

# TDOT Curb Ramp Civil Cells

## Contents

Preface.....	2
General Procedure.....	3
Perpendicular Curb Ramps: CR-10 and CR-11 .....	8
Parallel Curb Ramps: CR-20, CR-21, CR-22, and CR-23.....	14
Bi-Directional Curb Ramps: CR-30 through CR-34 .....	24
CR-30 DUAL CROSSING .....	24
CR-31 BLENDED TRANSITION .....	29
CR-32 LOWERED CORNER .....	35
CR-33 SINGLE CROSSING .....	40
CR-34 SINGLE CROSSING WITH RAMP .....	43
Mono-Directional Curb Ramps: CR-40.....	48
Single Crossing Curb Ramp In Curve: CR-41 .....	56
Pedestrian Refuge Islands: CR-50 and CR-51.....	65
CR-50 RIGHT TURN ISLAND WITH RAMPS .....	65
CR-50 RAMP ONLY .....	74
CR-51 RIGHT TURN ISLAND WITH CUT-THRU .....	85
CR-51 MEDIAN REFUGE.....	93

## Preface

This document was developed based on OpenRoads Designer 2023, Version 23.00.01.11. The TDOT ORD workspace (23.00.01.11\_09.02.2025) complies with the latest CADD standards and contains the civil cells detailed throughout. It can be downloaded on the TDOT CADD Support website under ORD Resources. If you have any technical issues or recommendations for this document, please contact TDOT CADD Support at [TDOT.ORD@tn.gov](mailto:TDOT.ORD@tn.gov).

The **TDOT Curb Ramp Civil Cells** have been recreated to align with the [CR series](#) standard drawings that are effective as of July 1, 2025 ([I.B. No. 25-05](#)). This document explains how to use each civil cell in the **CurbRamps\_TDOT.dgnlib** found in the TDOT ORD Workspace 23.00.01.11\_09.02.2025.

This document assumes the user has the foundational knowledge of the Tennessee Department of Transportation (TDOT) ORD workspace that is used in the [Fundamentals](#), [Roadway Design I](#), and [Roadway Design II](#) training manuals found within [ORD Resources](#) on the TDOT website. The user should also refer to the [TDOT Basics](#) video and [ORD Civil Cells Tips and Tricks](#) document for general information about modeling with Civil Cells.

The standard civil cell abbreviations are listed below:

- ML Mainline
- SR Sideroad
- EOP Edge of Pavement
- SHLD Shoulder
- CR Curb
- SW Sidewalk
- GS Grass Strip
- C&G Curb and Gutter
- CS Clear Space
- TS Turning Space
- TL Turn Lane
- DTWS Detectable Warning Surface
- CTRL Controlling Element
- A Approach
- ENT Entrance
- EXT Exit
- L or [LEFT] Left
- R or [RIGHT] Right

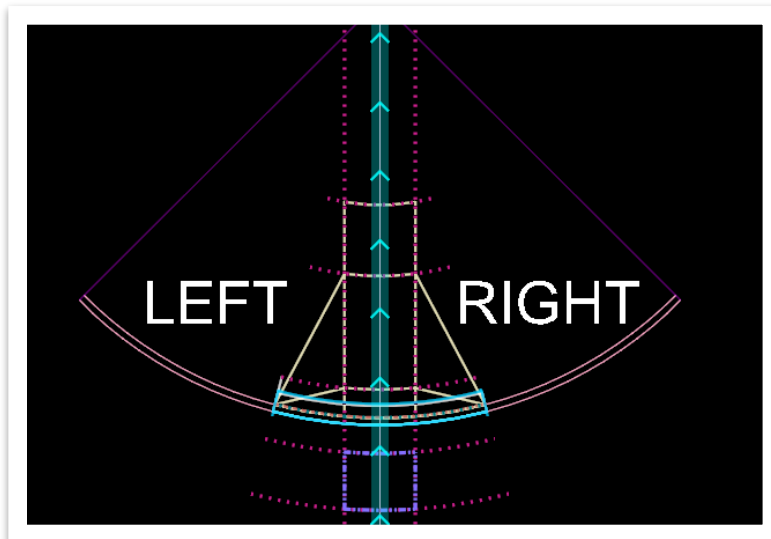
## General Procedure

Most CR-series standard drawings have a corresponding civil cell. Likewise, some standard drawings have multiple associated civil cells for different design applications. In addition to the CR standard for each curb ramp type, when using any of the civil cells, the user must refer to the following standard drawings for required design information:

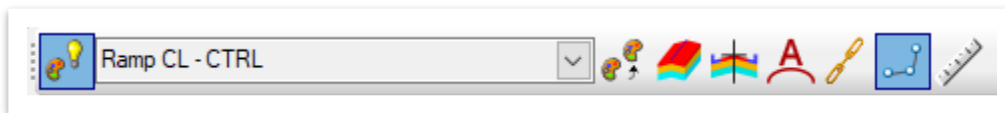
- [CR-GN-1](#) GENERAL NOTES CURB RAMPS
- [CR-GN-2](#) CURB RAMP NUMBERING
- [CR-DWS-1](#) DETECTABLE WARNING SURFACE DETAIL
- [CR-PLL-1](#) PUSH BUTTON LOCATION LAYOUT
- [CR-CRT-1](#) CURB RAMP TYPES
- [CR-GTL-1](#) and [CR-GTL-2](#) GUTTER TRANSITION LAYOUT

Many aspects of the procedure for placing curb ramp civil cells are similar regardless of the specific civil cell chosen. The following guidance applies to all curb ramp civil cells.

