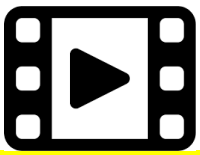
J. Note that ORD will correctly calculate the half-lane of a 3-lane and 5-lane template as per AASHTO Green Book if the lane is 6 feet wide.



Review Superelevation

After calculating superelevation, the user should check over the calculations and plan view shapes to ensure that they were calculated as expected. The user should focus on curve transitions, especially compound curve and reverse curve areas where there may not have been enough length to fully transition the shapes and certain decisions were made based on the NCDOT .XML rules file about how these areas were transitioned. As mentioned in the .XML rules file editing video, time can be spent by the user to further customize the compound curve and reverse curve settings or they can be manually modified with various editing options once calculated. The .XML file's compound and reverse curve settings are currently set to **Planar** where the road will transition with the same slope across the width of the lanes from Full Super to Full Super with the Zero Crown and Normal Crown stations are eliminated.

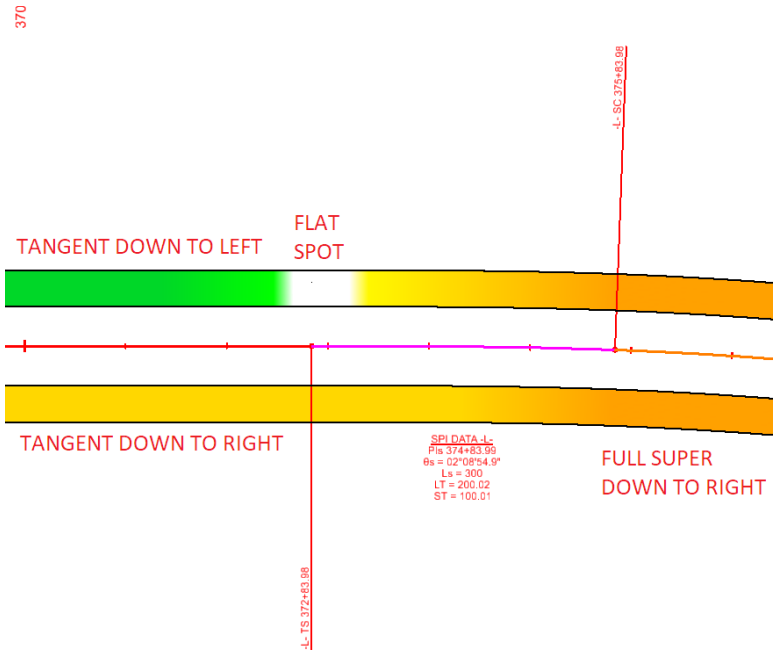
There are many ways to review, edit, and rerun the superelevation into the file. This module will introduce them to the user and the user can develop a workflow that is most effective for them.



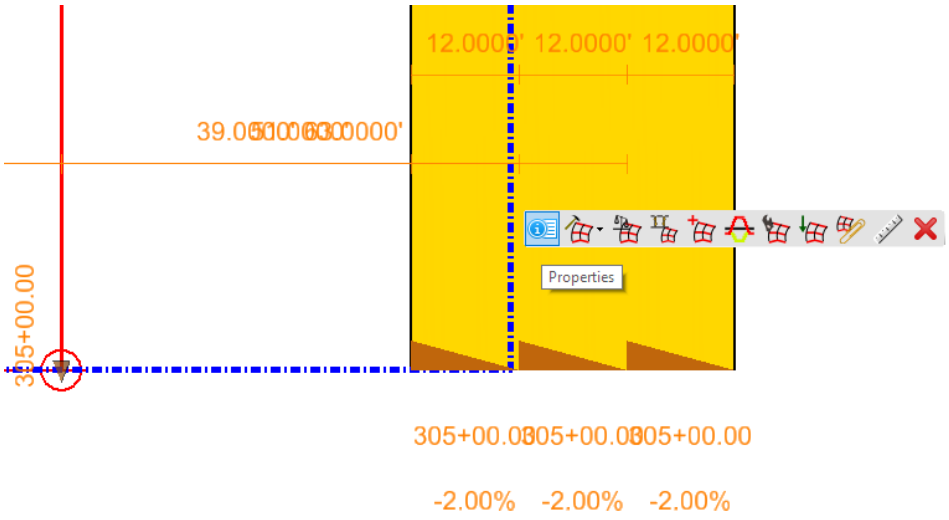
Video 10-6 Review Superelevation
HTTP LINK PLACEHOLDER

1. **Review Superelevation Shapes**
   A. Zoom in on the first curve on the L alignment and note the color change of the shapes as they transition from the tangent, through the spiral, and into the curve. The lanes are now filled with colors that indicate the various cross slopes as detailed below. Note the white flat area occurs where you'd expect it to be at the TS for those lanes and the slopes of both NB and SB lanes have transitioned to be superelevated down to the right by the SC and therefore colored orange.

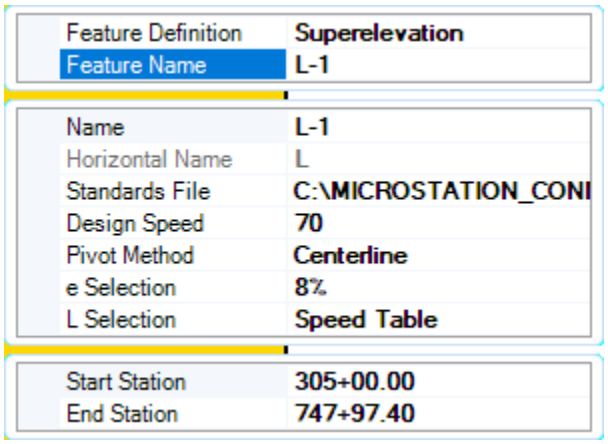
      - Slope < -10% = blue DOWN LEFT
      - -10% <= Slope <= -0.5% = Calculated color between blue and green DOWN LEFT
      - -0.5% < Slope < 0.5% = white FLAT
      - 0.5% <= Slope <= 10% = Calculated color between yellow and red DOWN RIGHT
      - Slope > 10% = red DOWN RIGHT



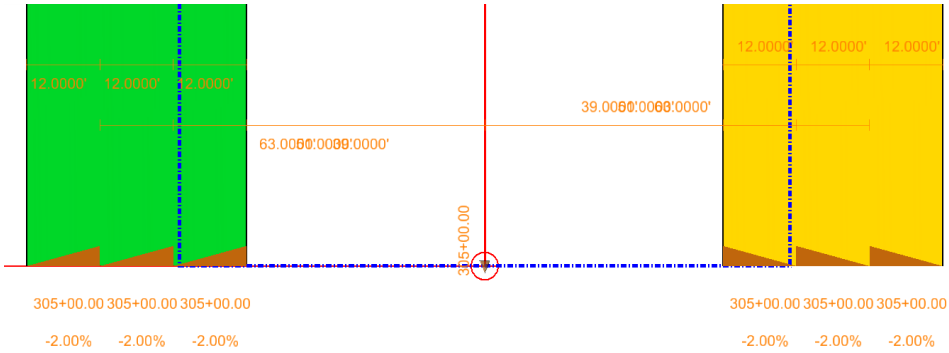
B. Zoom in to the beginning of the alignment and select the **L-1** superelevation **section**. Pull the mouse away from the selected shape and then hover back over the selected shape until the context sensitive menu appears.



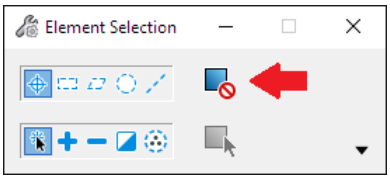
C. Choose the Properties tool and review the superelevation section properties. These properties can be edited with tool and calculations will update automatically.



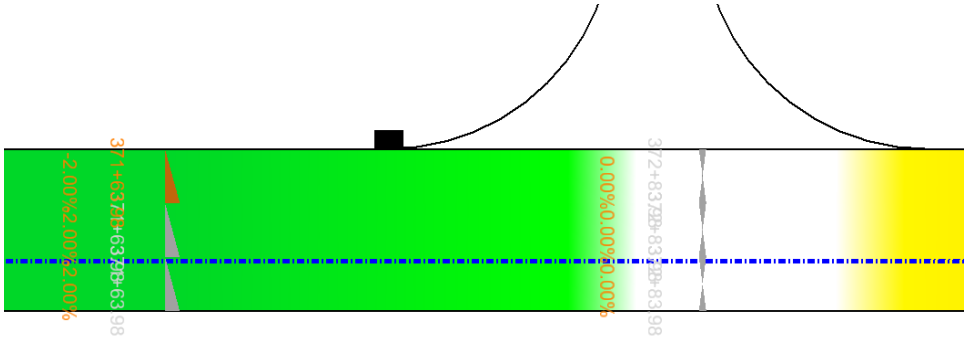
D. Zoom in to the beginning of the alignment and select the **L-1** superelevation **section** to display the wedge-shaped graphical manipulators, station, offset, and dimension text for all shapes of the section.



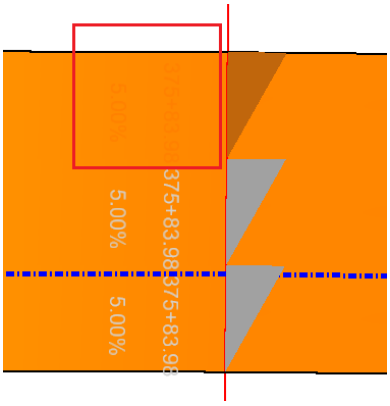
Note that if the graphic manipulators do not show, check the Element Selection tool to see if the **Disable Handles** may have been inadvertently toggled on. Toggle it off for proper operation.



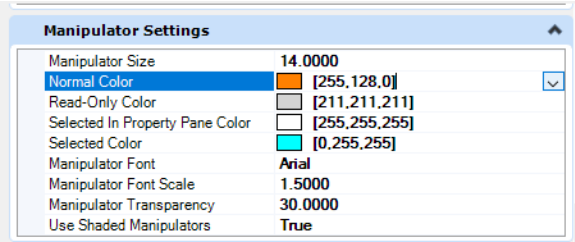
E. Zoom into the first curve of the L alignment and note that the direction of the wedges indicates the slope direction and a double wedge indicating a 0% cross slope. **Grey wedges and text** are **not** immediately editable in the plan view due to the distance and slope rule constraints placed on them during superelevation calculations. These constraints can however be removed if editing is required and will be discussed later in the Module. **Orange wedges and text** are immediately editable in the plan view.

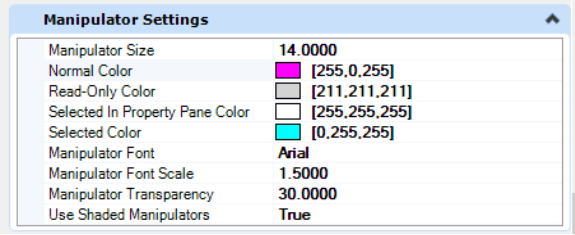


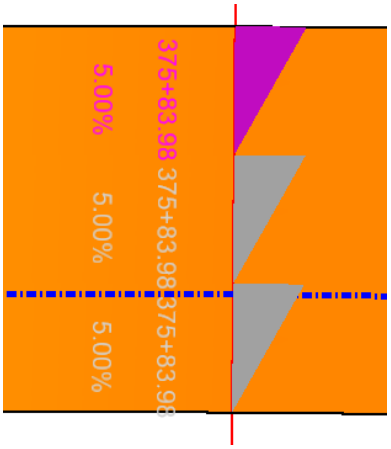
Note that the orange labels can sometimes be hard to see when the shapes are also orange.



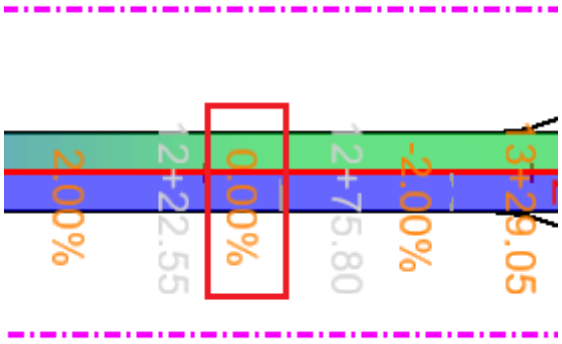
To remedy this, the user has the option to go to **File (to get to the backstage)** → **Settings** → **User** → **Preferences** and use the pulldown to change the **Manipulator Settings Normal Color** from Orange to Magenta.



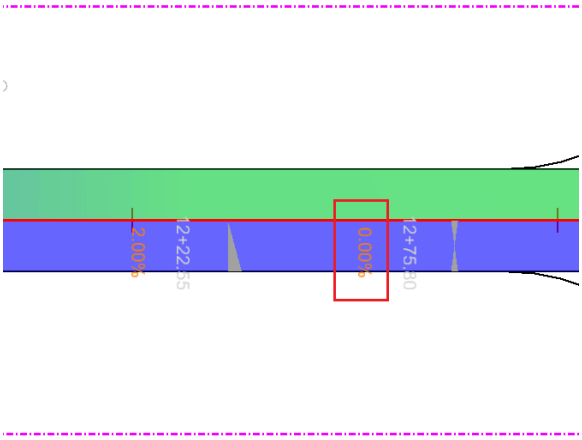




F. Pan through all of the shape transitions for L, Y8, and Y14 to see if any transition errors can be spotted. Note that when transition increments are small, superelevation station and slope labels can overlap on the adjacent increment causing some confusion.



This can be solved by zooming in until the labels show adjacent to the wedges.

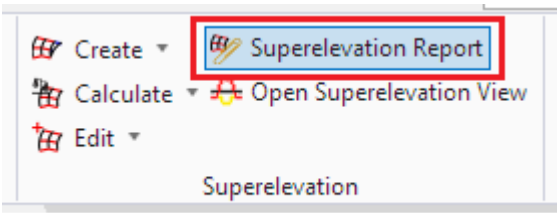


Generate Superelevation Reports

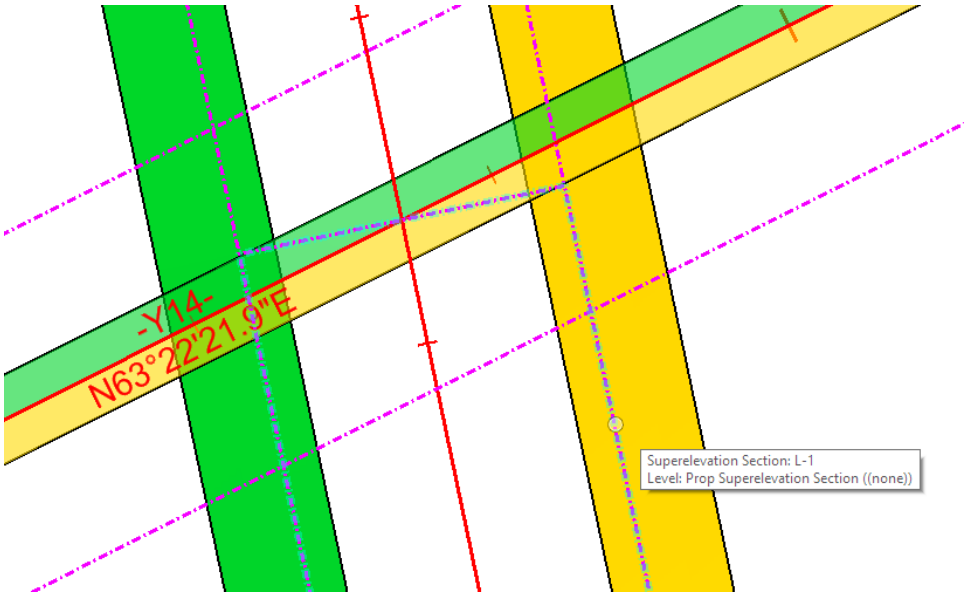
After reviewing the graphical shapes for possible errors, the user should run a superelevation report for each alignment to check the settings that were used to calculate the transitions and verify the values calculated to ensure they are correctly computed. Even though the superelevation was calculated using the same AASHTO formulas that the user may use in calculating superelevation transitions with a spreadsheet, various settings within the NCDOT superelevation rules file may not align with how you as an engineer would calculate superelevation. As with the graphical review, the user should focus on curve transitions, especially reverse curve areas where there may not have been enough length to fully transition the shapes and certain decisions were made based on the NCDOT rules file about how these areas were transitioned. There are many ways to review, edit, and rerun the superelevation into the file. This module will introduce them to the user and the user can develop a workflow that is most effective for them.

Video 10-7 Generate Superelevation Reports
HTTP LINK PLACEHOLDER

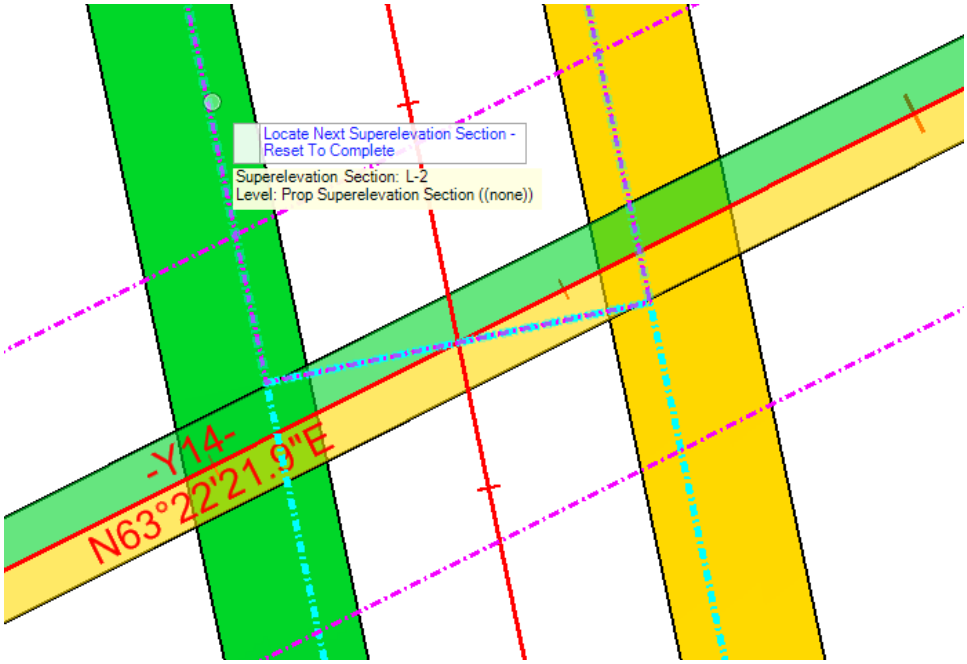
1. **Superelevation Report**
   A. Choose the *Corridors* Tab → *Superelevation* tool group → **Superelevation Report** tool.



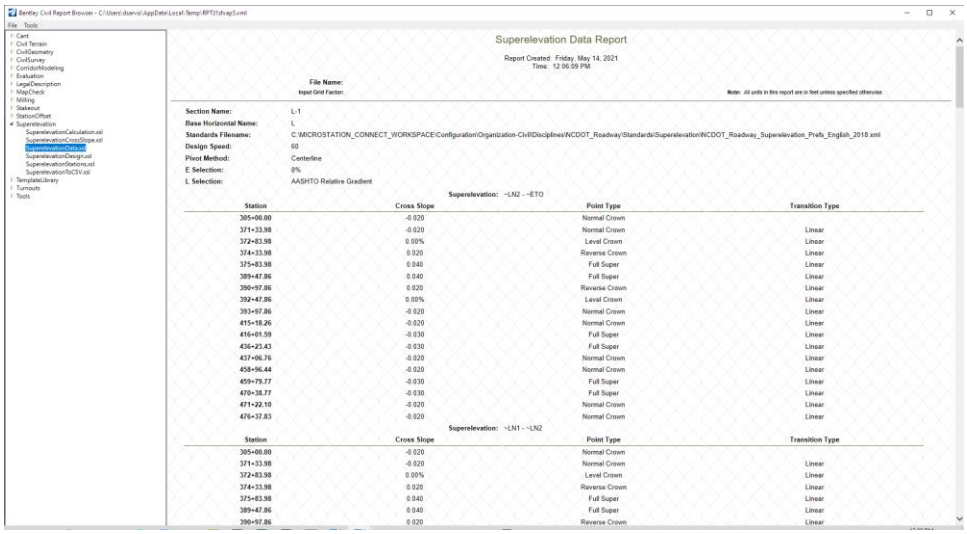
   B. Zoom in to the split between the L superelevation sections **L-1** and **L-2** where **L** and **Y14** cross and follow the heads-up prompt to Locate the First Superelevation Section by choosing Section **L-1** with a datapoint.



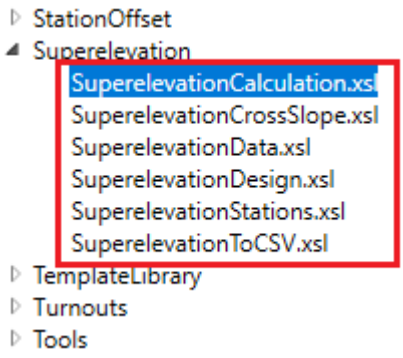
C. Follow the heads-up prompt and **Locate the Next Superelevation Section** by choosing the **L-2** section with a data point and resetting to complete the command.