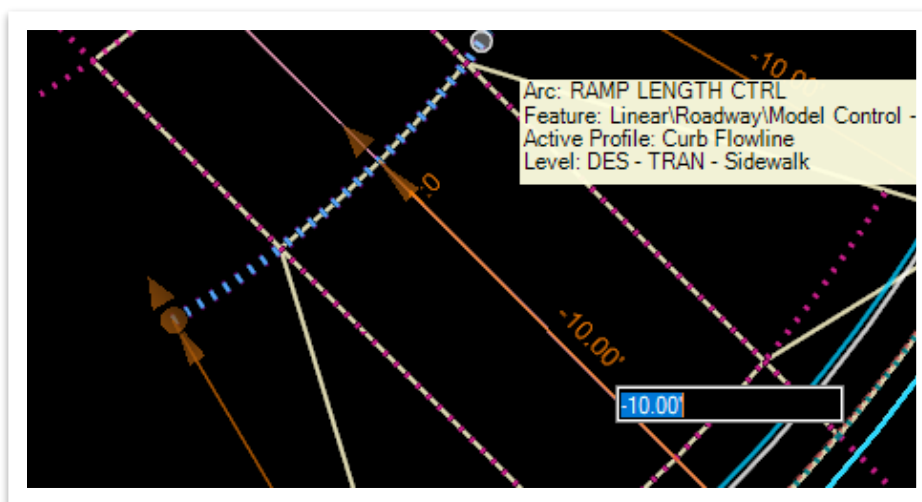
1. The typical naming convention for each civil cell assumes that the user is looking at the ramp with the curb line at the bottom of the screen and the sidewalk at the top, as shown in the **CR-10 BOTH FLARES** screenshot below. Curb ramp civil cell reference lines are typically drawn from left to right, with exceptions for some elements within asymmetrical cells. When placing the civil cell, you may need to reverse the direction of one or more of your reference lines to match the direction they are drawn in the **CurbRamps\_TDOT.dgnlib**. You will know the lines are oriented correctly when the preview matches the corresponding standard drawing.



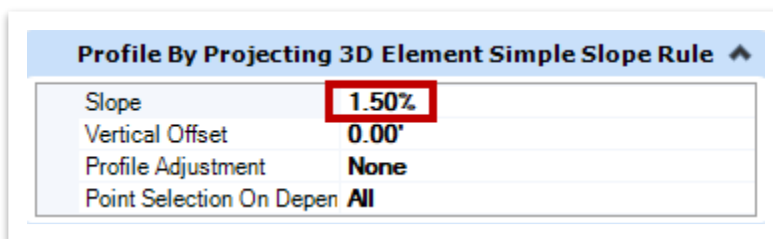
- Where necessary, ramp centerlines, should be drawn in the direction from the roadway toward the sidewalk and should extend at least as far as the clear space area (by default 6 ft from the CR FLOWLINE element). The feature definition used will not impact the civil cell functionality, but it is recommended to use the **Ramp CL - CTRL** feature definition (**Linear >> Roadway >> Model Control - 2D Plan >> Sidewalk**).



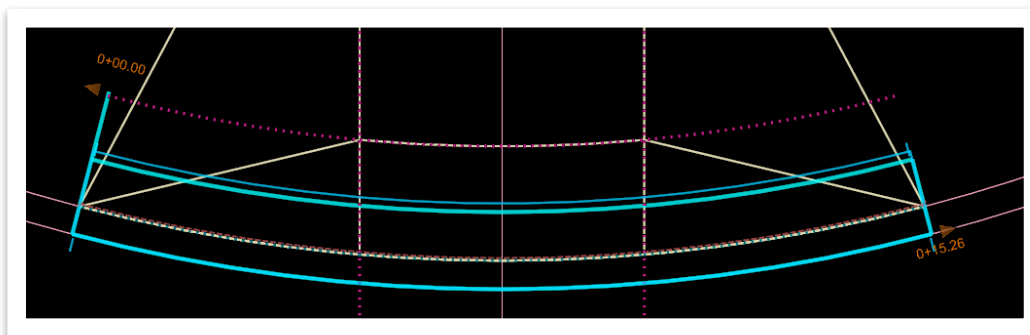
- When modifying default dimension values of civil cell control elements, it is recommended to use the orange manipulators, rather than the element Properties. **Note:** *Editing in Properties is equally valid but is usually less intuitive because element dependencies are less apparent.*



- When modifying default slope projection values, no orange manipulators will be available. Therefore, slope modifications should be made in the Properties of the appropriate control elements.



- Most curb ramp civil cells assume a **6-in** wide and **6-in** tall concrete curb. The exceptions to this are the **CR-50** and **CR-51** civil cells, which are built for use with median islands. The user may adjust the curb dimensions of any civil cell by applying parametric constraints to the linear template that is placed by the civil cell along the **Curb Flowline** element, or by replacing that linear template entirely.



- All curb ramp civil cells have default slope and distance values based on typical situations that may or may not meet the appropriate design requirements when applied to a particular project. The user must always verify that each value meets TDOT requirements and accessibility standards or make modifications after placement, as necessary. An example ramp slope from the **CR-10** civil cells is shown below. Slopes will typically show as a **Profile Line Between Points Rule** in the element **Properties** since the slopes of the 3D model elements are created by snapping to the profiles of control line elements.

Feature	
Feature Definition	Prop Sidewalk Front Top
Feature Name	RAMP R

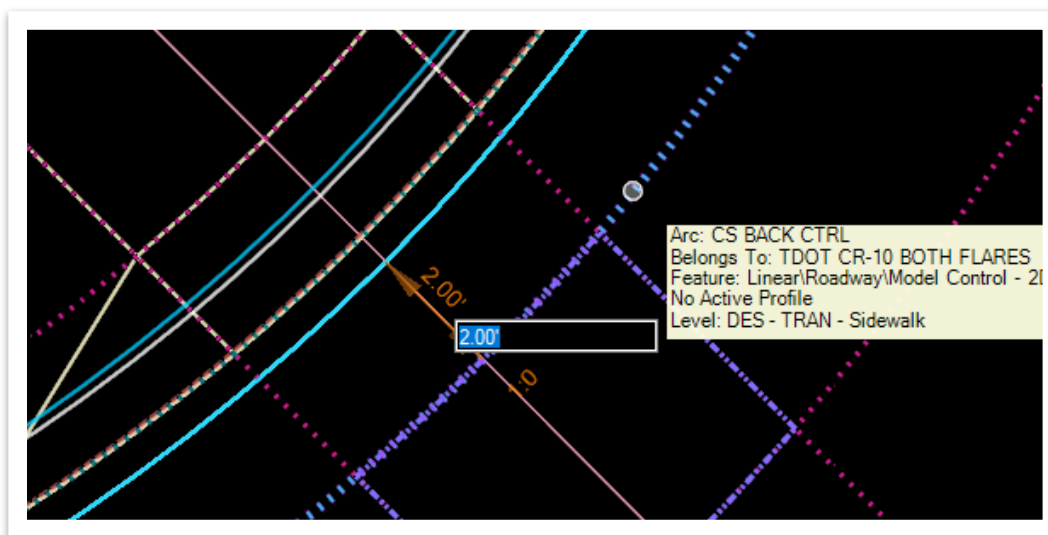
  

Extended	
Model	Default
Last Modified	7/25/2025 1:58:19 PM
Snappable	Snappable
Modified	Not Modified
New	New
Locked	Unlocked
Display Style	<input type="checkbox"/> (From View Display)

Profile Line Between Points Rule	
Length	8.05'
Slope	7.46%

- By default, many curb ramp civil cells show a minimum **4-ft** clear space beginning **2 ft** away from the flow line so that if the gutter slope is not modified to be less than **5.00%**, the appropriate clear space with a running slope less than 5.00% will still be provided (see [CR-GN-1](#), Note 9). The user may elect to include the entire gutter pan in the clear space by adjusting the offset of the **CS BACK CTRL** element included in these civil cells to **0-ft**. The CS elements will automatically update to show the minimum CS area needed, but the **CS FRONT CTRL** element may also be modified if a clear space distance different from **4-ft** is desired. **Note:** *The clear space elements are only a guide. The user must ensure the appropriate clear space area is provided based on TDOT standards. The **CR-10 BOTH FLARES** civil cell is shown below for example.*



- In most cases, curb ramp civil cells may be placed either directly on corridors or on intersection civil cells, as long as all the required reference line elements are available. If the intersection civil cell or corridor elements must be specified, it will be noted in the directions for that specific civil cell. **Note:** *The same curb ramp civil cells can also be used in projects that do not include new roadway construction. The user would simply create reference lines (with profiles) that correspond to the lines that a proposed model would have created (e.g., existing curb flowline, existing back top of curb, sidewalk lines, etc.).*