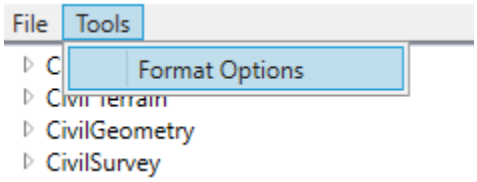
D. A new window will launch that contains a **Superelevation Report** for both sections **L-1** and **L-2**.

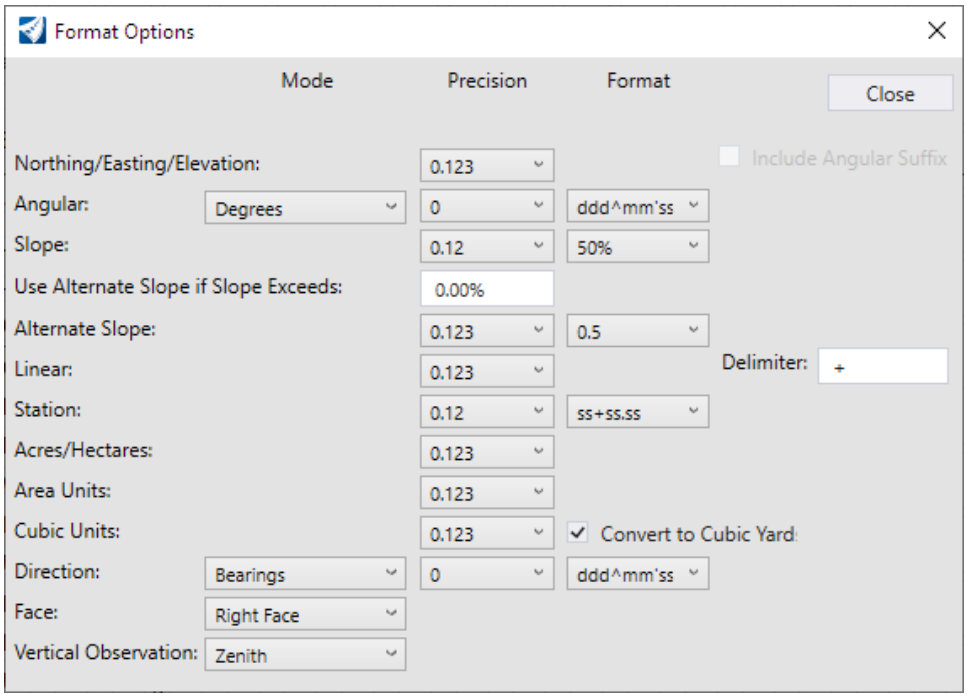


E. In the left column of the report window, choose various formats of the report to be able to obtain the information needed to verify the superelevation calculations.



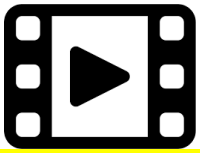
F. Various format options of the reports can be changed by choosing Tools → Format Options and changing the dialog box settings.




Format Options
Mode
Precision
Format
Close
Northing/Easting/Elevation:
0.123
Include Angular Suffix
Angular:
Degrees
0
ddd^mm'ss
Slope:
0.12
50%
Use Alternate Slope if Slope Exceeds:
0.00%
Alternate Slope:
0.123
0.5
Linear:
0.123
Delimiter:
+
Station:
0.12
ss+ss.ss
Acres/Hectares:
0.123
Area Units:
0.123
Cubic Units:
0.123
Convert to Cubic Yard
Direction:
Bearings
0
ddd^mm'ss
Face:
Right Face
Vertical Observation:
Zenith

Import Superelevation

ORD has provided a way for users to import superelevation calculations which are typically created with an Excel spreadsheet. This is accomplished through exporting the spreadsheet to a CSV (comma separated values) file that ORD can read.



Video 10-8 Import Superelevation
HTTP LINK PLACEHOLDER

1. **Import Superelevation Workflow**
   - **A. Calculate superelevation transitions using Excel**
   - **B. Export the Excel spreadsheet to a CSV file**
   - **C. Draw superelevation sections(s) and lane(s) into the design file**
   - **D. Import the externally calculated transitions to apply to the lanes**

Superelevation transitions WILL automatically recalculate and change with changes to the horizontal geometry if they were computed and placed with a rules file. The user should be aware that superelevation transitions WILL NOT update when changes are made to the horizontal geometry when using the Import Superelevation method. Because of this, it MAY be best to allow ORD to use the NCDOT rules file to calculate the superelevation transitions, associate them with the alignment, constrain transitions to spirals and other transitions, and draw them into the file. The user can then compare these transitions to an external Excel spreadsheet for checking ORD's calculations.

2. **CSV File Format**

When importing superelevation data from a CSV file there is a specific format you must follow in order for OpenRoads Designer to be able to read the superelevation data properly. The order is important, but you do not need every option. The format of the CSV file should be as follows:

If all fields are used:
SuperelevationName,Station,CrossSlope,PivotAbout,PointType,TransitionType,NonLinearCurveLength

RT1,2+50.00,-0.02,RS,NCIN,L,0

If only the required fields are used:
SuperelevationName,Station,CrossSlope,PivotAbout

LT1,2+50.00,-0.02,LS

Unknown non-required data must be represented by a ",(space)," to maintain the order of the data input:
SuperelevationName,Station,CrossSlope,PivotAbout,UNKNOWN,TransitionType,NonLinearCurveLength

RT1,2+50.00,-0.02,RS**, ,**PC,50

Superelevation Name - Links the data to an existing superelevation lane so the name in the CSV file must match the lane names created prior to importation.

Station – Station unit and accuracy should the match the alignment file. Station equations are supported based on the section's reference alignment and the Design File Settings > Civil Formatting > Station Settings > Equation setting.

Cross Slope - Formatted as: ±0.0 (i.e. -2% = -0.02)

Pivot About – LS or RS which refers to which edge to pivot about. Generally, if you are rotating about the center line, the right lane would pivot about the left edge LS while the left lane would pivot about the right edge RS.
LS = left side
RS = right side
Note: The terminology is confusing here, where it refers to **side** rather than **edge**.

Point Type - NC,NCIN,NCOUT,LC,LCIN,LCOUT,RC,RCIN,RCOUT,FS,FSIN,FSOUT,U
NC = Normal Crown
LC = Level Crown
RC = Reverse Crown
FS = Full Super
U = Undefined

Transition Type - L,PC,PRC,BRC,CRC,SRC
L = Linear
PC = Parabolic Curve
PRC = Parabolic Reverse Curve
BRC = Biquadratic Reverse Curve
CRC = Cubic Reverse Curve
SRC = Symmetrical Reverse Curve

Non-Linear Curve Length - Default Value = 0.0

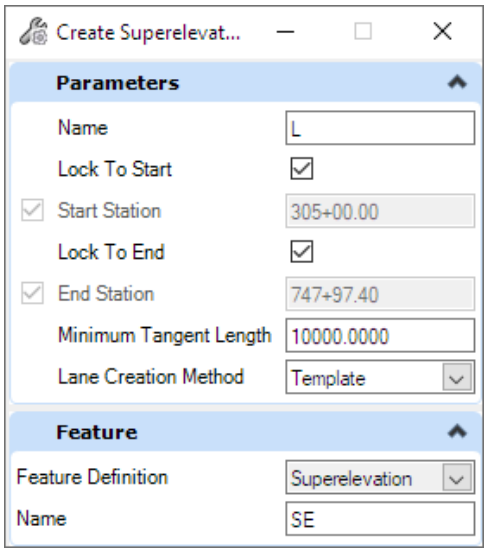
Only used for transition type parabolic curve or symmetrical reverse curve.

3. Import Superelevation

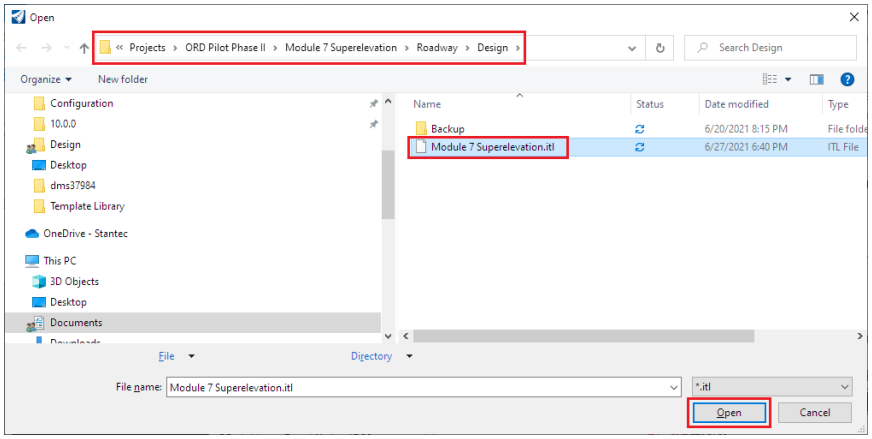
A. Open the ***R-2635_RDY_SUP_IMPORT.dgn*** file to draw superelevation shapes into.

B. Under the *Corridors* Tab → *Superelevation* tool group → **Create** pulldown → choose the **Create Superelevation Sections** tool to begin the section and shape creation.

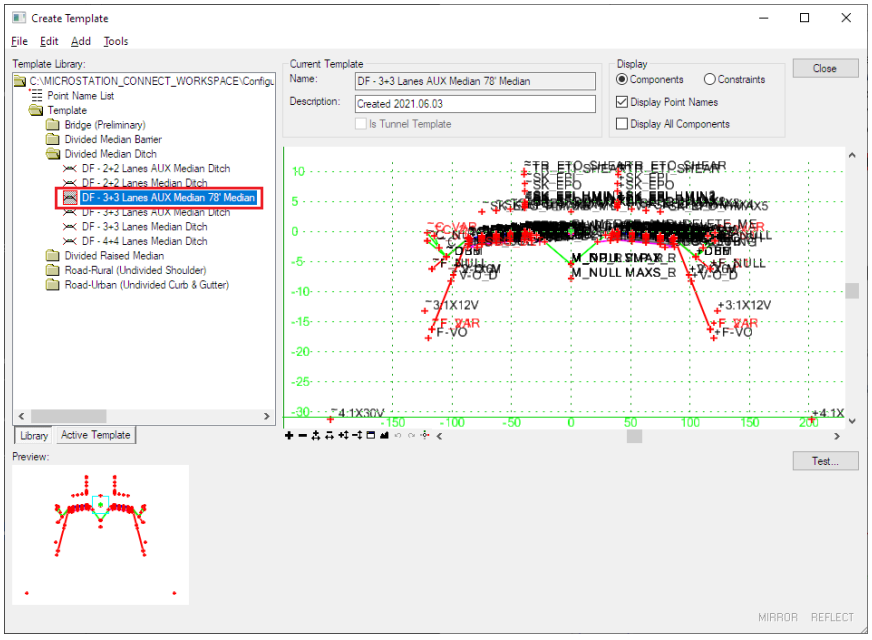
C. Use the following settings to create a single superelevation section for the entire **L** corridor. Accept the values from the heads-up display.



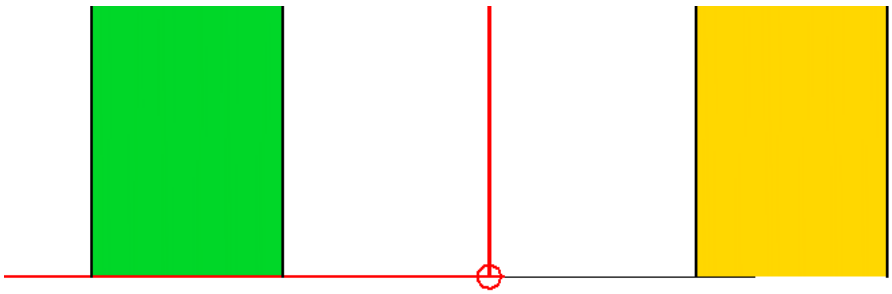
D. Choose the ***Module 8 Superelevation.itl*** file so a superelevation template can be chosen.



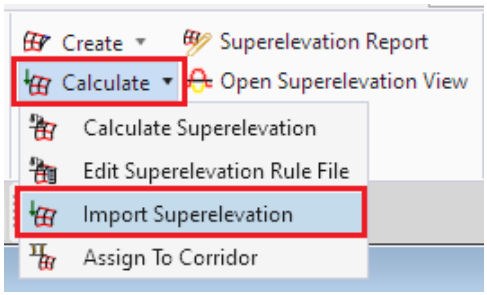
E. A custom template was created to accommodate the 78’ depressed median of this project. Choose the **DF - 3+3 Lanes AUX Median 78' Median** template that was used to create the corridor in the CMD file. Double click the template and confirm it is active by viewing it in the graphical display.



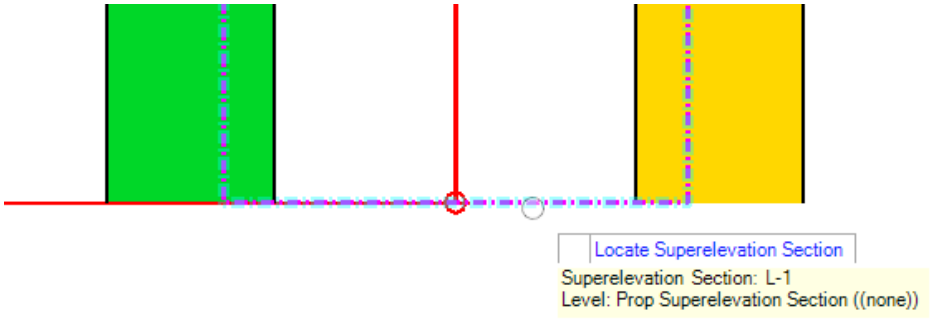
F. Accepting the heads-up display draws the lanes into the file without superelevation transitions but the user will **not** be calling the superelevation rules file to apply superelevation transitions. Our goal is to manually assign cross slopes to the lanes by **importing superelevation** data from a **CSV** file.



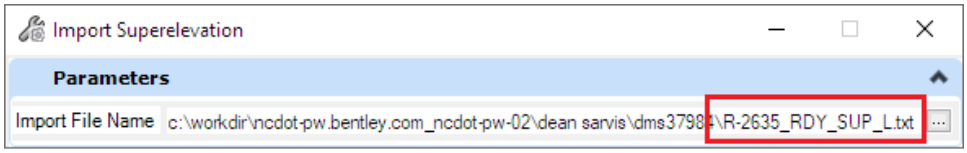
G. Choose the *Corridors* Tab → *Superelevation* tool group → **Calculate** pulldown → choose the **Import Superelevation** tool.



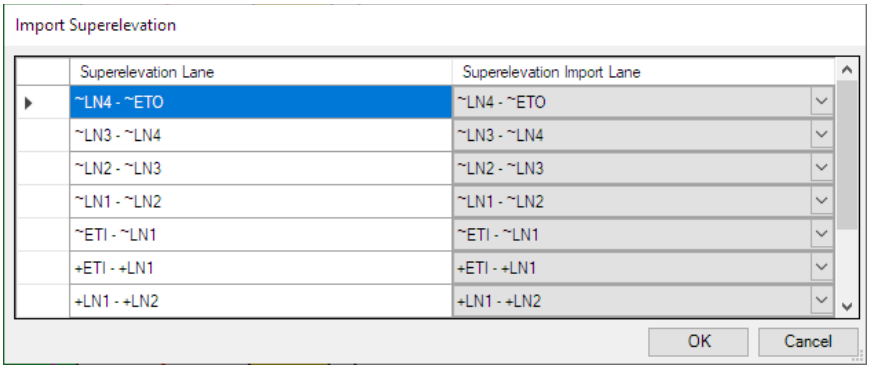
H. Zoom in and choose the **L-1** section created above.



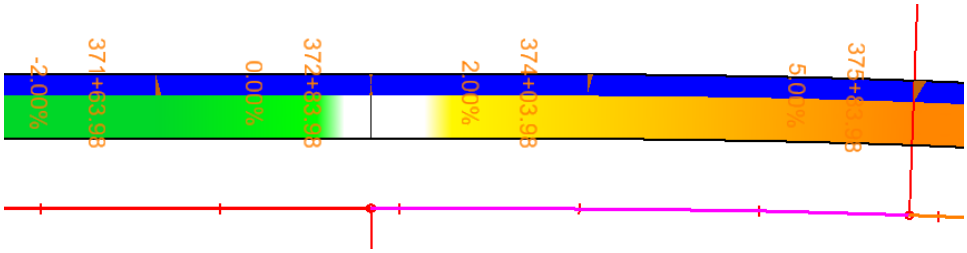
I. Choose the ***R-2635C_RDY_SUP_L.txt*** file that contains the correctly formatted comma separated values (CSV) to import into the file.



J. A dialog box will pop up to confirm the **Superelevation Lanes** in the design file and the **Superelevation Import Lanes** in the CSV file. Ensure that these match or the superelevation will not import to correct lanes or possibly not import at all. Choose **OK** to import the superelevation from the CSV file so the values will be applied to the lanes.



K. Zoom into the first curve and notice the shape colors have changed indicating the superelevation transitions have been applied. Select the far-left shape to reveal the superelevation transition values. Note that all of the values are **orange** indicating that they are all editable but also indicating that the values are **NOT tied to any superelevation rules file nor the horizontal alignment and subsequently will NOT change when changes are made to the horizontal geometry. The superelevation values will need to be recalculated and re-imported if any revisions are made to the horizontal alignment.**



Edit Superelevation

Once superelevation has been calculated and applied to the shapes in the files, the user may need to edit the transitions for various reasons. A "flat spot" may occur in an intersection where the stormwater runoff is difficult to collect, or the superelevation transition may need to be shifted to allow the stormwater to be collected in the catch basin at the radius turn-out point. Other instances where the superelevation transition may need to be edited are reverse curves, mainline intersection approaches to provide more comfortable passage through the intersection, and ramps to avoid adverse rollover in the gore areas. The superelevation transitions can be edited in these areas at the discretion of the engineer.

It should be noted that warping the superelevation transitions of a side road connection with the mainline will be accomplished under **Detailed Modeling.** Normal corridor superelevation transitions on the side road will stop short of the intersection and the cross-slope designations of the Detailed Corridor Model will take over to provide superelevation transition to match the mainline's edge of pavement elevations. This procedure is explained in the **Detailed Modeling** module.

Options for editing Superelevation

1. **Edit the Superelevation Section in plan view graphically and editing text**
2. **Edit the Individual Lanes in plan view graphically and editing text**
3. **Edit the Control Line Diagram in the Superelevation Managed Model View**
4. **Edit the Superelevation Lanes using the Superelevation Table Editor**
5. **Edit the Superelevation Lane using Insert Station Cross Slope**
6. **Edit the Superelevation Section or Lanes using Properties**
7. **Edit the Superelevation Section by adding an Auxiliary Lane**

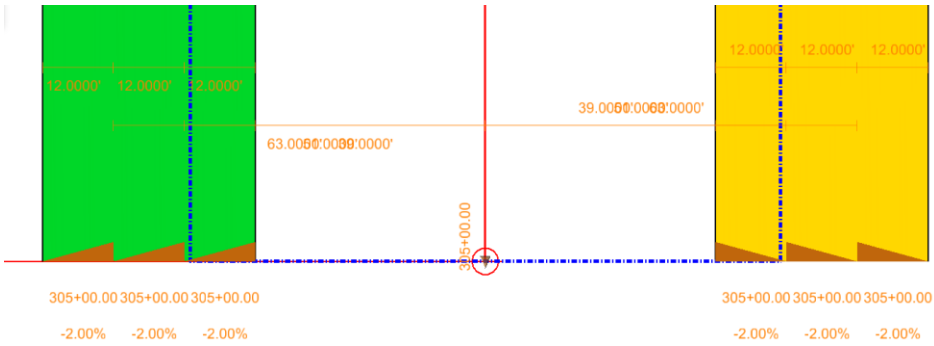
1. Edit the Superelevation Section in plan view graphically and editing text

A. Open the ***R-2635C_RDY_SUP.dgn*** design file.

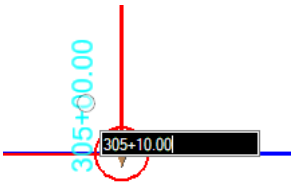
Video 10-9 Edit the Superelevation Section in plan view graphically and editing text
HTTP LINK PLACEHOLDER

B. Zoom in to the beginning of the alignment and select the Superelevation Section shape.

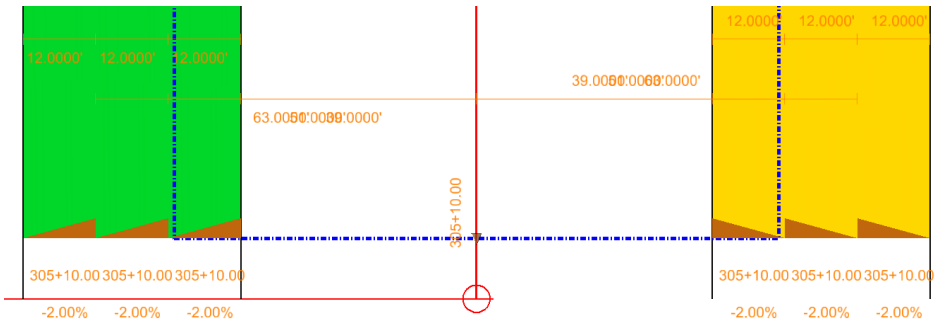
C. Note that all of the text is orange indicating that they are editable and were not constrained by the superelevation rules file.