9. **Dummy elements:** If there are no reference lines available that cover the whole civil cell area, the user may need to create dummy elements which match the roadway model to allow for civil cell placement. The most common scenario is if the user needs to place a ramp at the junction of two models (e.g., where the mainline corridor elements end and the intersection civil cell begins). In that case, it is recommended to create complex **CR FLOWLINE** and **CR BACK TOP** elements that span the entire distance, following the steps below:
- a. Using the **Single Offset Partial** tool (**OpenRoads Modeling >> Geometry >> Horizontal >> Offsets and Tapers**), make copies of the Corridor and Civil Cell **CR FLOWLINE** and **CR BACK TOP** elements, respectively, and then complex them into one **CR FLOWLINE** and one **CR BACK TOP** element using the **Complex by Element** tool (**OpenRoads Modeling >> Geometry >> Horizontal >> Complex Geometry**). *Note: Make sure that you copy long enough element segments to cover the entire curb ramp civil cell area.*
  - b. Using the **Profile by Slope from Elements** tool (**OpenRoads Modeling >> Geometry >> Vertical >> Element Profiles**), profile the new complex elements at a 0% slope from each element of the corridor and intersection civil cell elements. Then, complex the profiles together using the **Profile Complex by Elements** tool (**OpenRoads Modeling >> Geometry >> Vertical >> Complex Geometry**). *Note: There are alternative methods the user may use to copy profile data to the new horizontal geometry, including the **Project Profile Range to Element** tool (**OpenRoads Modeling >> Geometry >> Vertical >> Profile Creation**), and the **Profile by 3D Element** tool (**OpenRoads Modeling >> Geometry >> Vertical >> Element Profiles**).*
  - c. Occasionally, the profile projection may result in a discontinuity. If this happens, the user may drop the profile to a MicroStation line using the **Drop Element** tool (**OpenRoads Modeling >> Drawing >> Groups**) to delete the erroneous vertex and then set that MicroStation line as the **active** profile. *Note: If this is done, the profile would need to be revised manually in the event of any modifications to the roadway corridor and/or intersection civil cell.*

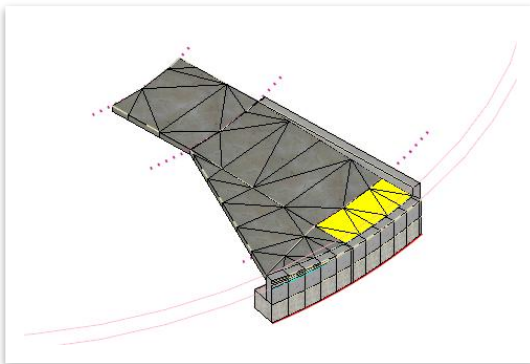
## Perpendicular Curb Ramps: CR-10 and CR-11

To place perpendicular curb ramps conforming to the [CR-10](#) standard drawing, first choose the appropriate flare option. All other aspects of these four civil cells are the same.

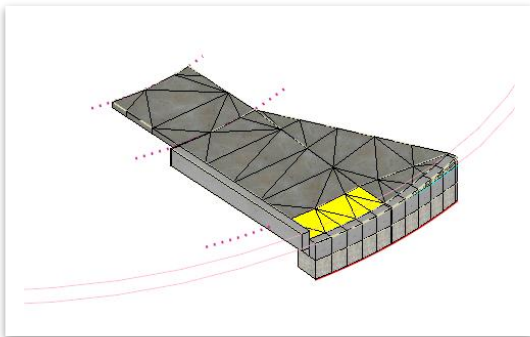
The purpose of the [CR-11 PERPENDICULAR CURB RAMP WITH BRICK DETAILS](#) standard drawing is to show the installation of a concrete curb ramp within existing brick sidewalk. Its design is identical to **CR-10** and therefore the same civil cells may be used for both scenarios. For brevity, this group of civil cells is referred to as **CR-10** civil cells.

The four civil cell flare options are listed below:

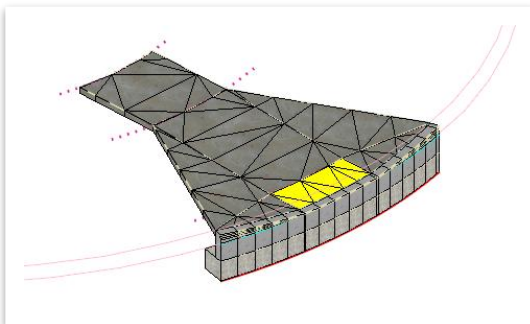
- **CR-10 LEFT FLARE – PERPENDICULAR CURB RAMP**



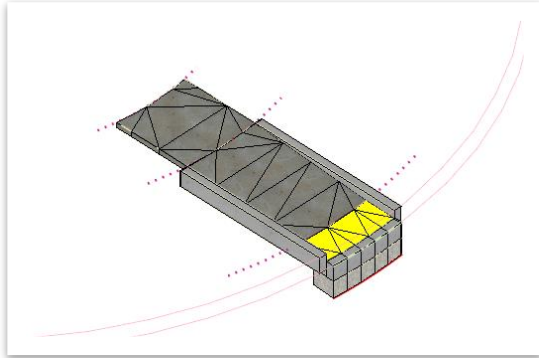
- **CR-10 RIGHT FLARE – PERPENDICULAR CURB RAMP**