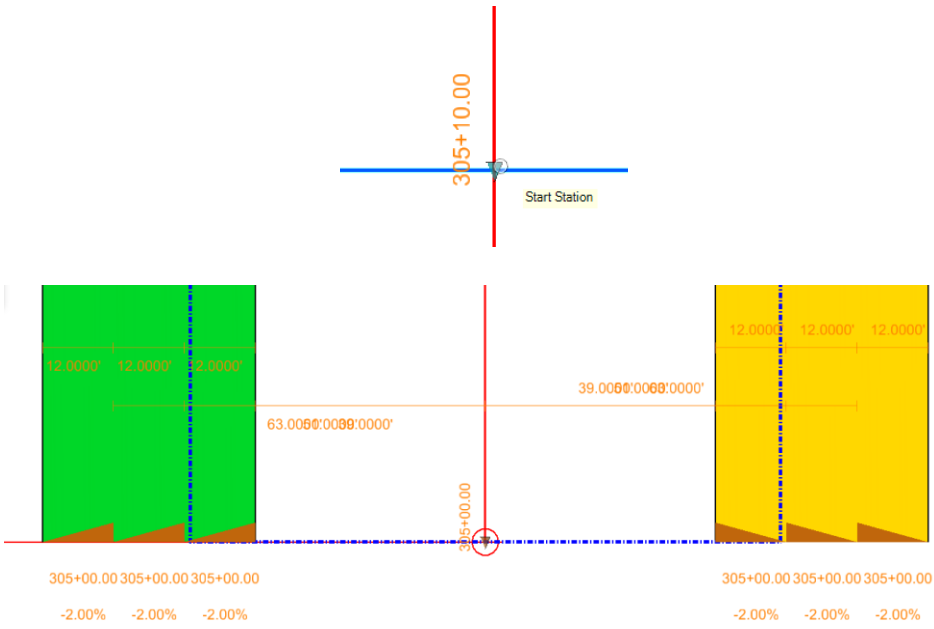
D. Select the orange station text **305+00.00** and change the value to **305+10.00**.



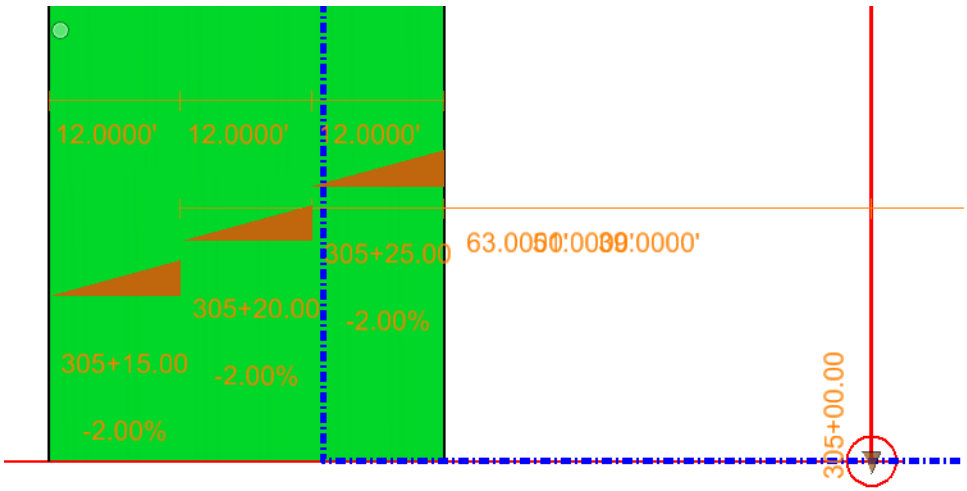
E. Choose Enter or tag a data point on the screen to accept the value and the beginning station for all six superelevation transition shapes will change to **305+10.00**.



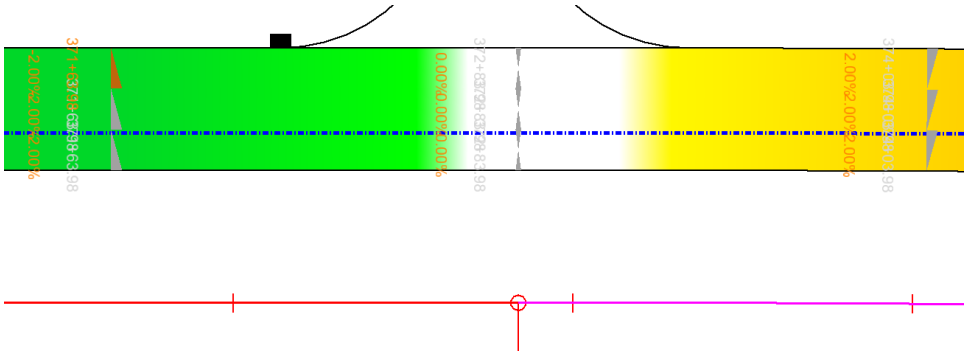
F. Zoom in to the small triangle manipulator for the start station. Select it and **drag** the station back to **305+00.00** and note the six shapes all changed back to **305+00.00** for a starting point



G. Changing each lane's individual stations will change their begin station but note that the fill does not change. Individual lane slopes, widths, and offsets can be changed in this view also.



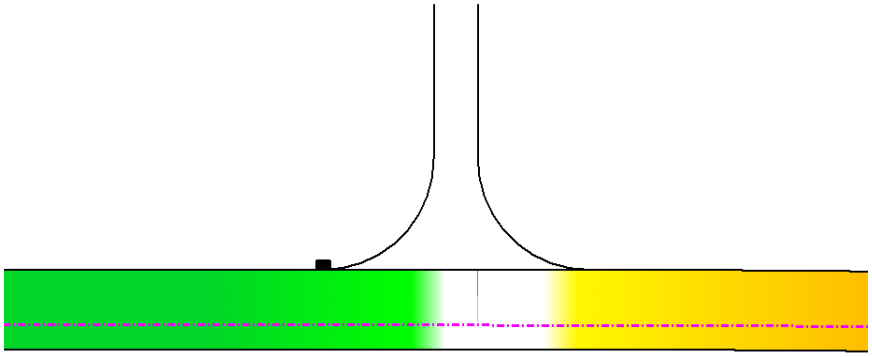
H. Zoom in to the first curve, rotate the view so that left is south, and select the superelevation section **L-1**. Note that the direction of the wedges indicates the slope direction and a double wedge indicates a **0.00%** cross slope. Note that some values are grey indicating they are un-editable in the plan view and constrained to the superelevation rules file causing them to only be editable in the **Superelevation Table Editor** where the constraints can be removed. Some values are orange indicating that are editable and not constrained to the superelevation rules file so they can be edited in the plan view. Note that at **371+63.98**, the outside lane's wedge manipulator is orange while the inside lane's wedge manipulators are grey. That is because the inner lanes are constrained to the outer lanes. Editing the outer lane's station will also move the inner lanes' stations. Note that at **372+83.98**, all of the wedge manipulators are grey since our superelevation rules file ties the **0.00%** cross slope to the beginning of the spiral.



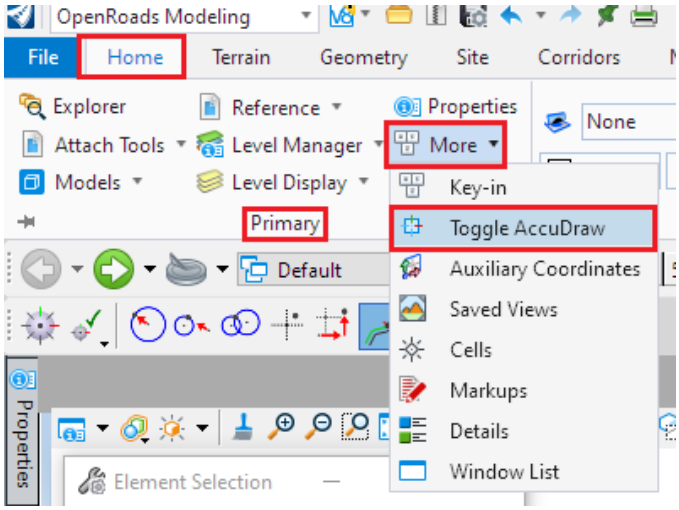
2. Edit the Individual Lanes in plan view graphically and editing text

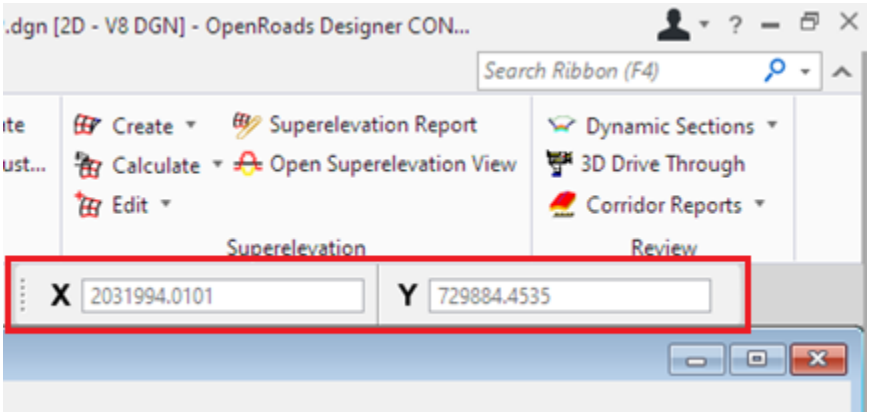
Video 10-10 Edit the Individual Lanes in plan view graphically and editing text
HTTP LINK PLACEHOLDER

A. Consider a design situation where a road turnout connects to the mainline and a catch basin has been placed at the radius point. The hydraulic designers have requested that the 0.015 down to the left super increment be located at the catch basin location so that it catches the water before it runs across the drive.

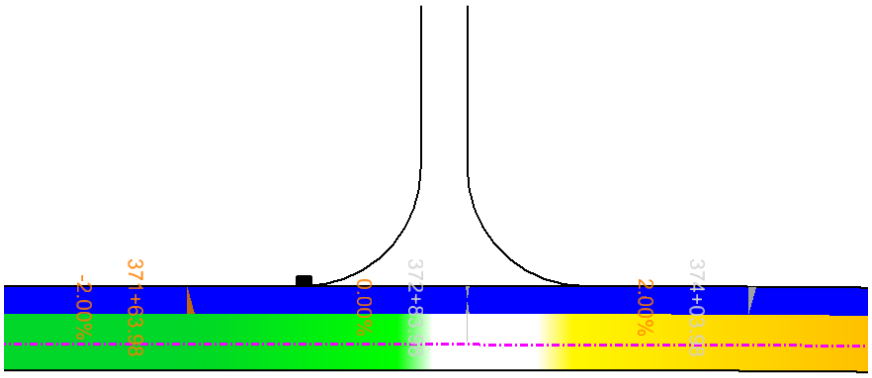


B. Under the *Home* Tab → *Primary* tool group → **More** pulldown → choose the **Toggle Accudraw** tool and dock it to be able to precisely control movement of the transitions.

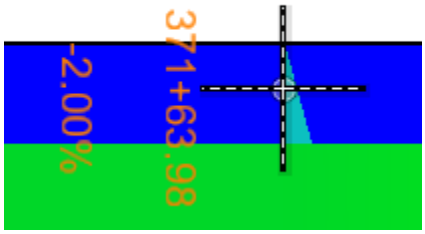




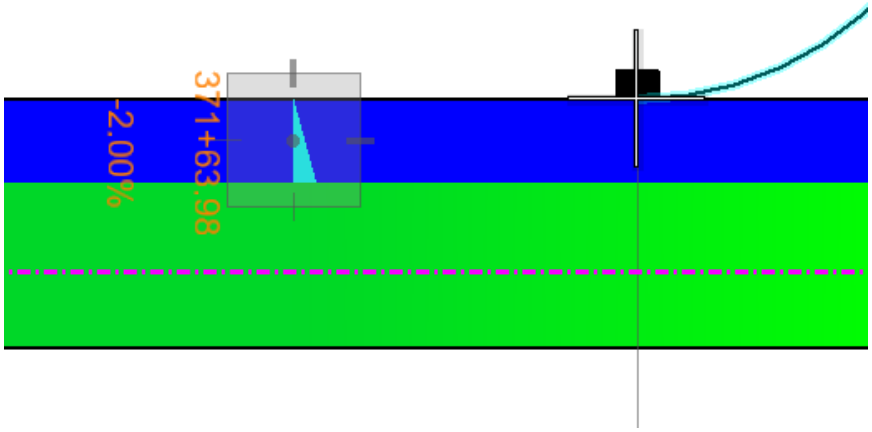
C. Use the **Element Select** tool and select the outside left lane at the beginning of the first curve on **L.**



D. Select the left side of the wedge at **371+63.98** with a **Tentative** selection using a left + right chord or center button, however your mouse is configured. The wedge should now show highlighted.



E. Accept the **Tentative**, drag to the right, and **Tentative** to the radius point.

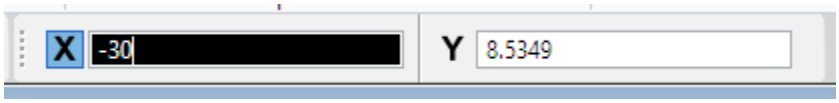


F. Accudraw will show the horizontal distance from the wedge manipulator to the radius to be 49.9973 and pull focus to Accudraw as indicated in the black highlighting.

G. Type the letter "O" to reset the X origin of Accudraw to the radius point

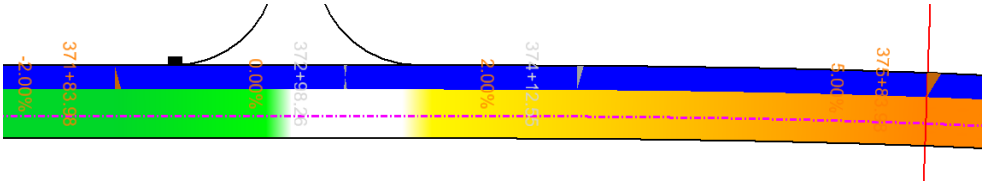
H. Move the mouse to left of the radius point where you placed the tentative point and in the direction that you want to place the wedge and note that the focus is still on the X-Axis tracing the curser's movements.

I. Type 30 to move the curser location 30 feet to the left of the radius point since the increment length is 60 feet and 1/2 of that length is 30 feet which would put the 0.015 point at the catch basin.

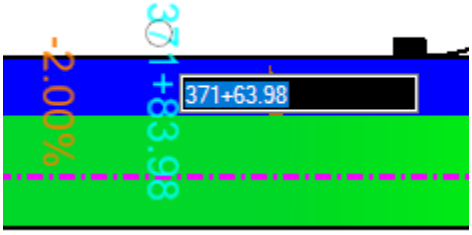


J. Accept the new location with a data point and watch as the superelevation wedge that was originally at **371+63.98** is moved to **371+83.98**.

K. Zoom out and notice that the next two superelevation wedges have also been moved to maintain the correct superelevation transition since they were constrained to the first wedge that was moved. Notice also that the wedge at the SC did not move since it was originally orange and therefore not constrained to the three previous wedges.



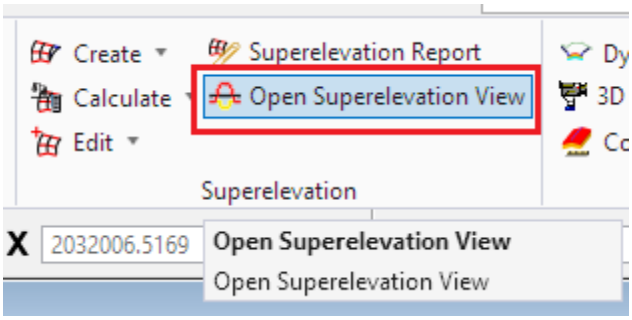
L. Orange superelevation stations and slopes can also be directly edited by choosing the station value and changing it in the heads-up display. Choose the **371+83.98** station text the was just graphically changed, edit the heads-up display, and accept the new station to move it back to its original location at **371+63.98**.



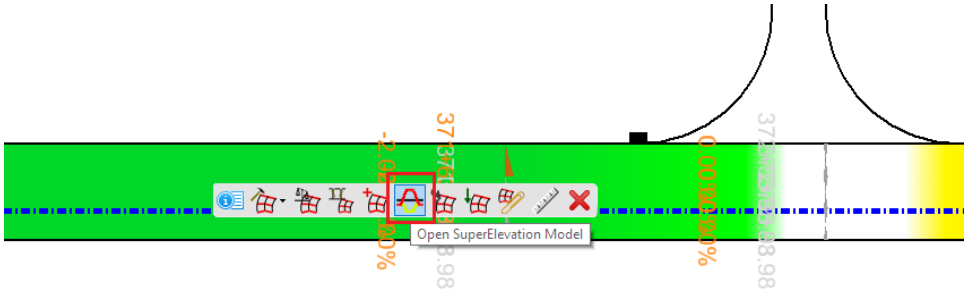
3. Edit the Control Line Diagram in the Superelevation Managed Model View

Video 10-11 Edit the Control Line Diagram in the Superelevation Managed Model View
HTTP LINK PLACEHOLDER

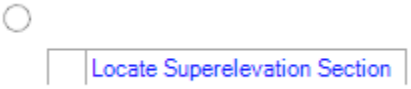
A. Choose the *Corridors* Tab → *Superelevation* tool group → **Open Superelevation View** tool.



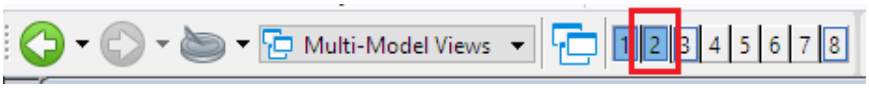
A. Note that this can alternatively be opened in the context sensitive menu after you select the superelevation section although its tool tip shows Open Superelevation Model. Technically both Open Superelevation View and Open Superelevation model is correct because you are opening a model inside of a view.



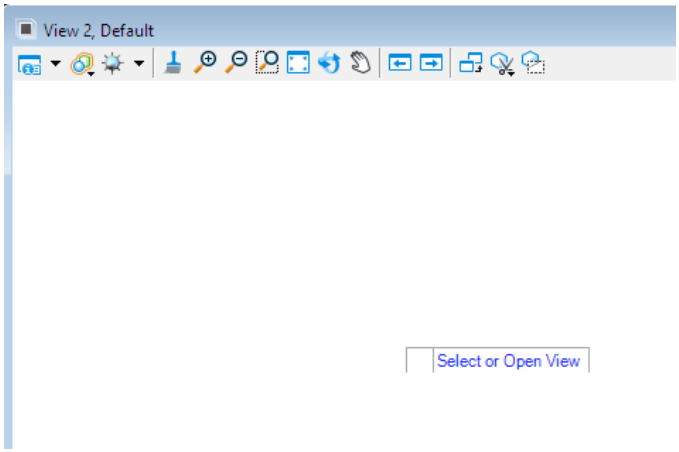
B. Follow the heads-up prompt and choose the **L-1** superelevation section.

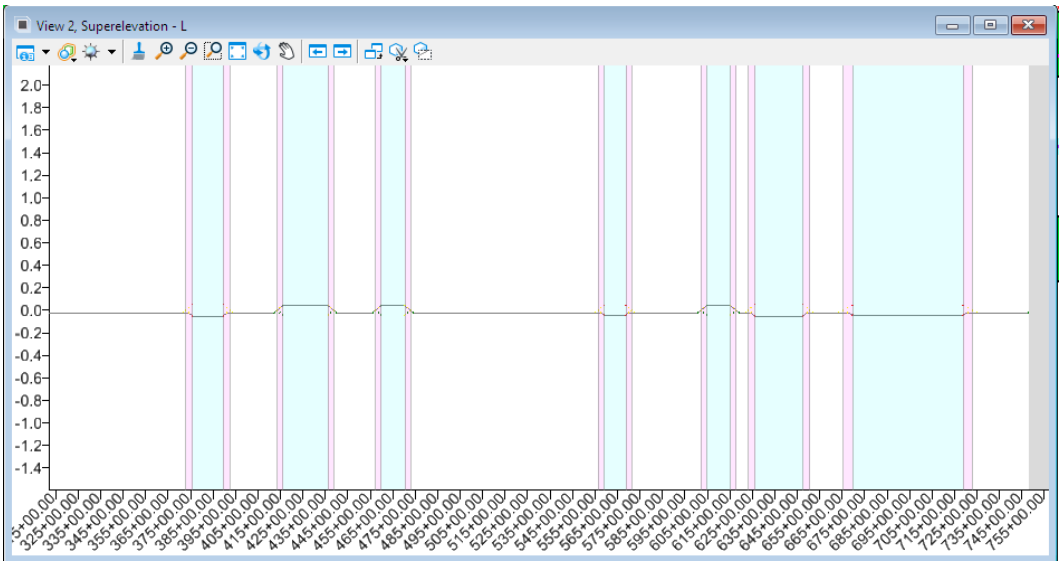


C. Follow the heads-up prompt and choose **View 2** in the view dialog to open it.



D. Follow the heads-up display and place a data point in **View 2** and the Superelevation Model with a diagram will be displayed in **View 2**.