- **CR-10 BOTH FLARES – PERPENDICULAR CURB RAMP**



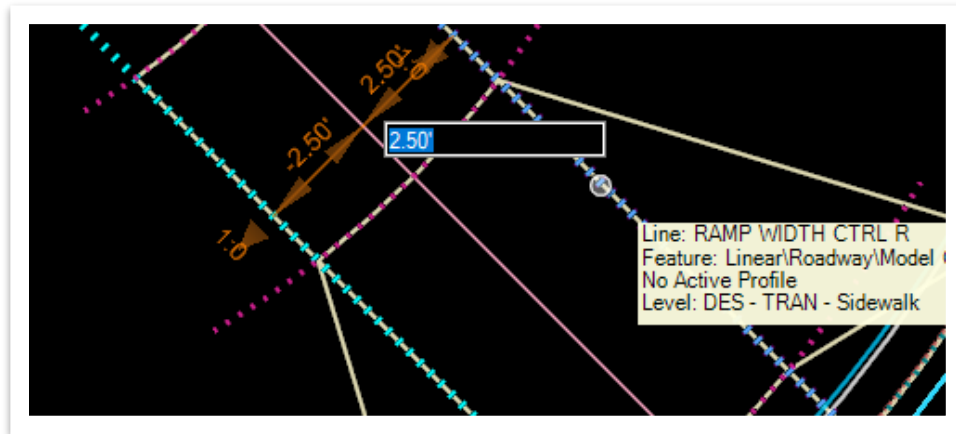
- **CR-10 NO FLARES – PERPENDICULAR CURB RAMP**



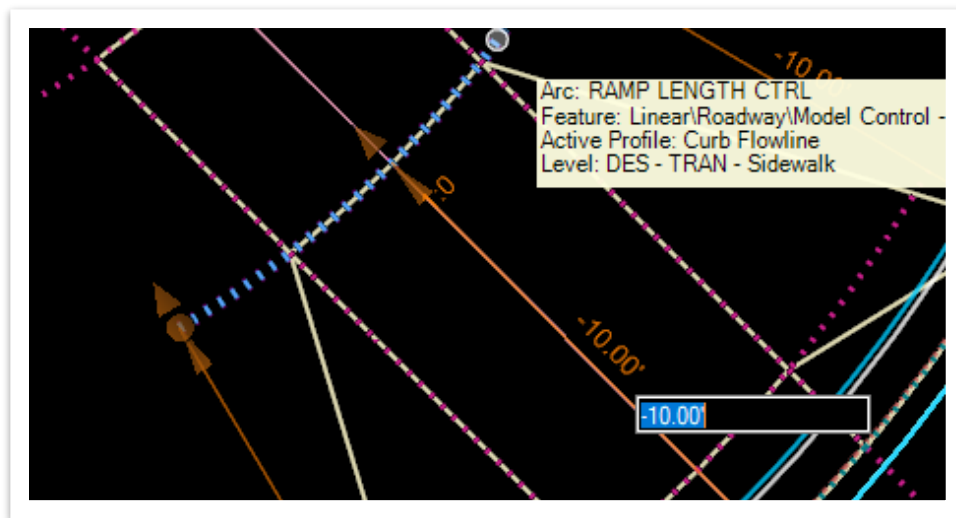
The **CR-10** civil cells may be placed at any location by manually drawing the proposed ramp centerline location. The user should refer to [CR-PL-1 PERPENDICULAR CURB RAMP PLACEMENT LAYOUT](#) for guidance. **Note:** *The **CR-10** civil cells will only work for ramps that are approximately perpendicular to the curb line, with a maximum skew of approximately 16-degrees, depending on the reference line geometry selected.*

1. Prior to placement, the user should ensure that the slope along the gutter flowline will be **2.00% or less (1.50% desirable)** at the proposed pedestrian crossing location. This must also include any modification needed to reduce the gutter pan slope per standard drawing [CR-GTL-1](#) and [CR-GTL-2](#), which will be required in situations where the curb ramp slope must be greater than **5.00%** and the available right-of-way does not allow for the construction of a **2-ft** transition area (refer to **Step 6**). The curb ramp civil cell will match the cross slope along the **CR FLOWLINE** reference element provided to it.
2. Begin by drawing a curb ramp centerline along the centerline of the proposed ramp location using the **Line Between Points** tool (**OpenRoads Modeling >> Geometry >> Horizontal >> Lines**). This line does not need any profile data.
3. Open the **Place Civil Cell** tool (**OpenRoads Modeling >> Model Detailing >> Civil Cells**). In the **Pick Civil Cell** window, select the appropriate civil cell from the dgnlib and click **OK**. Then, select the following reference lines in order: **CR FLOWLINE**, **CR BACK TOP**, and **RAMP CL - NO PROFILE**, along with the corridor to be clipped, if applicable. **Note:** *The user may need to reverse the direction of one or more reference lines during placement.*

4. Adjust the civil cell to match the proposed design.
  - a. Modify the ramp width using the **RAMP WIDTH CTRL R** and **RAMP WIDTH CTRL L** elements.

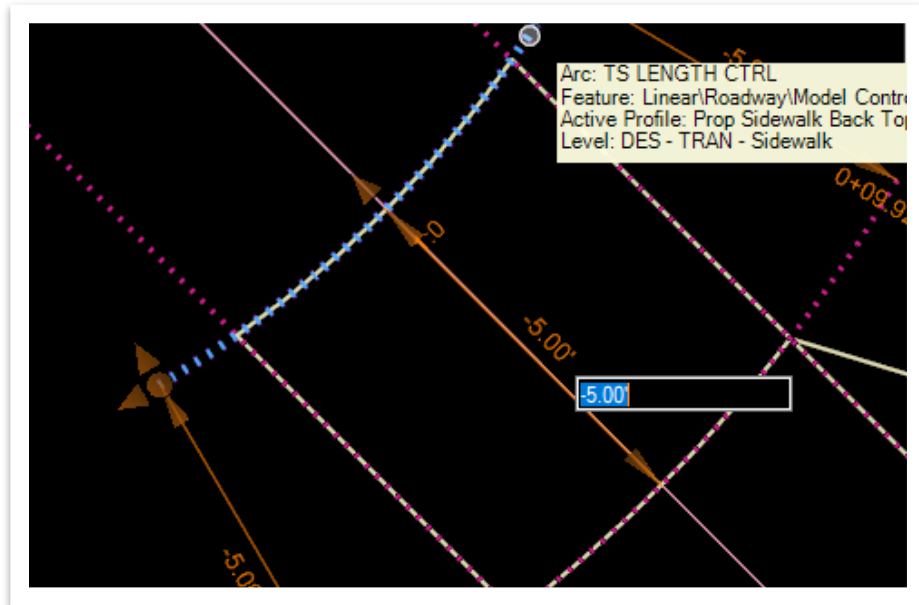


- b. Modify the ramp length to match the front edge of sidewalk using the **RAMP LENGTH CTRL** element. This will automatically adjust the slope of the ramp. **Note:** *By default, the elevation of the front of the turning space is controlled by projecting a 1.50% slope up from the **CR BACK TOP** element based on typical TDOT details. This may be adjusted by the user in the **Properties** of the **RAMP LENGTH CTRL** element, or by manually drawing a profile within **RAMP LENGTH CTRL** at the desired elevation.*

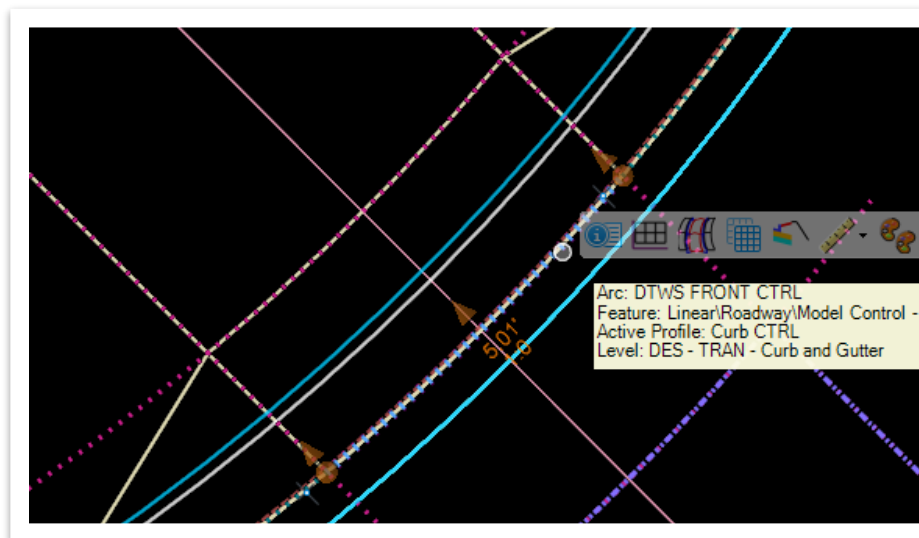


Profile By Projecting 3D Element Simple Slope Rule ^	
Slope	1.50%
Vertical Offset	0.00'
Profile Adjustment	None
Point Selection On Depen	All