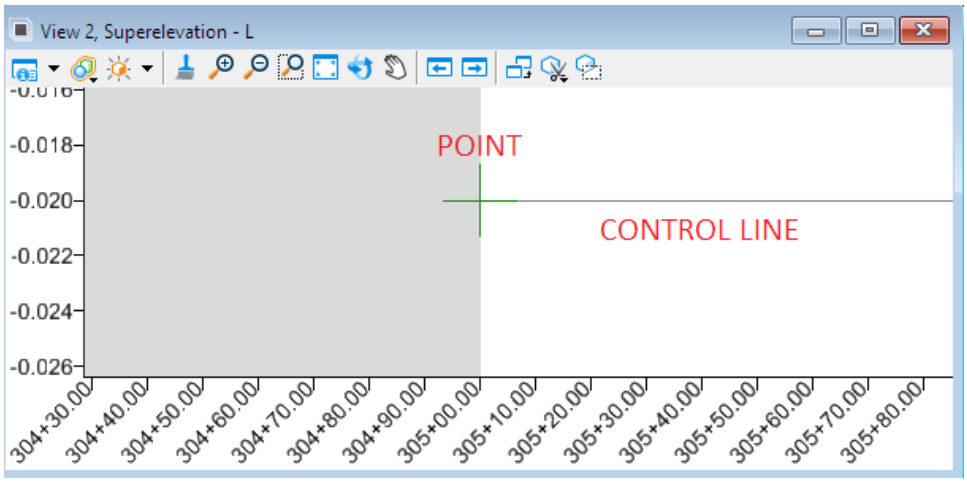


E. Zoom in to the beginning of the alignment to see the **green control point.**

Note that your Superelevation diagram background will be black. The diagram was turned to white for printing purposes.

Note that the color of your control lines may be different due to a bug in ORD's software.

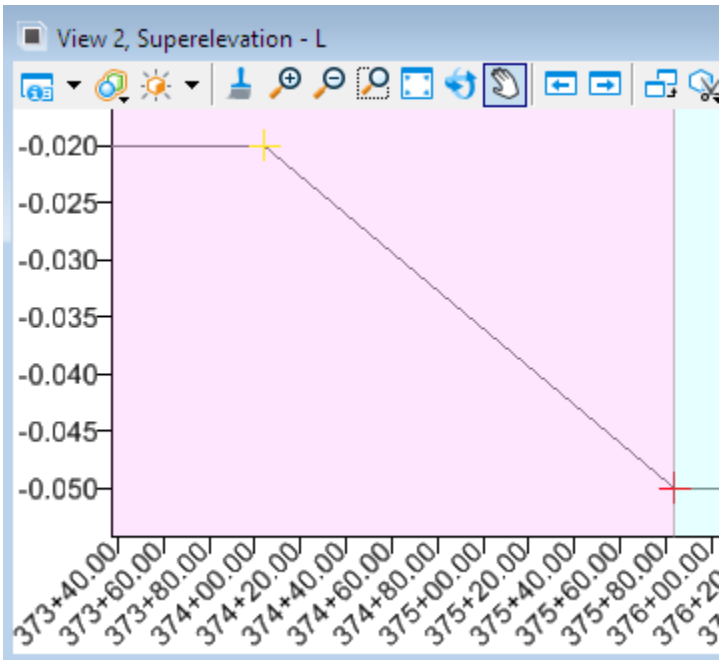
Note that this view shows the superelevation for the entire alignment even though only the **L-1** section was selected.



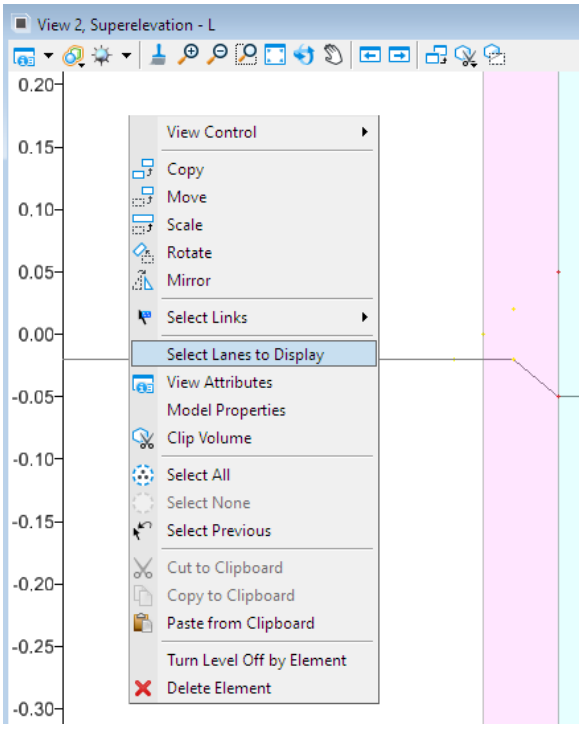
F. Zoom into the first curve's transition section and note the **red and yellow control points.** These represent the control points of the lines that represent the superelevation transition as seen in the plan view. Each lane has superelevation control points and transition lines connecting them, so the user is actually viewing multiple superelevation control lines stacked on top of each other when viewing this diagram.

Editing the control points allows the user to modify the superelevation transition slopes and stations. Much like the control points of a template, the colors represent the constraints on the points as such:

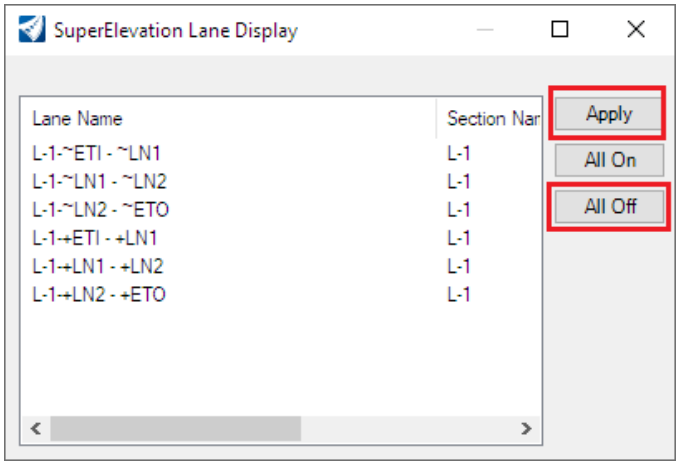
- Red = Fully Constrained (Can't adjust w/o unlocking in Superelevation Editor)
- Yellow = Partially Constrained (Either slope or Station is locked)
- Green = No Constraints (Neither slope nor station is locked)

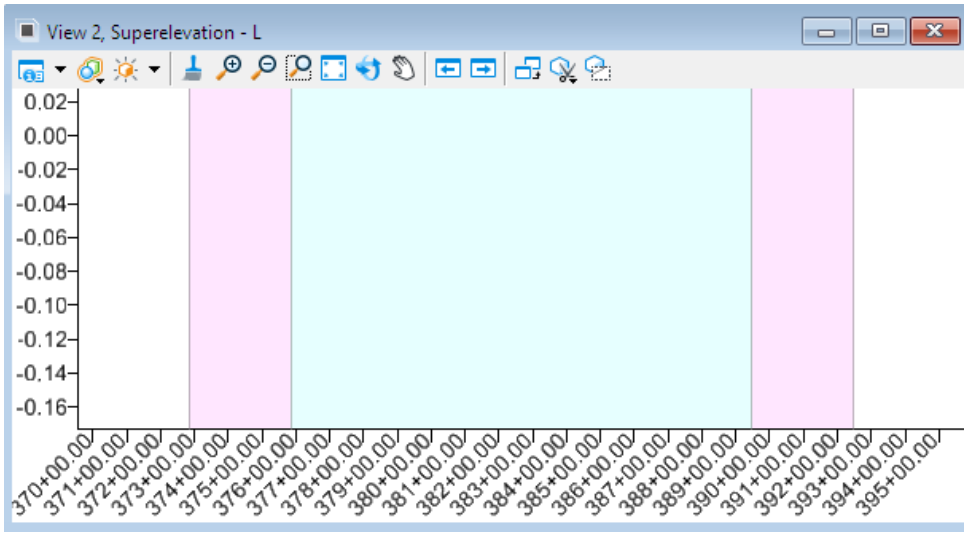

View 2, Superelevation - L
-0.020
-0.025
-0.030
-0.035
-0.040
-0.045
-0.050
373+40.00
373+60.00
373+80.00
374+00.00
374+20.00
374+40.00
374+60.00
374+80.00
375+00.00
375+20.00
375+40.00
375+60.00
375+80.00
376+00.00

G. This diagram can be modified to display only the control line for the superelevation lane you are interested in. Isolating the control line is necessary on multi-lane cross sections to allow the user to edit the correct lane. Right click and hold down the right mouse button in the superelevation view until the pop-up menu appears and select the **Select Lanes to Display** tool.

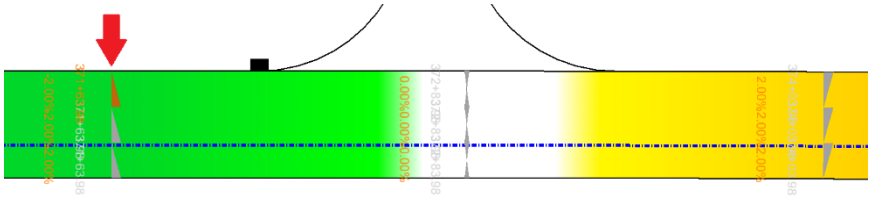


H. When the SuperElevation Lane Display dialog box appears, choose **All Off** and **Apply** to turn off all lanes.

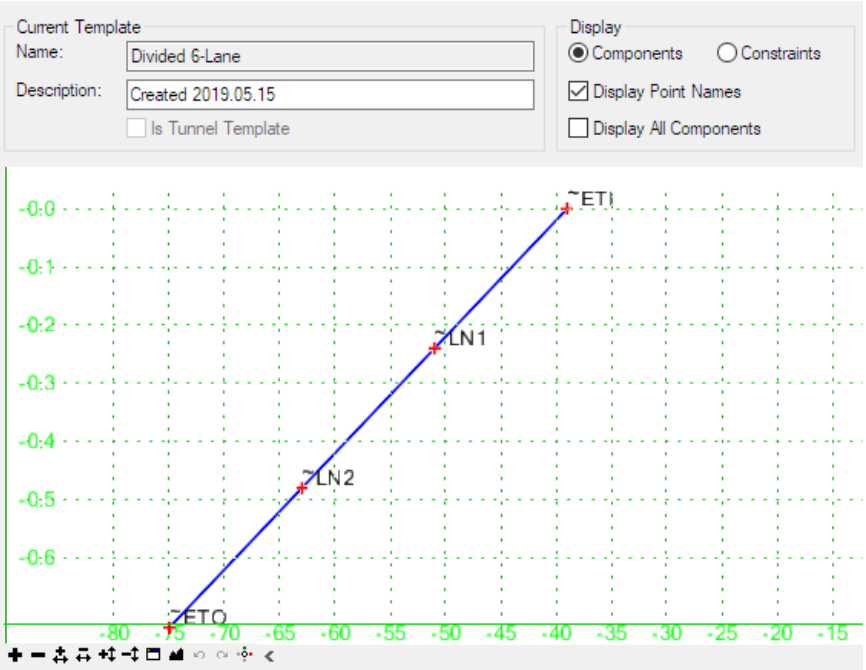




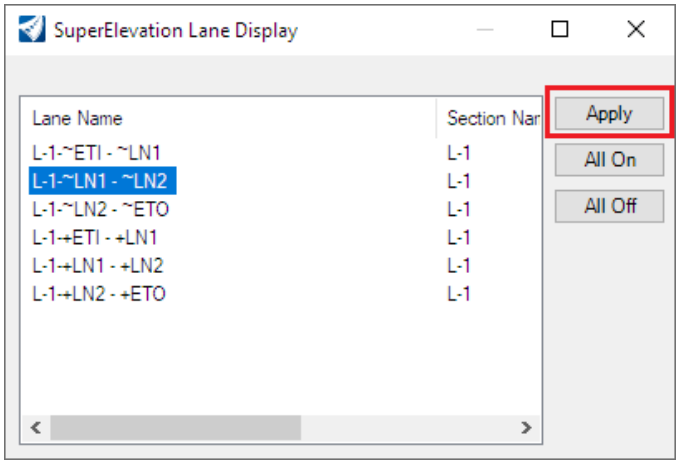
I. Remember from plan view that the **outside lane** was the one that had the editable station and slope and that others only had an editable slope.

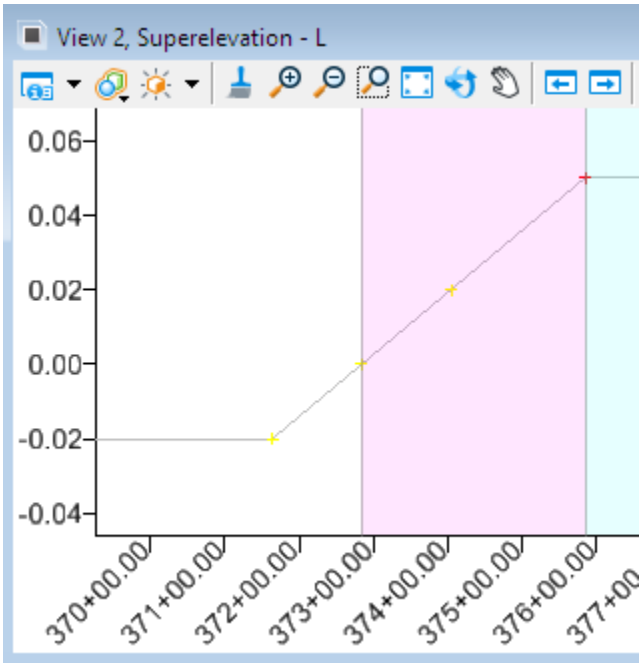


J. Note the point names from the **Divided 6-Lane** superelevation template.

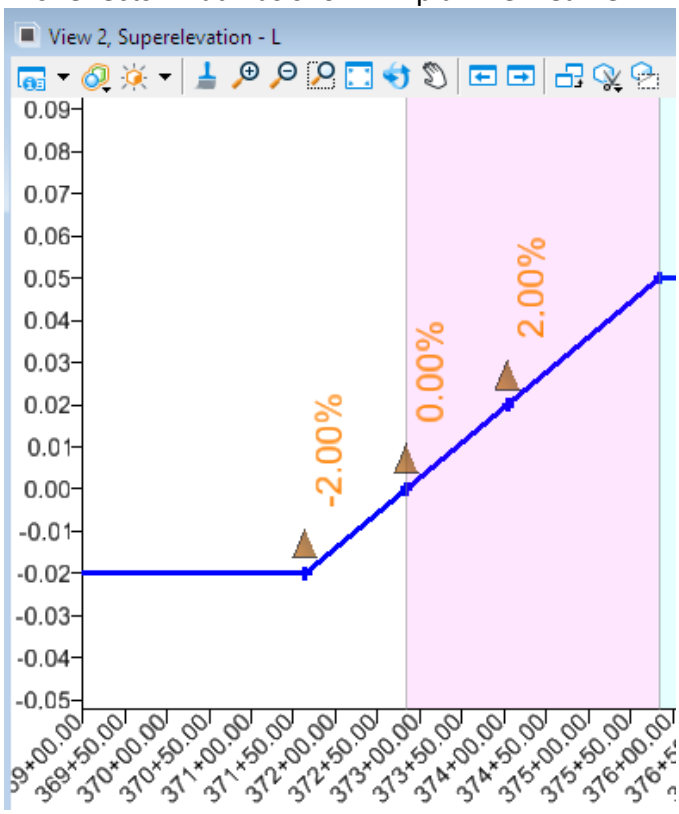


K. Based on the information above choose the center Lane Name **L-1 - ~LN1 - ~LN2** and choose **Apply** to show **only** the control line for that center lane.

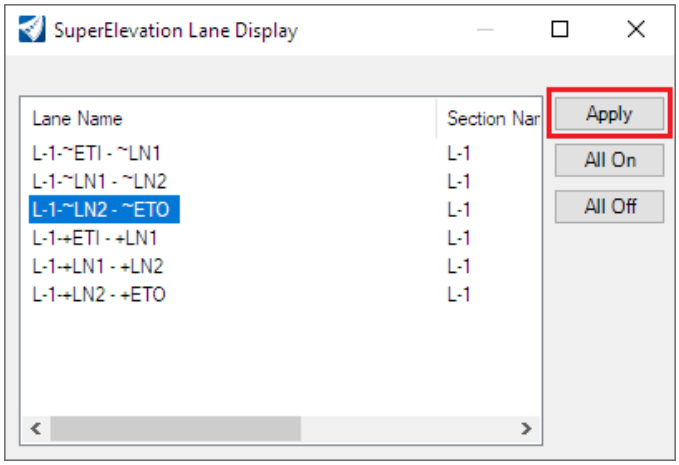



View 2, Superelevation - L
0.06
0.04
0.02
0.00
-0.02
-0.04
370+00.00
371+00.00
372+00.00
373+00.00
374+00.00
375+00.00
376+00.00
377+00

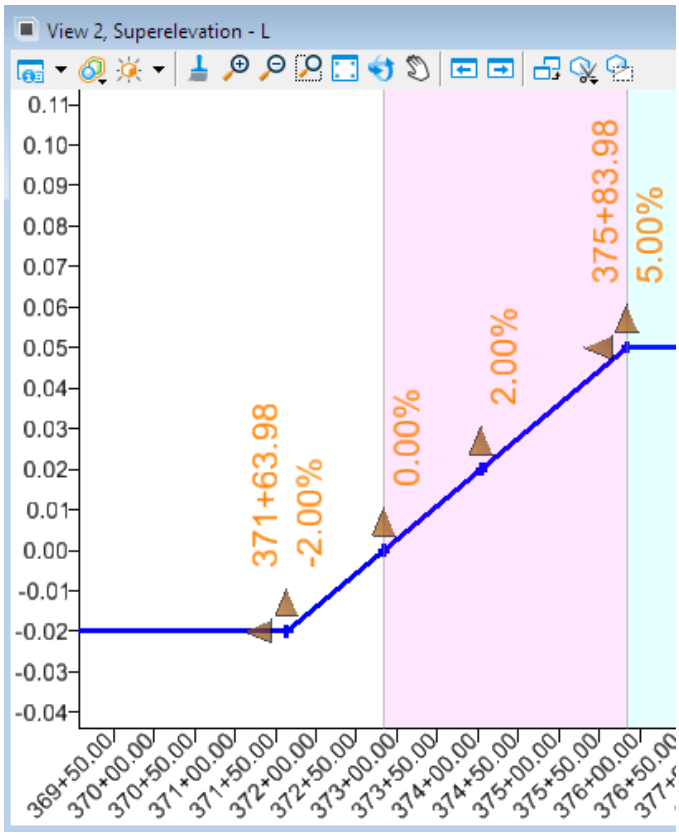
L. Use Element Select to choose the control line for the lane displayed and note that only the **slopes** are editable and can be changed by editing the text or dragging the arrows. This reflects what was shown in plan view earlier.



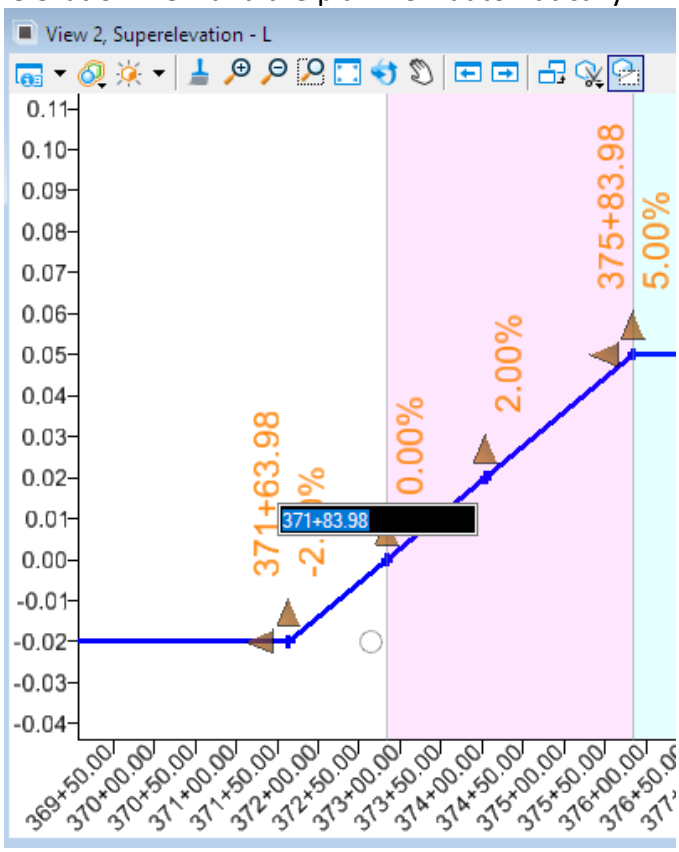
M. Under SuperElevation Lane Display, choose the outermost lane Name **L-1 - ~LN2 - ~ETO** and choose **Apply** to show only the control line for only the outside lane.



N. Use Element Select to choose the control line for the lane displayed and note that the **slopes** and **stations** are editable and can be changed by editing the text or dragging the arrows. This also reflects what was shown in plan view earlier.



O. Edit the **371+63.98** station to be **371+83.98** to align the 0.015 cross slope to the catch basin as we did before in plan view graphically. This change will reflect in the Superelevation View and the plan view automatically.