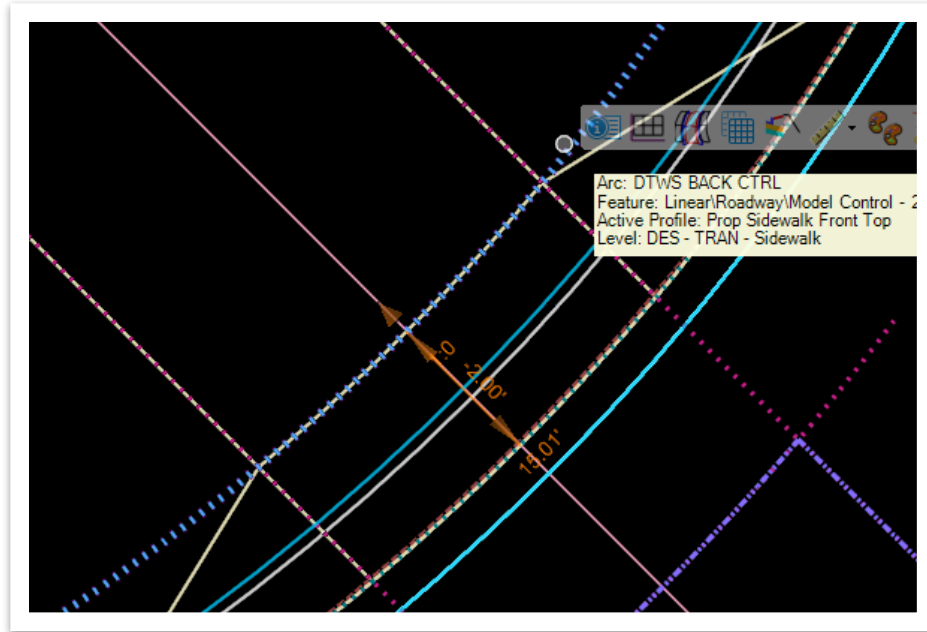
- c. Modify the turning space length using the **TS LENGTH CTRL** element. **Note:** By default, the elevation of the back of the turning space is controlled by projecting a **1.50%** slope up from the **RAMP LENGTH CTRL** element based on typical TDOT details. This may be adjusted by the user in the **Properties** of the **TS LENGTH CTRL** element, or by manually drawing a profile within **TS LENGTH CTRL** at the desired elevation.



- d. Modify the slope of transition area by adjusting the slope of both **DTWS FRONT CTRL** (controls slope from **CR FLOWLINE** across the 6-in curb width) and **DTWS BACK CTRL** (controls slope across **2-ft DTWS length**) in the element **Properties**. **Note:** This step may need to be iterated until the slope of the transition area matches the slope of the ramp, if the **2.00%** transition is intended to be removed.

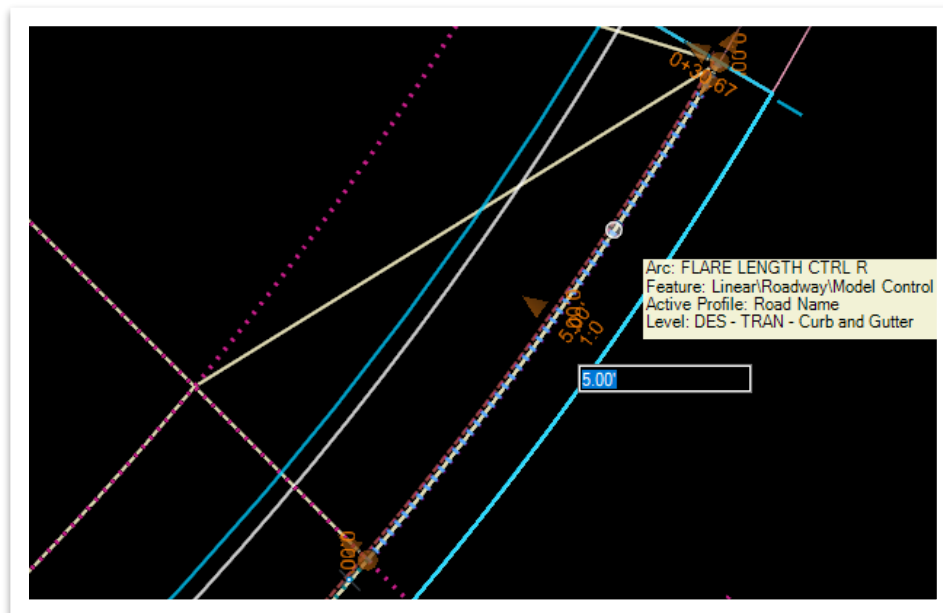


## Perpendicular Curb Ramps: CR-10 and CR-11



Profile By Projecting 3D Element Simple Slope Rule	
Slope	2.00%
Vertical Offset	0.00'
Profile Adjustment	None
Point Selection On Depen	All

- e. Modify the flare width using the **FLARE LENGTH CTRL R** and **FLARE LENGTH CTRL L** elements.