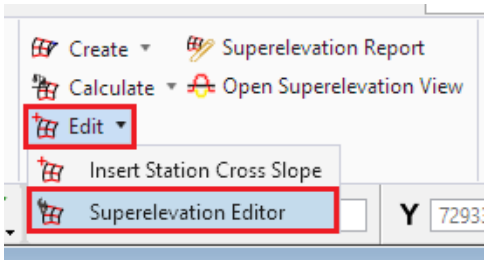
P. Change the station back to **371+63.98** and close the SuperElevation Lane Display dialog.

4. Edit the Superelevation Lanes using the Superelevation Table Editor

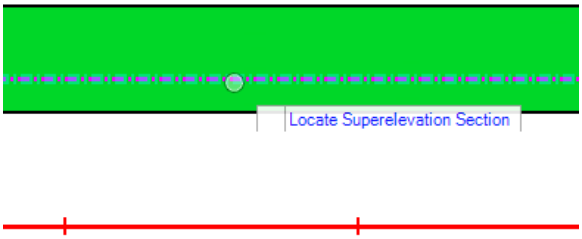
Video 10-12 Edit the Superelevation Lanes using the Superelevation Table Editor
HTTP LINK PLACEHOLDER

The superelevation table editor provides an interface for viewing and editing superelevation transitions and their constraints in a familiar table format. The columns in the table can be hidden, rearranged, and even renamed for the user's preferences. Data in the columns can be sorted to better find the transition that the user would like to view or edit. The table is accompanied by a graphical display of the table's values with a view control toolbar. Edits to the table can be made with the aid of toolbar and are immediately reflected in the graphical display, which can also be turned off if desired, and reflected in the plan view graphical superelevation transition lanes and vice versa. Because of this, it is suggested that you place the Superelevation Editor on one monitor while the plan view of the superelevation lane transitions is, If available, on the other monitor.

A. Choose the *Corridors* Tab → *Superelevation* tool group → **Edit** Pulldown **Superelevation Editor** tool to launch the Superelevation Editor.

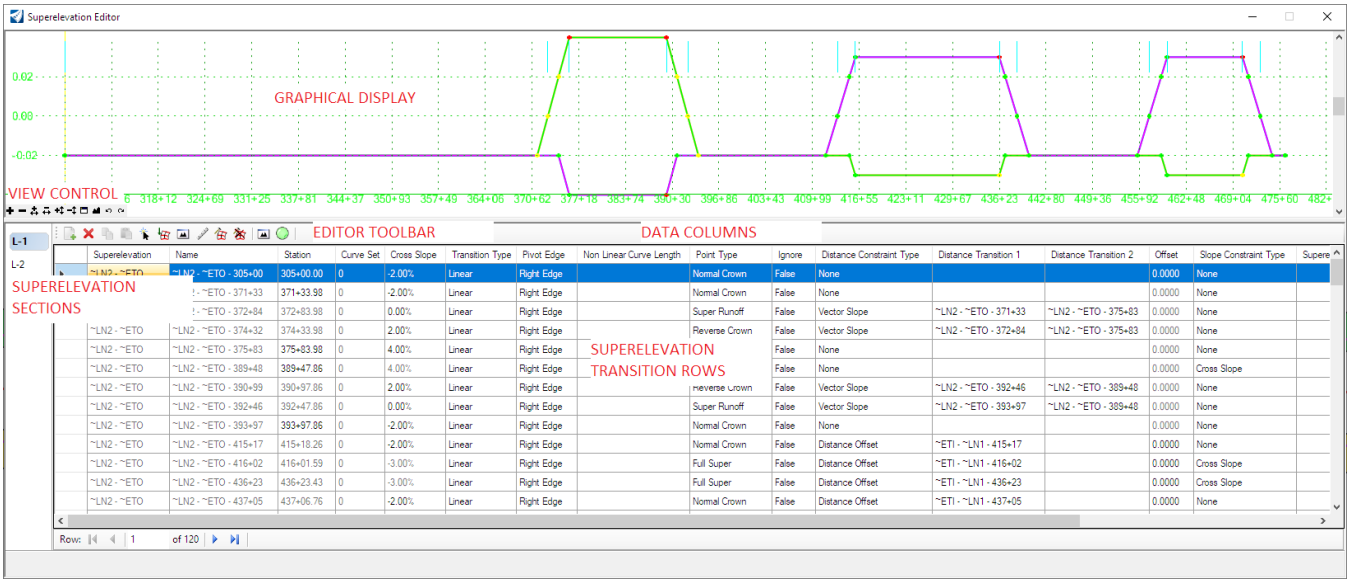


B. When ORD prompts for the Superelevation Section, Choose the **L-1** section.

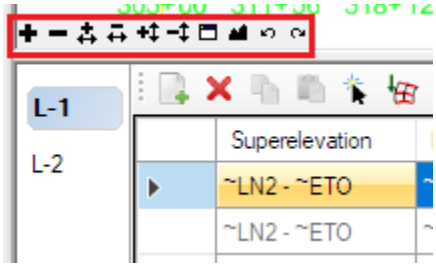


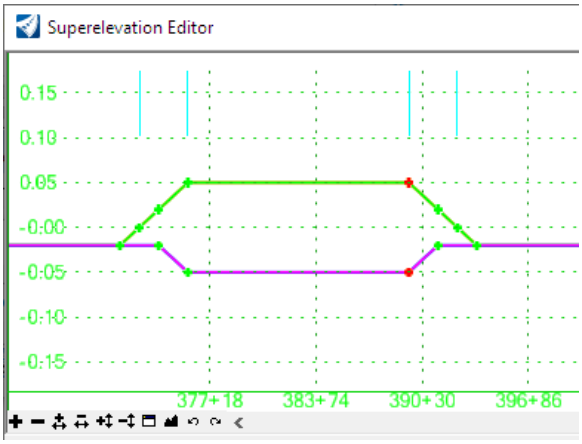
C. The Superelevation Editor will launch. Key features of the Editor are noted in red on the diagram. The purple control lines trace the right side of the pavement and the green trace the left side of the payment. (Your colors may vary due to a bug in ORD's software.) Note that the upper graphical display cannot be directly edited. It only reflects changes made to the rows below. As with the Superelevation Managed Model View as well as templates, the control line diagram in the upper portion of the Superelevation Editor connect to control points with varying degrees of constraints.

- Red = Fully Constrained (Can't adjust w/o unlocking in Superelevation Editor)
- Yellow = Partially Constrained (Either slope or Station is locked)
- Green = No Constraints (Neither slope nor station is locked)

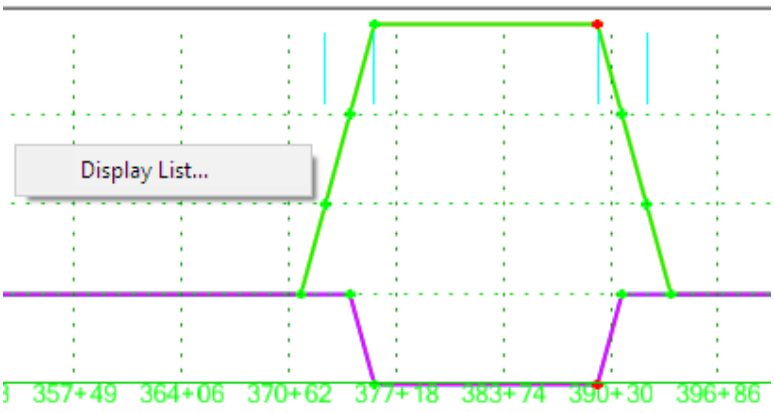


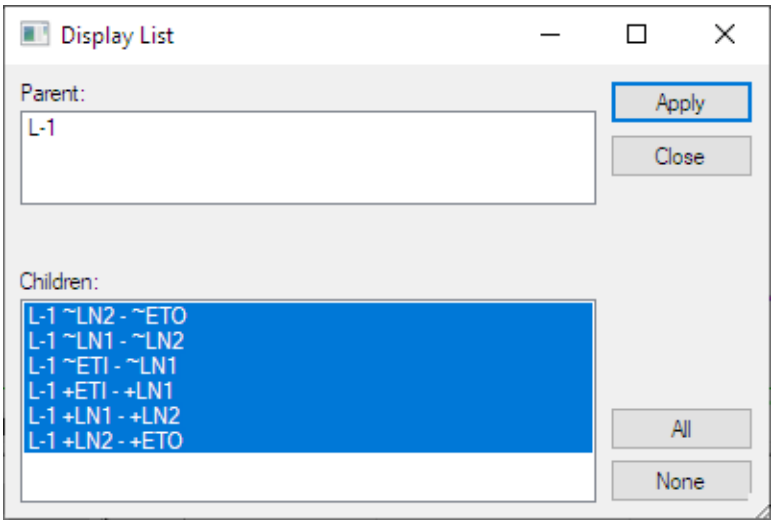
D. Practice using the graphical display toolbar as well as mouse commands to change the graphical view in order to be able to better see changes you will make in the tables below. Also note the name of the Superelevation Section **L-1** and **L-2** below the toolbar. Choosing the section will cause the transitions for that section to populate the table editor and show in the graphical display.



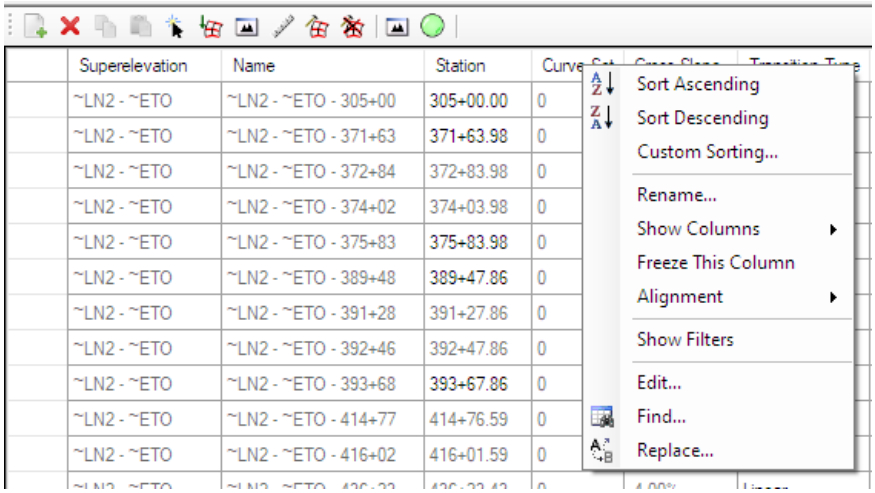


E. **Right click** over the graphical display and open the Display List dialog where the six color-coded lanes can be turned on and off individually for isolated viewing.

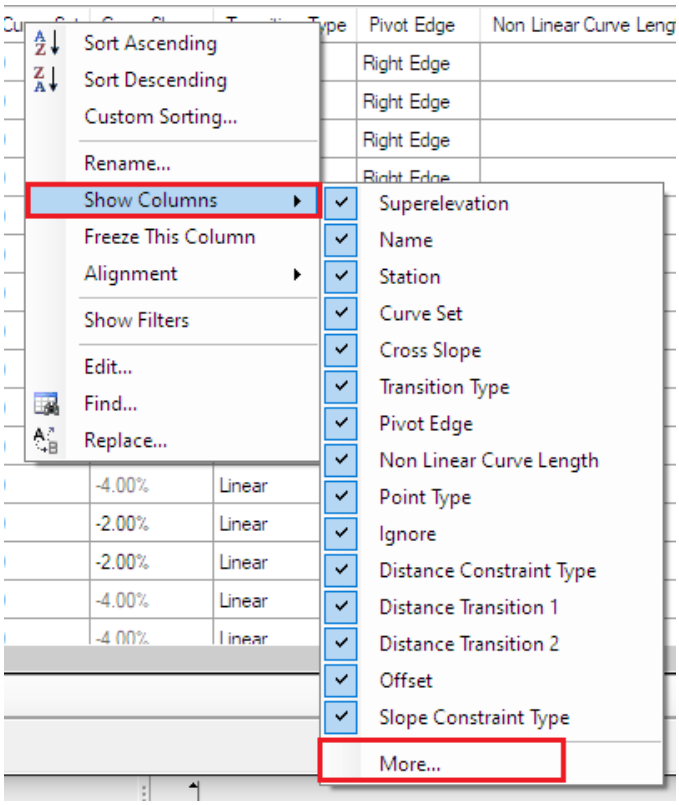


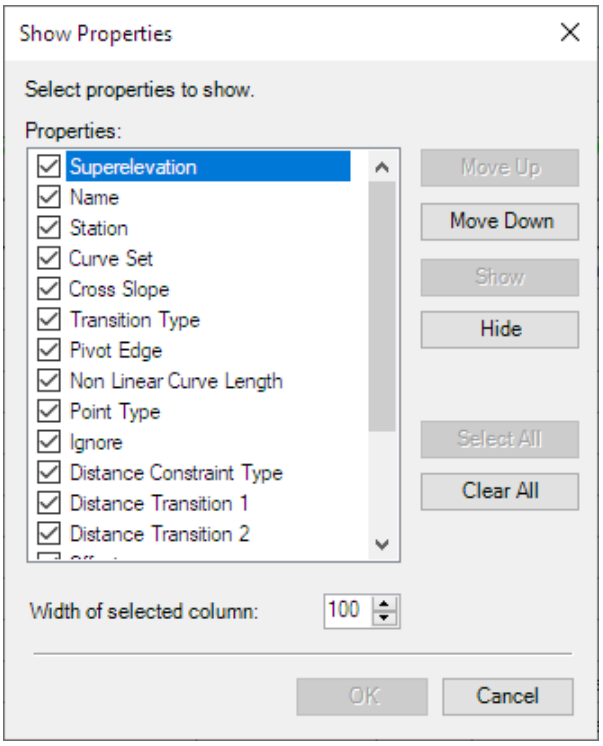


F. **Right click** over a data column to show that they can be sorted in various ways, renamed, displayed and un-displayed, frozen, and their contents filtered.

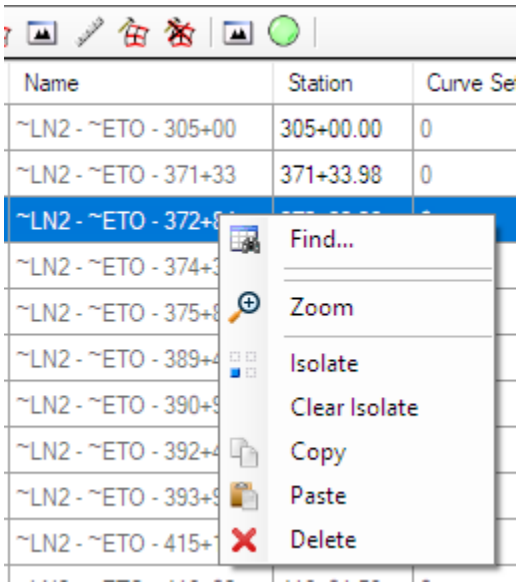


G. Under the same **right click**, navigate under the **Show Columns** → **More** → **Show Properties** tools to find more settings such as column width and the ability to display, un-display, and **reorder** the columns according to the user's preferences.

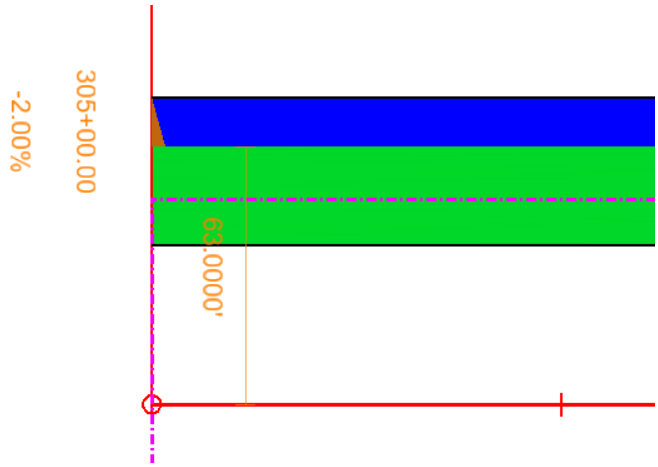




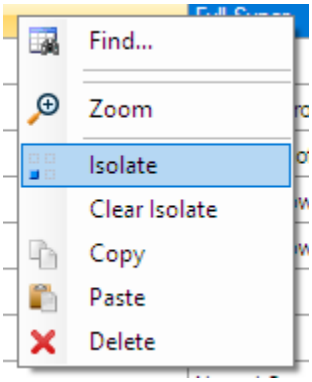
H. Right clicking over a row allows the user to find and replace data in the table, zoom or isolate a shape that has been selected in **PLAN VIEW** (not the table), copy, paste and delete data from the table.



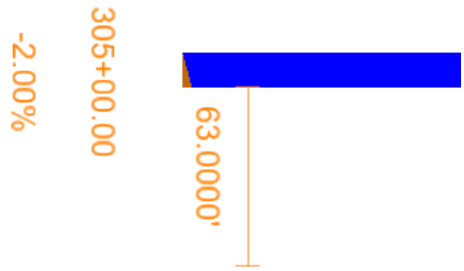
I. In Plan View, select the leftmost shape in section **L-1**.



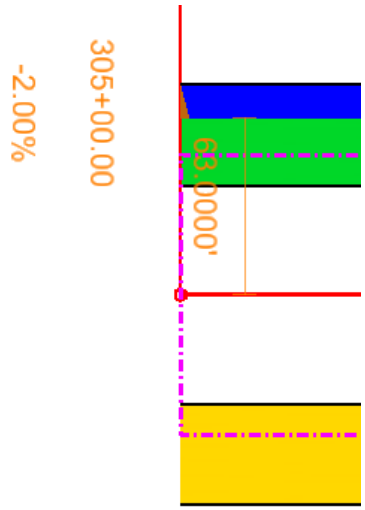
J. Right click anywhere over the data columns in the Superelevation Editor and choose **Isolate.**



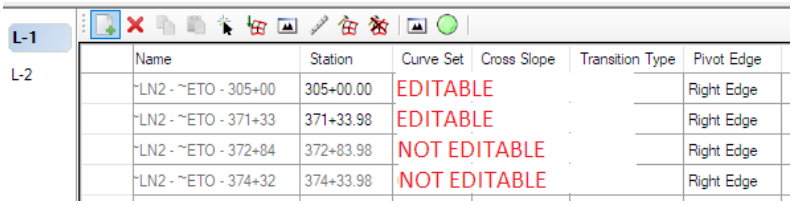
K. Note in plan view that only the chosen shape is showing.

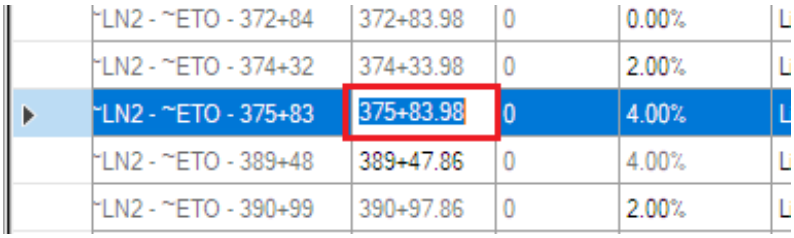


L. Right click anywhere over the data columns in the Superelevation Editor and choose **Clear Isolate** to return plan view back to the default display.



M. Note that some of the superelevation transition row values are black and some are grey. The black values are editable and the grey values aren't due to the constraints place on them by the NCDOT superelevation rules file. If it is difficult to see the subtle difference between the grey and the black, quickly choosing the cell will reveal if it is editable.

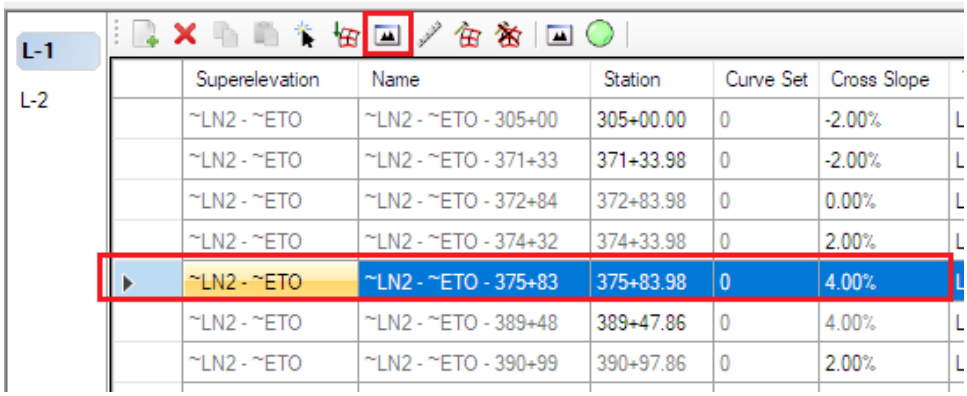




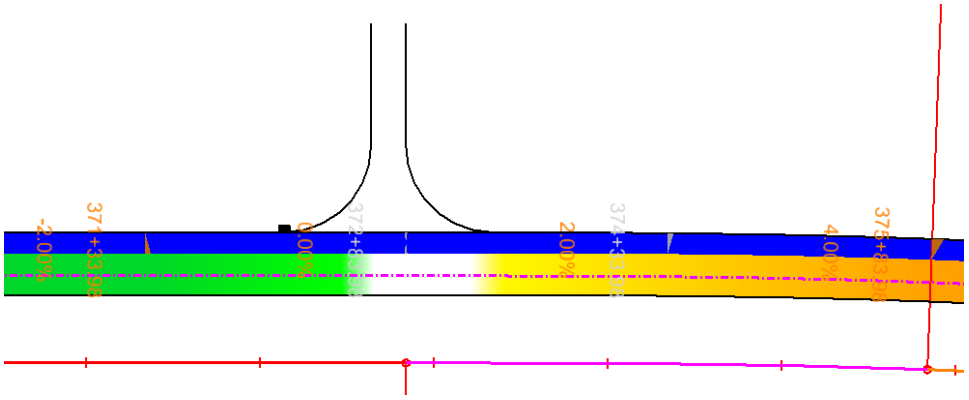
N. Note the two columns towards the right of the Superelevation Editor named **Distance Constraint Type** and **Slope Constraint Type.** Note the different types of constraints placed on these transitions by the NCDOT superelevation rules file. Note that these rows are un-editable due to these constraints.

Distance Constraint Type	Distance Transition 1	Distance Transition 2	Offset	Slope Constraint Type
None			0.0000	None
None			0.0000	None
Vector Slope	~LN2 - ~ETO - 371+33	~LN2 - ~ETO - 375+83	0.0000	None
Vector Slope	~LN2 - ~ETO - 372+84	~LN2 - ~ETO - 375+83	0.0000	None
None			0.0000	None
None			0.0000	Cross Slope
Vector Slope	~LN2 - ~ETO - 392+46	~LN2 - ~ETO - 389+48	0.0000	None
Vector Slope	~LN2 - ~ETO - 393+97	~LN2 - ~ETO - 389+48	0.0000	None
None			0.0000	None
Distance Offset	~ETI - ~LN1 - 415+17		0.0000	None

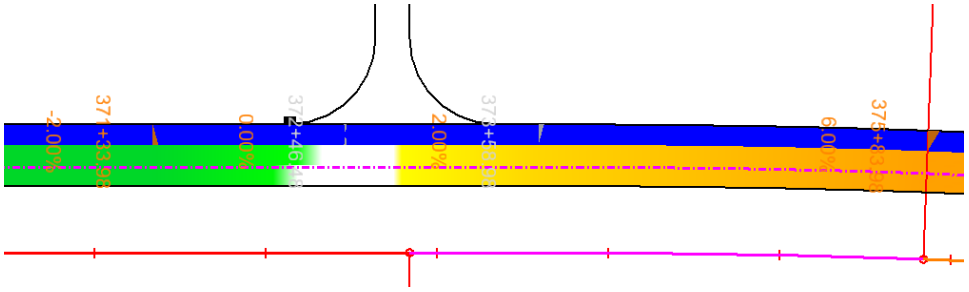
O. Choose the row from the **~LN2 - ~ETO** superelevation lane at station **375+83.98** and choose **Fit Selected Superelevation Transitions** to zoom to this transition in plan view.



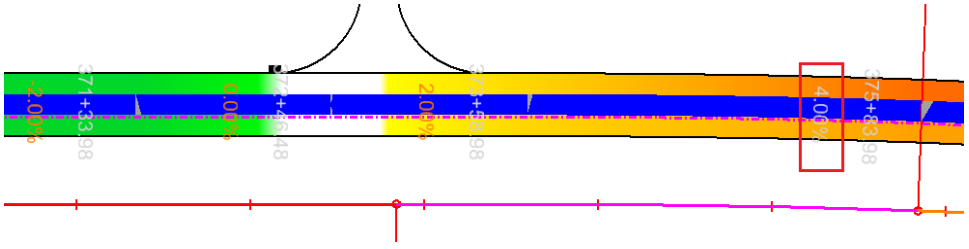
P. Zoom out and rotate, if necessary, from the automatic zoom to show the first curve's transition. Select the leftmost superelevation shape.



Q. While watching the plan view on one screen, change the cross slope for the selected row from **-4.00%** to **-6.00%** in the Superelevation Editor. Note the immediate revision to the slope and how the three previous control stations shifted to accommodate the extra transition length needed to get up to a -6.00%. Note also that the cross slope at **389+47.66** also changed to **-6.00**% as well as the trailing transition control stations. This demonstrates the practicality of using constraints to assist in maintaining correct superelevation transition rates.



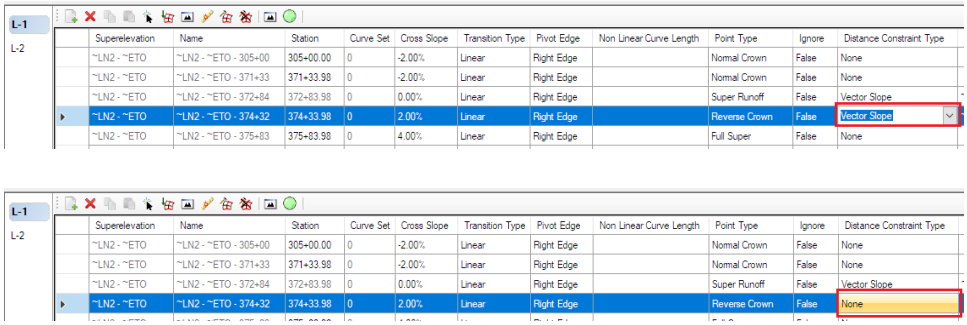
R. Select the middle left lane and note even though the transitions shifted for this and the inner lane, the cross slope at **375+83.98** remains at **-4.00%** and will need to be changed to match the outer lane.



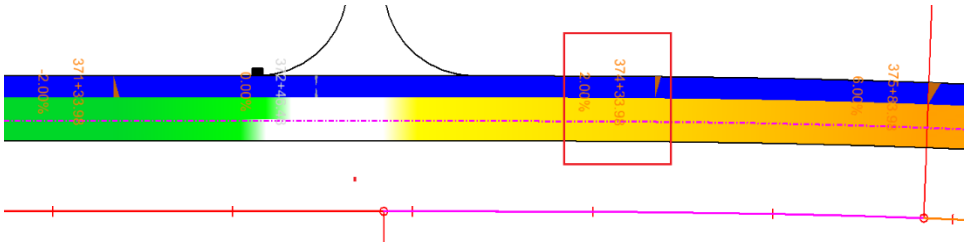
S. In the plan view, change the full super back to **-4.00%**. for the outer lane and note how the **Superelevation Editor** changes to reflect the plan view change.

T. Choose the row that contains the section named **~LN2 - ~ETO – 375.83** row and choose **Fit Selected Superelevation Transitions** to zoom to this transition in plan view.

U. Choose the row from the **~LN2 - ~ETO** superelevation lane at station **374+33.98** and change the **Distant Constraint Type** from **Vector Slope** to **None**.



V. Select the leftmost superelevation shape as before. Go back to the row that was edited before, **~LN2 - ~ETO** superelevation lane at station **375+83.98** and while watching the plan view on one screen, change the cross slope for the selected row from **-4.00%** to **-6.00%** in the Superelevation Editor. Note that the control points at **371+33.98** and **372+46.48** changed but the control point at **374+33.98** did **NOT** change because we removed the **Distance Constraint Vector Slope** constraint.



W. Superelevation Editor Toolbar

- Adds a new point on the superelevation control line. (same as Insert Station Cross Slope on main menu)

- Deletes the selected rows from the table

- Copies data from an EDITABLE cell in the table

- Pastes data into and EDITABLE cell in the table

- Make graphical edit – inoperable within Superelevation Editor. Use Superelevation View described above for graphical editing.

- Import superelevation transitions from a CSV file

- Fits the selected superelevation **Transition(s)** into the plan view

- Deactivates rules – inoperable

- Creates superelevation lanes

- Deletes superelevation lanes

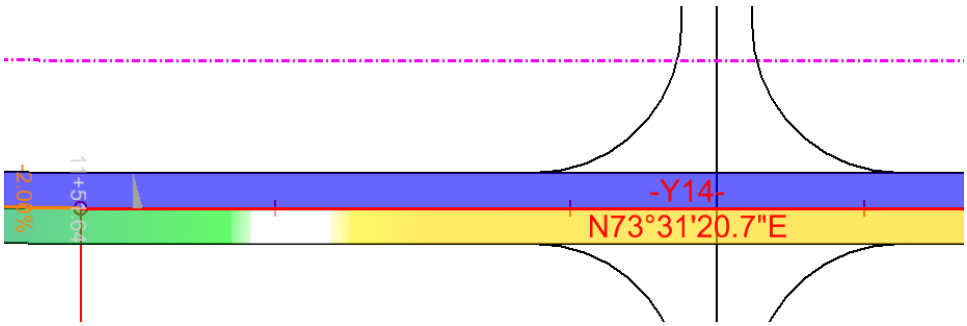
- Fits the selected superelevation **Section** in the plan view

- Toggles on/off the graphical display

5. Edit the Superelevation Lane using Insert Station Cross Slope

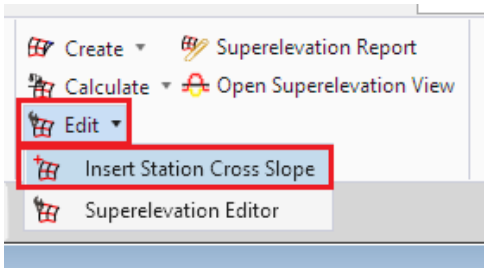
Video 10-13 Edit the Superelevation Lane using Insert Station Cross Slope
HTTP LINK PLACEHOLDER

A. Zoom into the **Y14** station **13+50** and note the intersection. Use element select to choose the left superelevation transition lane and note that the intersection occurs in **2.00%** normal crown

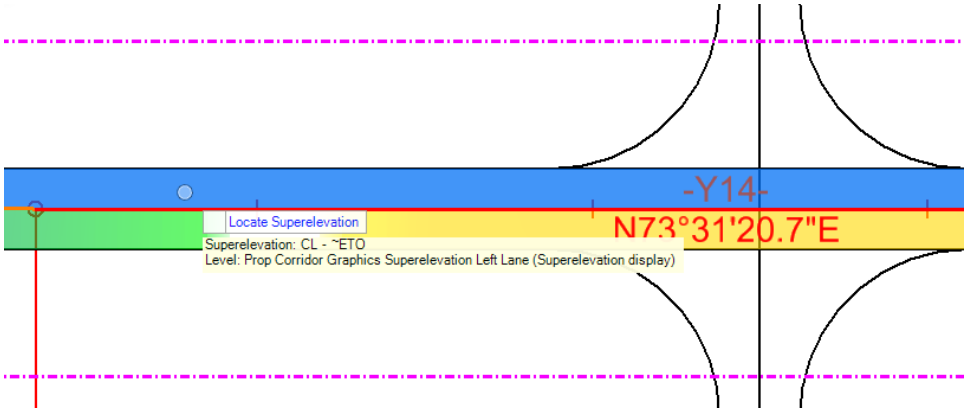


B. Consider a design situation where a 2 lane, undivided road travels through an intersection and it has been determined that it would be best to slightly warp the mainline superelevation approaching the intersection to allow for a better grade through the intersection for the side road. A transition from a 2.00% normal crown up to 1.00% cross slope and from 1.00% cross slope back down to 2.00% can be inserted into the current superelevation transition on Y14.

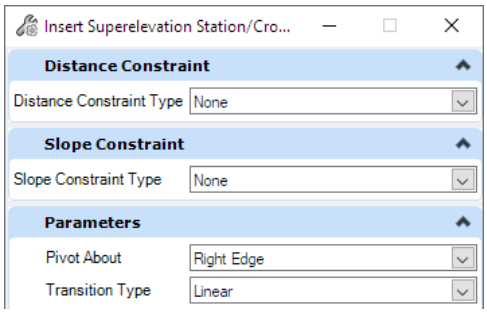
C. Choose the *Corridors* Tab → *Superelevation* tool group → **Edit** Pulldown **Insert Station Cross Section** tool to launch the Superelevation Editor.



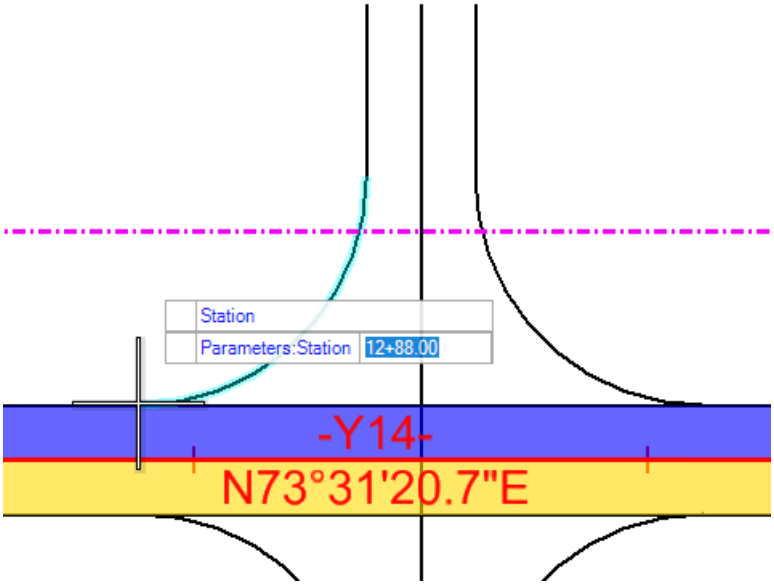
D. Choose and accept the **CL - ~ETO left lane** of the Y14-1 Superelevation section when the **Locate Superelevation** heads-up display appears.



E. Accept the heads-up display for the following values:



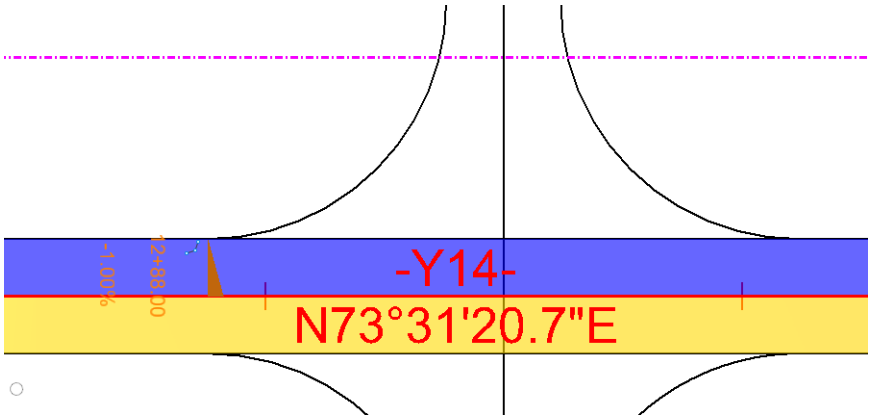
F. When the head-up display prompts for a station, tentative and accept the left radius point with Y14 and accept the 12+88 station.



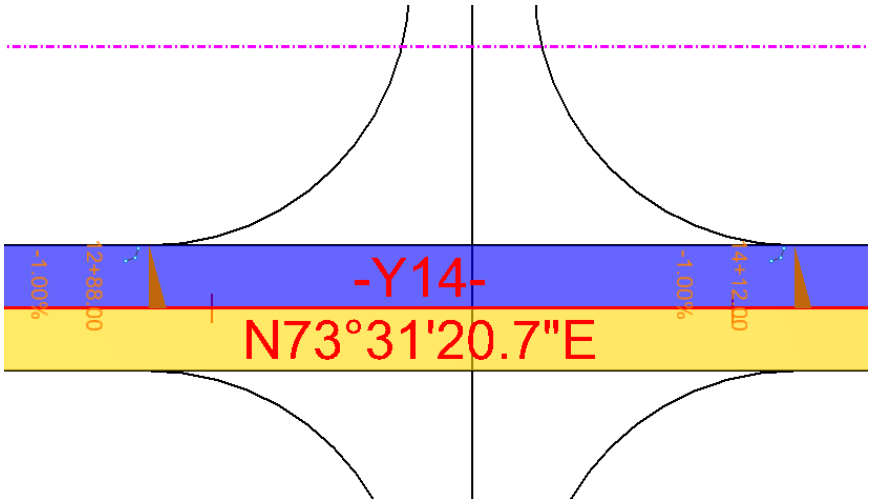
G. When the head-up display prompts for a cross slope, type in **-1.00** and accept to specify a **-1.00%** cross slope through the intersection.

H. Accept the **Undefined Type** for the point type.

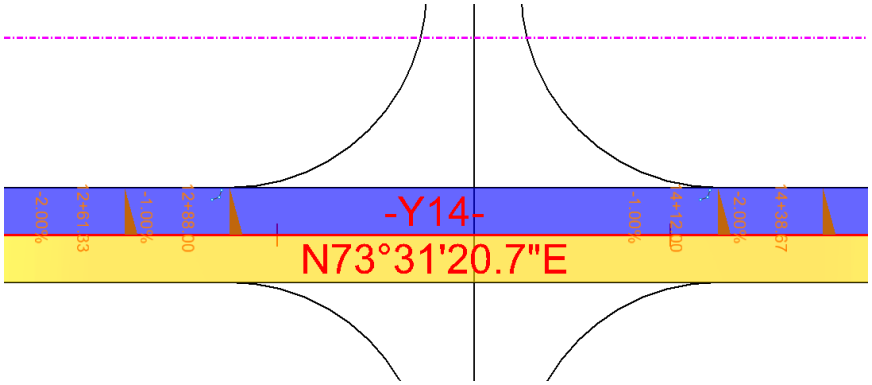
I. Note the new station that has been added.at **12+88.00** with a **-1.00%** cross slope.



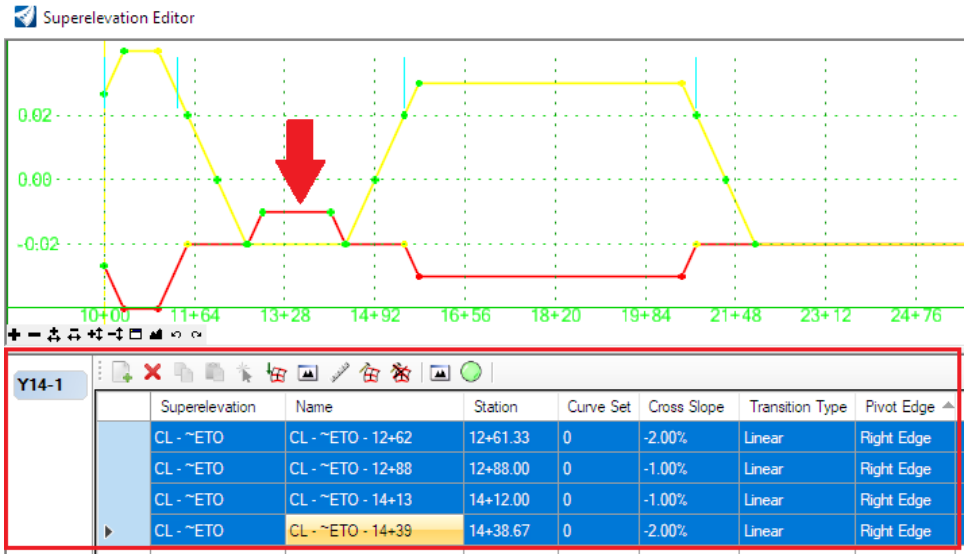
J. Repeat this process at the other radius return with the same settings except for the **14+12.00** station.



K. Since the superelevation increment is 26.67', add two more stations at **12+61.33** and **14+38.67** with a normal crown cross slope of **-2.00%.**



L. Open the superelevation editor and note the new transitions displayed in the table and the diagram allowing a smooth transition from **-2.00% to -1.00**%, **-1.00%** through the intersection and then transitioning back down from **-1.00% to -2.00%**

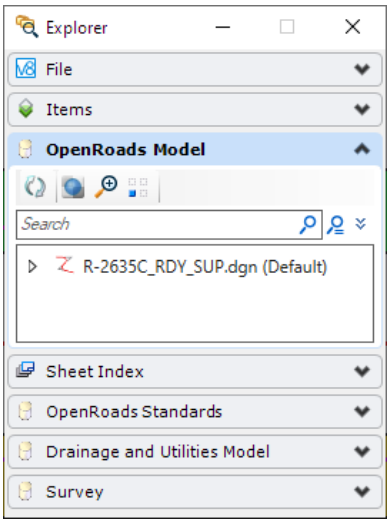


Superelevation	Name	Station	Curve Set	Cross Slope	Transition Type	Pivot Edge
CL - ~ETO	CL - ~ETO - 12+62	12+61.33	0	-2.00%	Linear	Right Edge
CL - ~ETO	CL - ~ETO - 12+88	12+88.00	0	-1.00%	Linear	Right Edge
CL - ~ETO	CL - ~ETO - 14+13	14+12.00	0	-1.00%	Linear	Right Edge
CL - ~ETO	CL - ~ETO - 14+39	14+38.67	0	-2.00%	Linear	Right Edge

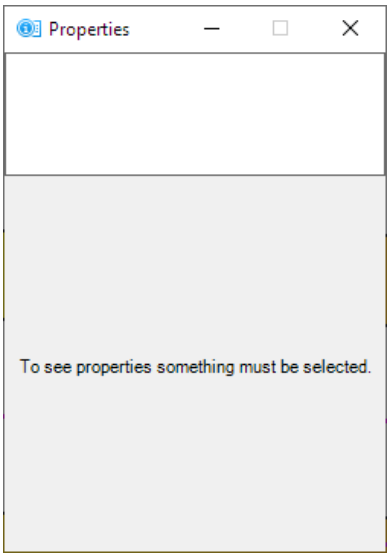
6. Edit the Superelevation Section or Lanes using Properties

Video 10-14 Edit the Superelevation Section or Lanes using Properties
HTTP LINK PLACEHOLDER

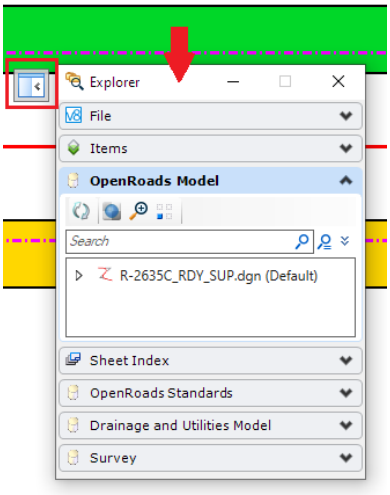
A. Choose the *Home* Tab → *Primary* tool group → **Explorer** tool and it will open on the screen.



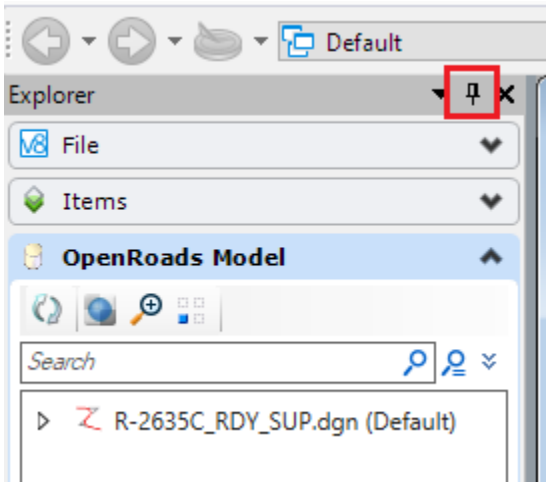
B. Choose the *Home* Tab → *Primary* tool group → **Properties** tool and a dialog box will open on the screen.



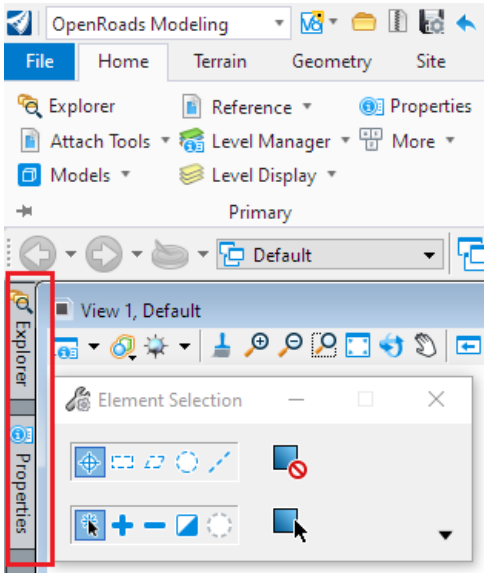
C. Grab the **Explorer** dialog box in its top border area and drag over the **Left Docking Icon** to dock the Properties dialog box to the left of View 1.



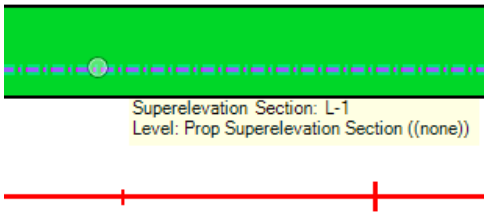
D. Choose the **Pin** to minimize it to the left of View 1.



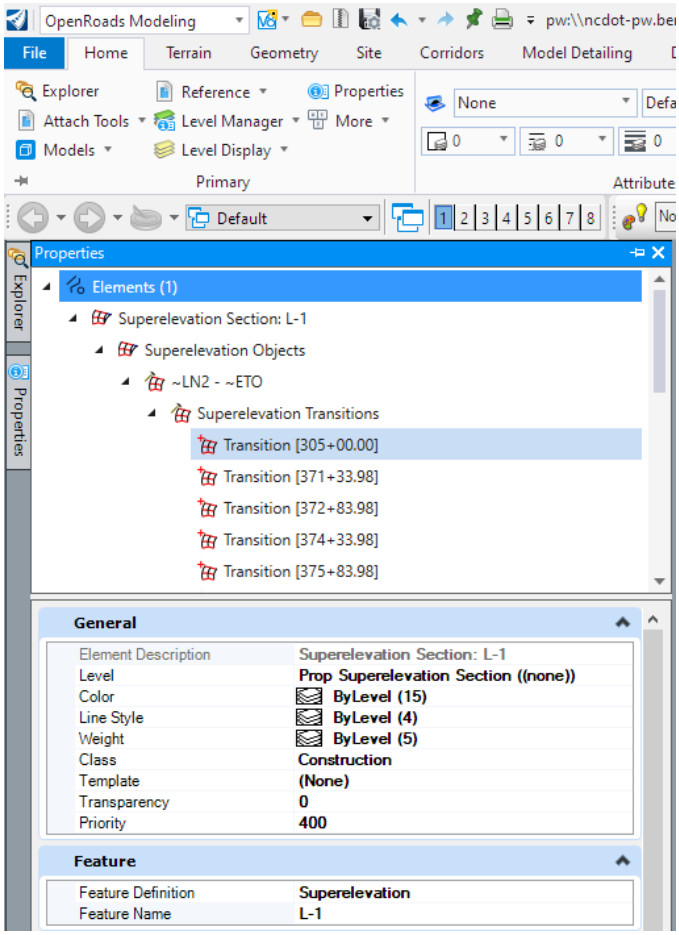
E. Do the same procedures with the **Properties** dialog to place it minimized to the left of View 1. These two tabs will be used throughout ORD design.



F. Using **Element Select**, choose the **Superelevation Section L-1**.



G. Choose the **Properties Tab** to the left of **View 1** and the **Properties Dialog Box** will fly out allowing you to see and edit the properties of the **individual Superelevation Objects** and transitions at the **top** and edit the values of the **overall Superelevation Section** at the **bottom**.



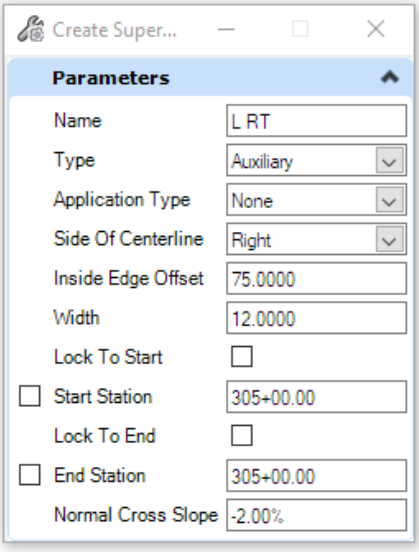
H. Pull your mouse away from the dialog and back over the design and the box will minimize back to its tab.

7. Edit the Superelevation Section by adding an Auxiliary Lane

Video 10-15 Edit the Superelevation Section by adding an Auxiliary Lane
HTTP LINK PLACEHOLDER

As introduced earlier in this Module, Auxiliary Lanes may be needed adjacent to the Primary Lanes for various reasons such as adding an auxiliary lane between interchanges on an interstate or setting the cross slope of a turn lane since templates are now lane-based in ORD and include auxiliary lanes. Auxiliary lanes have a user-specified begin and end station but **must be contained within a single superelevation section** and the user may need to edit superelevation section limits to accomplish this.

The distinguishing difference between Primary and Auxiliary Lanes is how the cross slope is defined. If the cross slopes are constrained and defined by calculations from the Superelevation XML rules file or calculated in a separate spreadsheet and applied to the lane, then it is a **Primary Lane**. Primary Lanes are typically the through lanes which stretch from the beginning of the superelevation section to the end. If the cross slope of a lane is determined by the adjacent lane or set to be a be a constant cross slope by the user, then it is an **Auxiliary Lane**. The **Create Superelevation Lanes** tool is used to define whether a lane is Primary or Auxiliary. When the Type is set to Auxiliary, the dialog is adjusted to reflect the parameters shown below.



The cross slope of an auxiliary lane set under the **Application Type** and is either a user-specified fixed value or is automatically set to match an adjacent superelevation lane as described below.

Application Type - used to define how the cross slope of the auxiliary lane will be defined.

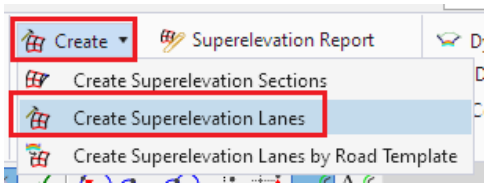
None - No cross slopes are assigned. Use this option if the cross slopes will be defined by importing a CSV file with the superelevation values.

Constant - Fixed slope of specified value utilizing the value in the Normal Cross Slope field. If lane is in transition, use this option and modify one end in the editor or graphically after creation.

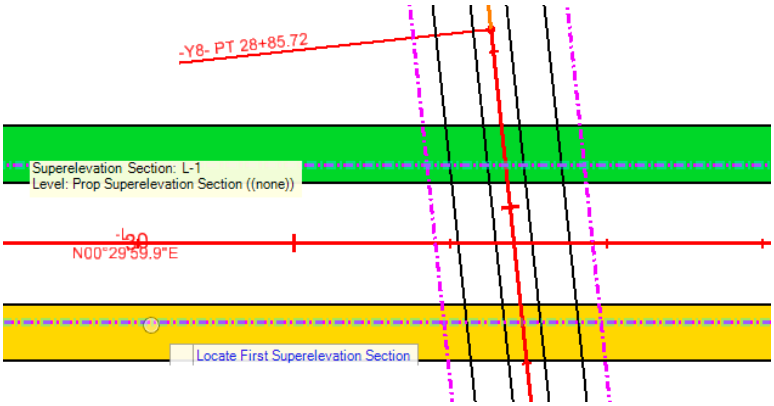
Follow Adjacent – This option projects cross slopes from the adjacent lane to the auxiliary lane.

A. Consider a design situation where an auxiliary lane is needed along a divided facility to facilitate the diverging and merging of ramps and loops. Since its addition makes the facility four lanes wide, Hydraulics would like to make the cross slope of the auxiliary lane a continuous **2.50%** to shed water from the lane faster.

B. Choose the *Corridors* Tab → *Superelevation* tool group → **Create** Pulldown **Create Superelevation Lanes** tool to launch the dialog box to create the Auxiliary Lane.



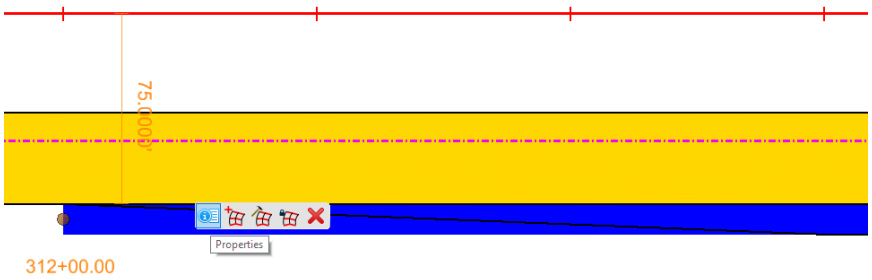
C. Zoom in to the intersection of **L** and **Y8** and choose Superelevation Section **L-1** when the heads-up displays prompts to Locate First Superelevation Section. Reset after selecting **L-1** to complete the choice



D. Fill in the settings

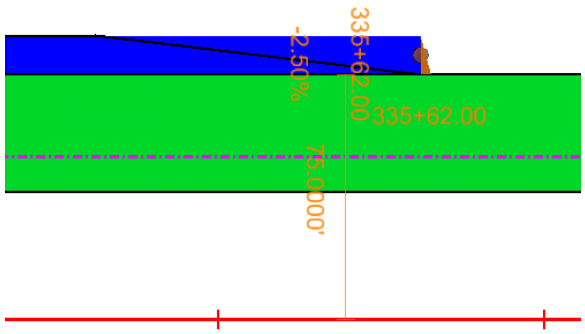
- Name the Auxiliary Lane **L AUX 312 RT** to coincide with the station and offset at the beginning.
- Change the Type to **Auxiliary** to designate what type of lane it is.
- Keep the Application Type as **None** because our desire is to have a constant, user-specified slope of -**2.50%** along the entire length of the lane and **NOT** match the adjacent lane.
- Change the Side Of Centerline to be **Right** because it's on the right side of the centerline.
- Set the inside offset to be **75** to start where the Primary lane widths ended
- Set the width to be **12** to match the lane width.
- Enter **312+00** for the Start Station to start the Auxiliary lane where the ramp diverging taper begins.
- Enter **368+00** for the End Station to end the Auxiliary lane where ramp taper merges in to the mainline.
- Set the Normal Cross Slope to be **2.50%** as Hydraulics requested.

E. Accept the heads up displays and the Auxiliary Lane will be created. Selecting the new lane will show its parameters although the cross slope doesn't seem to be labeled with the traditional wedge manipulators. A quick check of the Properties reveals that the cross slope is -**2.50%.**

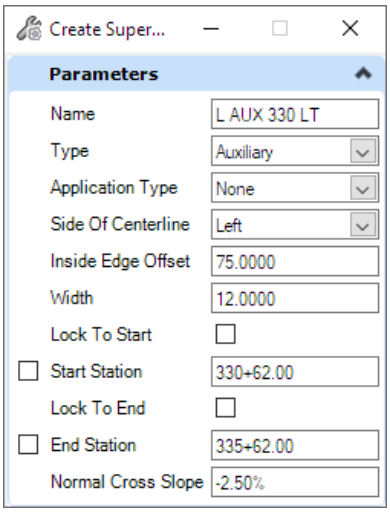


Name	L AUX 312 RT
Side Of Centerline	Right
Inside Edge Offset	75.0000'
Width	12.0000'
Start Station	312+00.00
End Station	368+00.00
Normal Cross Slope	-2.50%
Type	Auxiliary

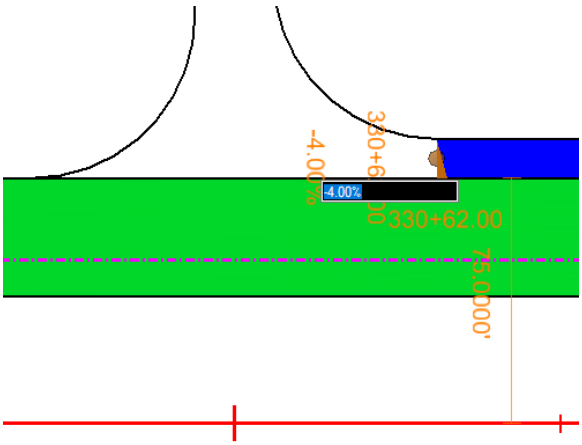
F. Zoom in to **L** Station **330+00** where a turn lane bay leads to a side road. If an auxiliary lane is tapered such as the entrance to a turn bay or a lane shift transition, set the limits of the auxiliary lane superelevation shape to contain the taper allowing the auxiliary lane superelevation shape to overlap beyond the taper width. The taper will be drawn at the correct widths by the template and only the cross slopes are used from the auxiliary superelevation lane.

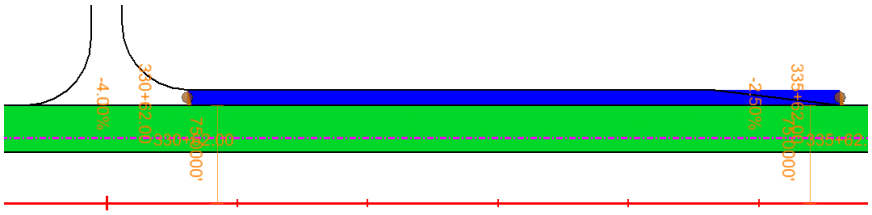


G. Add an Auxiliary Lane for the right turn bay that has these parameters.



Select the -**2.50%** cross slope at the end of the taper and change it to -**4.00%** to satisfy a request by Hydraulics and aid them in their drainage design of the radius turnout. (A little unrealistic due to rollover but wanted the change of slope to be noticeable) This change results in a smooth cross slope transition from **2.50%** at the beginning of the taper to -**4.00%** at the end of the turn bay. Note the green color becomes darker at the end because the slope is greater.





CURRENTLY, ADDING AN AUXILIARY (TURN) LANE TO THE **MEDIAN** OF A DIVIDED SECTION IS NOT WORKING CORRECTLY. NCDOT AND BENTLEY ARE WORKING TO RESOLVE THIS ISSUE.

Adding an auxiliary lane when calculating superelevation for the adjacent primary through lanes will be the most graphical method of adding superelevation calculation to these types of roadways whether it be a true auxiliary lane or turn lane.

Assign to Corridor

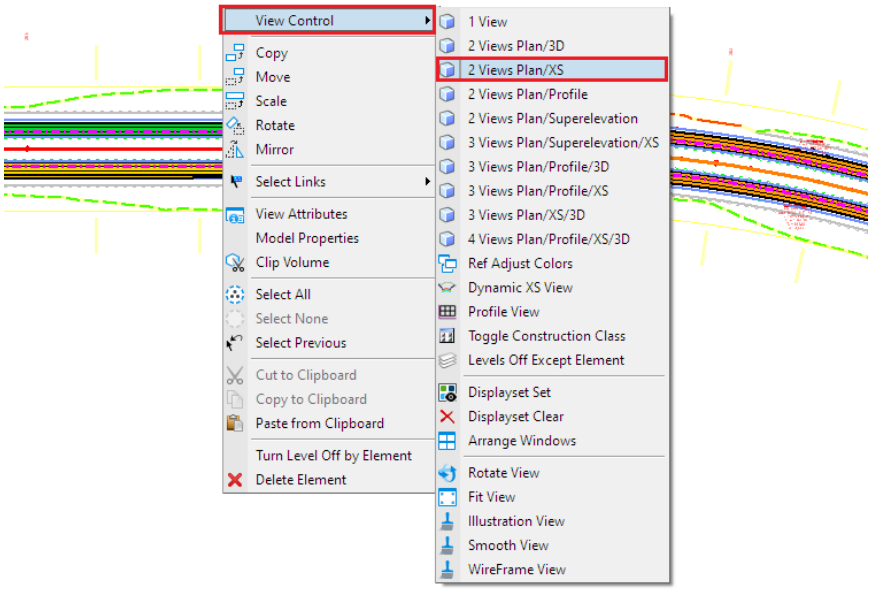
After the sections and lanes are created and the transitions have been calculated, checked, and edited, the user has all of data necessary to assign the superelevation transitions to a previously created corridor. Because the ultimate goal is to apply the superelevation transitions to the proposed corridor, we must open the design file where the corridor exists to be able to modify it.

Video 10-16 Assign to Corridor
HTTP LINK PLACEHOLDER

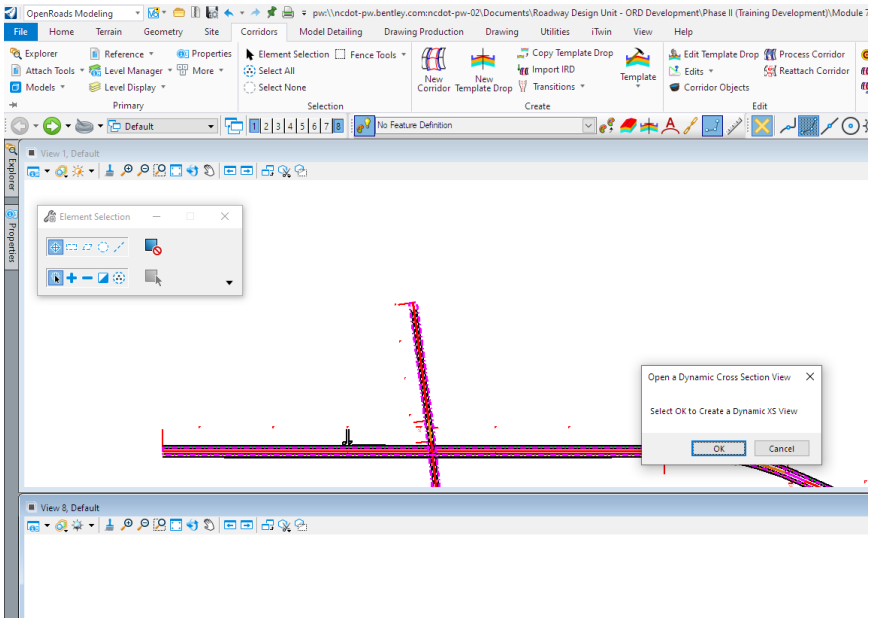
1. Assign to Corridor

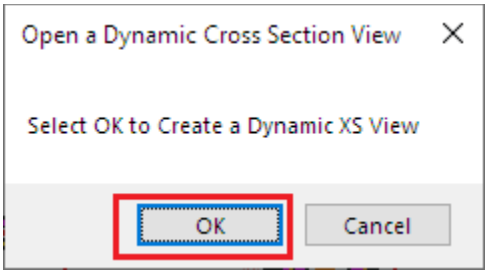
A. Open the ***R-2653_RDY_CMD_L.dgn*** file where the ***R-2635C_RDY_ALG.dgn*** and the ***R-2635C_RDY_SUP.dgn*** files are referenced.

B. In order to check if the superelevation transitions get applied to the cross sections, the user should open a Dynamic Cross Sections view in the CMD file. Right click and hold anywhere in View 1 and choose **View Control → 2 Views Plan/XS**.

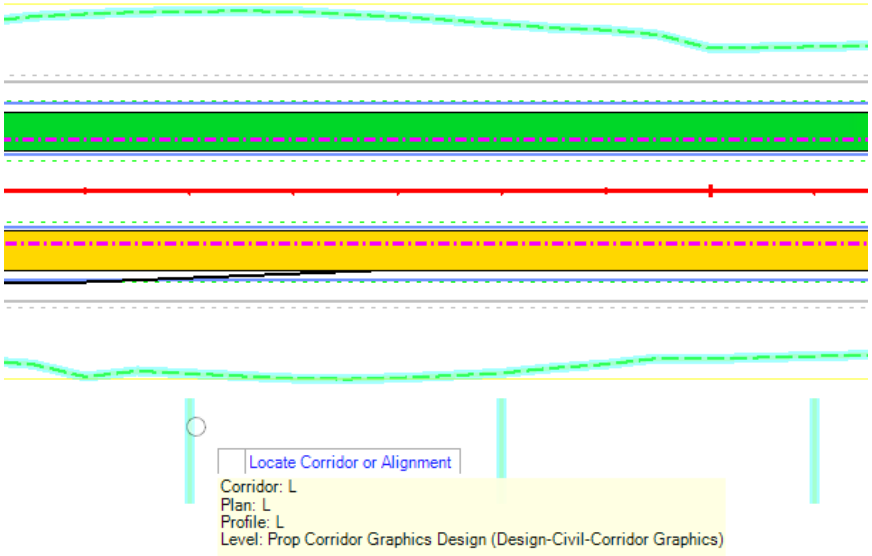


C. A new View will be created and docked under the current view. Choose OK on the dialog box to Create a Dynamic Cross Section View.

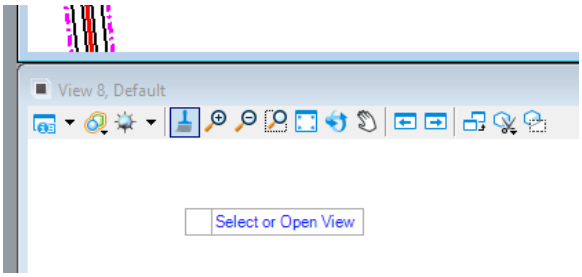




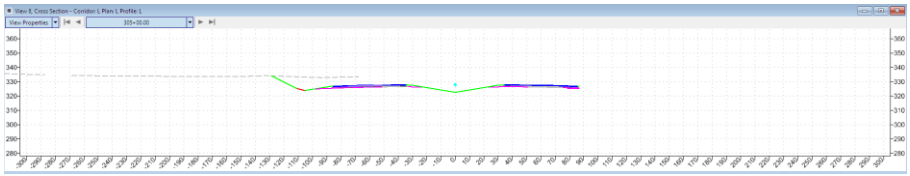
D. When the heads-up prompt asks to Locate Corridor or Alignment, the user has two choices. Choosing the Corridor results in slower scrolling through the dynamic cross sections but allows the user to place temporary dimensions for checking key values on the cross sections. Choosing the Alignment provides quicker scrolling through the cross sections but does not allow temporary dimensioning. Since we are interested in dimensioning the cross slope to ensure our calculations were assigned to the corridor correctly, choose the handles for the L corridor.



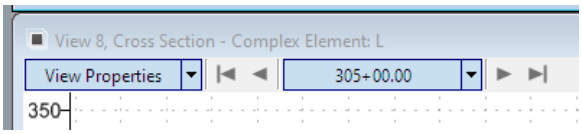
E. When the heads-up display asks to **Select or Open View**, place a data point in the View that was opened under the main view when the command was initiated.



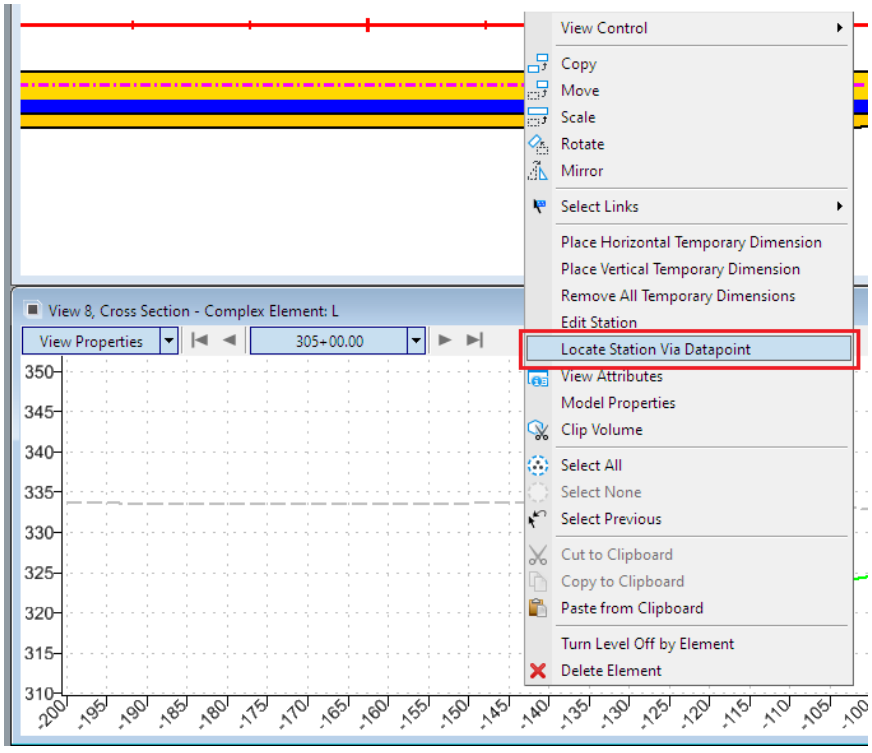
F. After a brief pause to generate the live cross sections of the model at 50-foot intervals, the Dynamic Cross Section view will display the beginning cross section at station **305+00**. Note that we have insufficient existing ground coverage to the right in the ETM file.



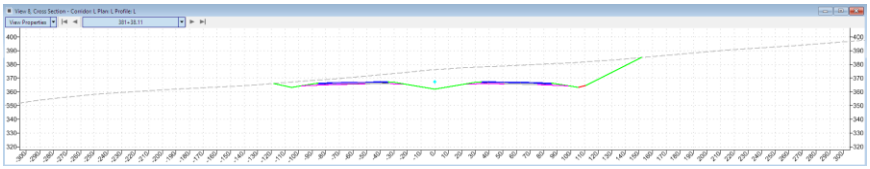
G. A navigation toolbar is incorporated into the view which allows the user to scroll through the cross sections for checking.



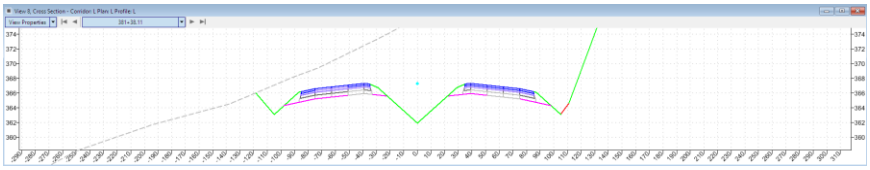
H. We want to investigate how applying the superelevation affects the cross sections that are in full superelevation. **Right click and hold** in the Dynamic Cross Section View and choose **Locate Station via Datapoint**……



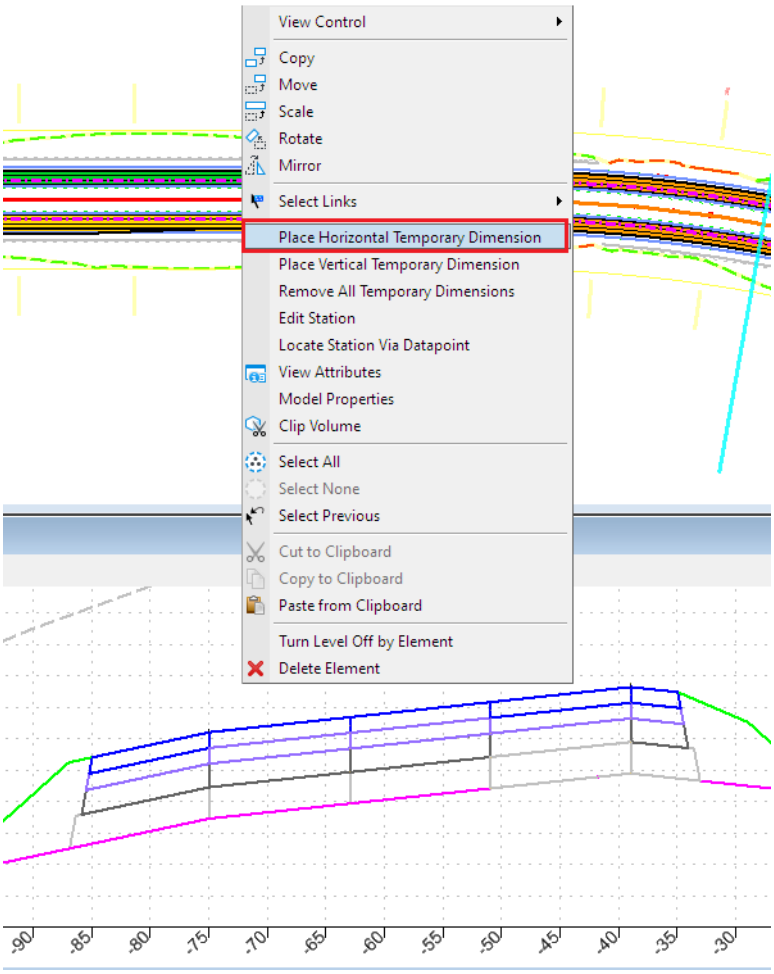
I. When the heads-up display prompts to Select Plan or Profile view, choose a data point in the upper plan view to activate the station picker. Choose a point in plan view somewhere near the middle of the first curve in the full superelevation section. The chosen station will appear in the Dynamic Cross Section View.



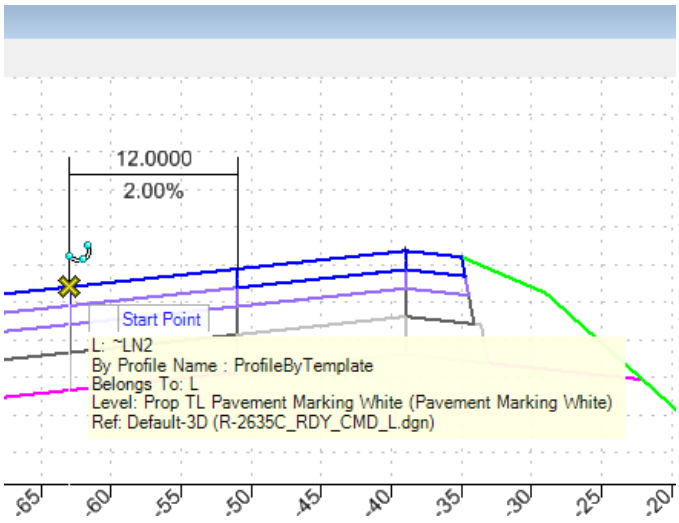
J. Choose a point in the Dynamic Cross Section View. **Hold Shift** and **roll the mouse scroll wheel up** to exaggerate the **Y axis** to see the cross slopes better. Note how the cross sections seems to have normal crown cross slopes.



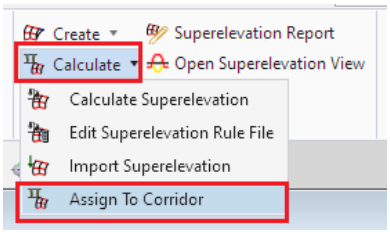
K. Zoom in on the left lanes. Right click over the cross-section view and choose Place Horizontal Temporary Dimension.



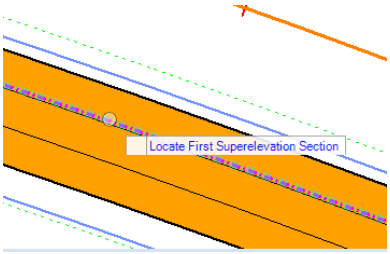
L. Dimension the center lane by placing a start and end point and note that the cross slope is **2.00%.**



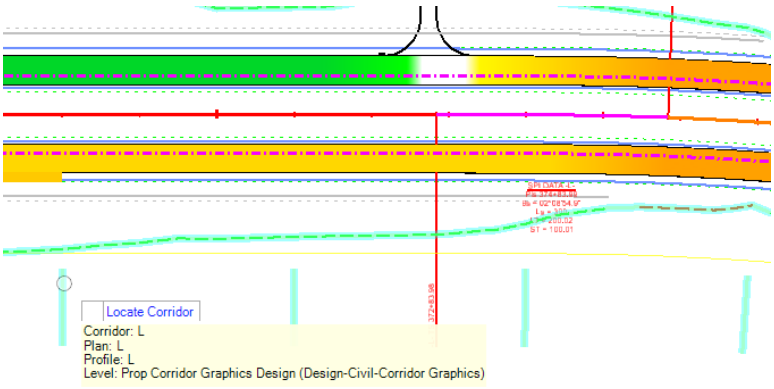
M. Choose the *Corridors* Tab → *Superelevation* tool group → **Calculate** Pulldown **Assign to Corridor** tool to launch the dialog box to assign the superelevation transitions to the cross sections.



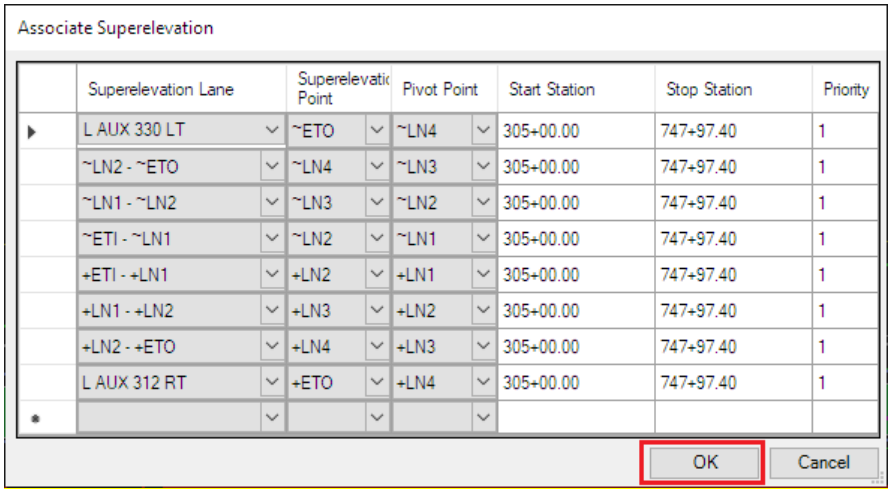
N. When the heads-up display prompts to Locate First Superelevation Section, choose the **L-1** section and reset to complete your choice.



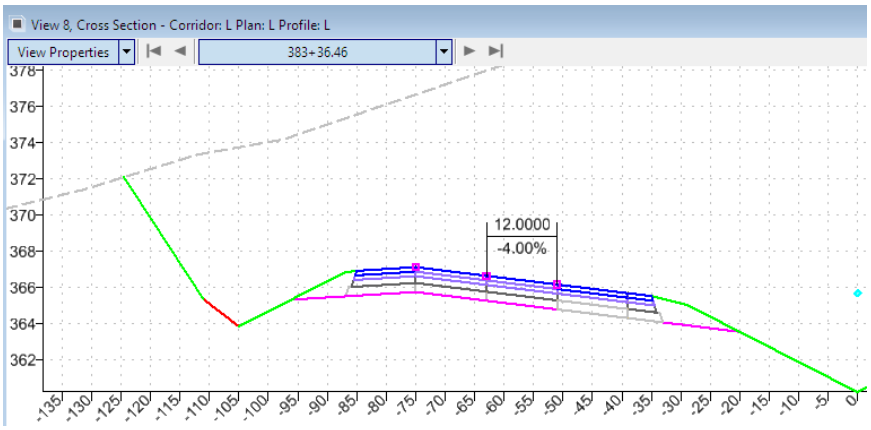
O. When the heads-up display prompts to Locate Corridor, choose a handle on the corridor.



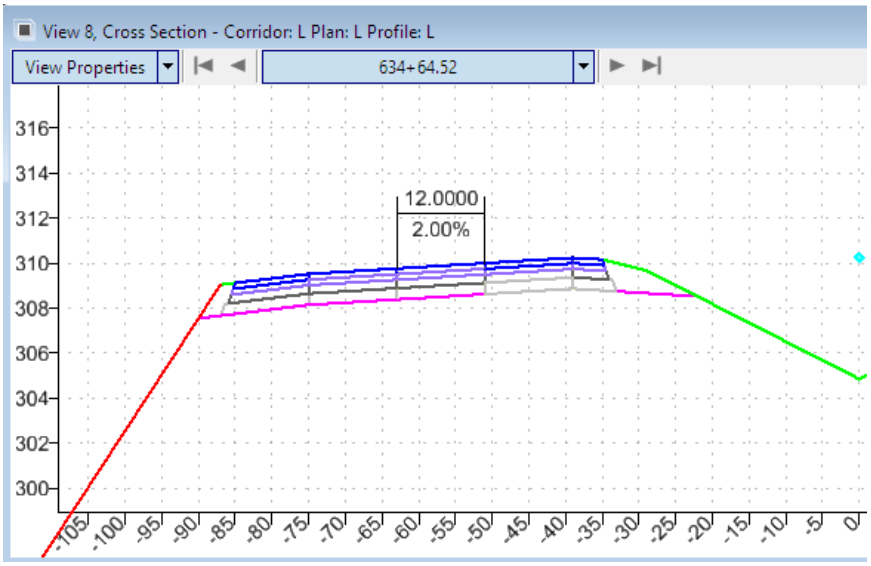
P. The Associate Superelevation dialog will appear. Each superelevation lane is associated to template points that have been flagged to be used with superelevation. Those template points will be used to define how the pavement will be superelevated. The **Superelevation Lane** represents the name of each superelevation lane created by superelevation control points in the SUP file. The **Superelevation Point** is the corresponding template point that will be superelevated based off of the control points in the SUP file. The **Pivot Point** defines the point of rotation. Choose OK to assign the superelevation to the corridor and note the progress of reprocessing the cross sections at the bottom left of the screen.



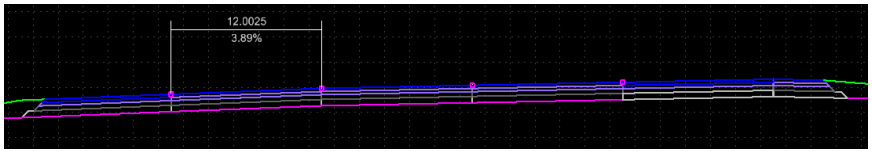
Q. Note that the selected cross section with the normal crown slope has now been superelevated.



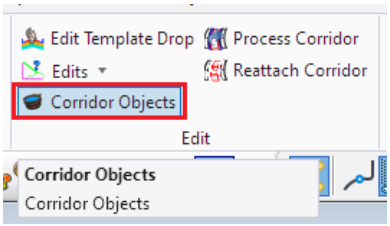
R. As before, **right click and hold** in the Dynamic Cross Section View and choose **Locate Station via Datapoint.** Choose a point in the center of any curve in the **L-2** Superelevation Section. Note that this curve did not get superelevated because we only applied the superelevation to Section **L-1**.



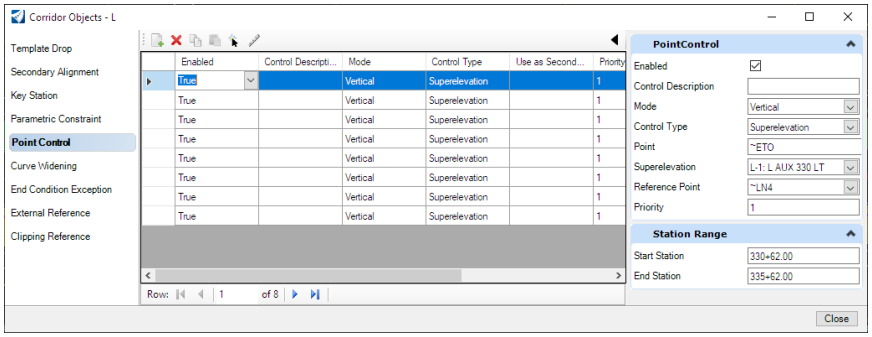
S. Finally, navigate to station 331+00 and zoom in to the left side. Note the auxiliary lane that was added. Dimension the auxiliary lane to show the odd cross slope of -3.89% from the SUP file resulting from the transition from -2.5% to -4.0% cross slope on the turn lane.



T. Choose the *Corridors* Tab → *Edit* tool group → **Corridor Objects** tool to launch the dialog box to review the assigned superelevation.



U. Locate the **L** Corridor and the Corridor Objects dialog will launch. Select **Point Control** to review the superelevation since superelevation is simply vertically controlling a template point. This is where the user would delete the superelevation by deleting point control rows using the Point Control tools menu.



V. Close the Corridor Objects dialog and exit the CMD file.

Labeling Superelevation

As of June 2021, ORD does not provide a way to automatically label superelevation in the plan view. While this function did exist in GEOPAK SS4, it has yet to be carried forward into ORD. Labeling of super is to be accomplished by using ORD's Place Label commands or by placing text and cell commands under ORD's Drawing tab.