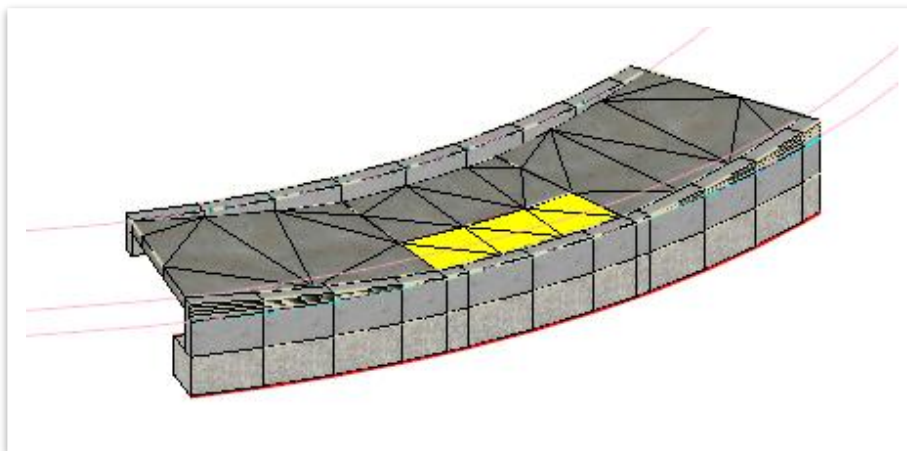
## Parallel Curb Ramps: CR-20, CR-21, CR-22, and CR-23

**Parallel Curb Ramp** civil cells may be placed at any location along a curb by manually drawing the proposed ramp centerline location. The user should refer to [CR-PL-2 PARALLEL CURB RAMP PLACEMENT LAYOUT](#) for guidance.

The purpose of the [CR-23 PARALLEL CURB RAMP WITH EXISTING BRICK](#) standard drawing is to show the installation of a concrete curb ramp within existing brick sidewalk. Its design is identical to **CR-20** or **CR-21**, depending on the existing sidewalk width, and therefore the same civil cells may be used for both scenarios. For brevity, these civil cells are referred to as **CR-20** and **CR-21** civil cells, respectively.

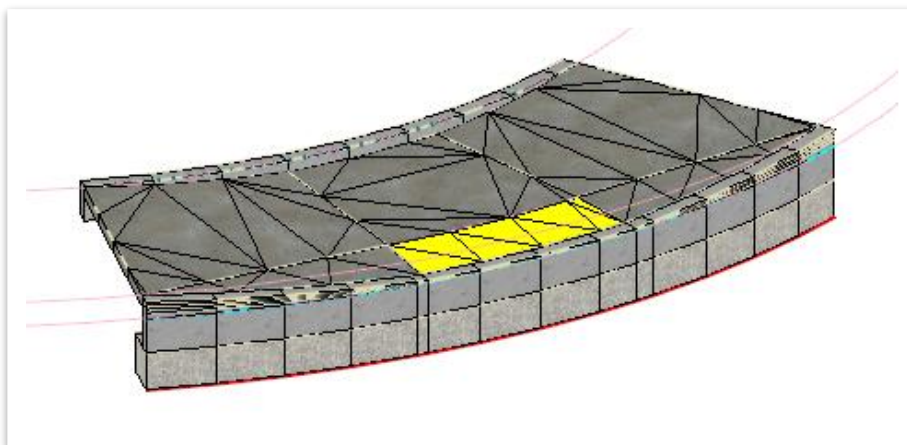
The three parallel curb ramp civil cells are listed below:

- [CR-20 BOTH RAMPS](#) – PARALLEL CURB RAMP 5-FT SIDEWALK

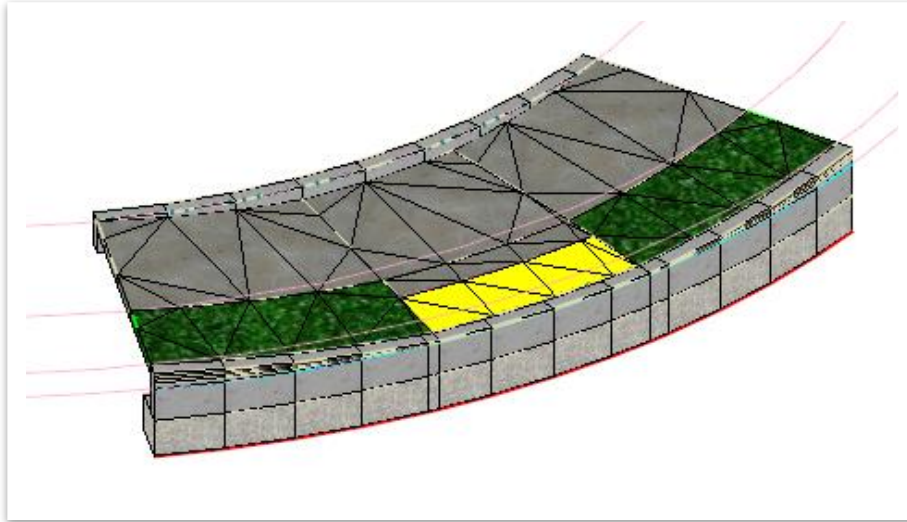


- **Note:** A **CR-20 BOTH RAMPS** civil cell is shown in this document, but the same procedure will also apply to **CR-20 LEFT RAMP** and **CR-20 RIGHT RAMP**.

- [CR-21 COMB WIDE SW](#) – COMBINATION RAMP USED WITH WIDE SIDEWALK



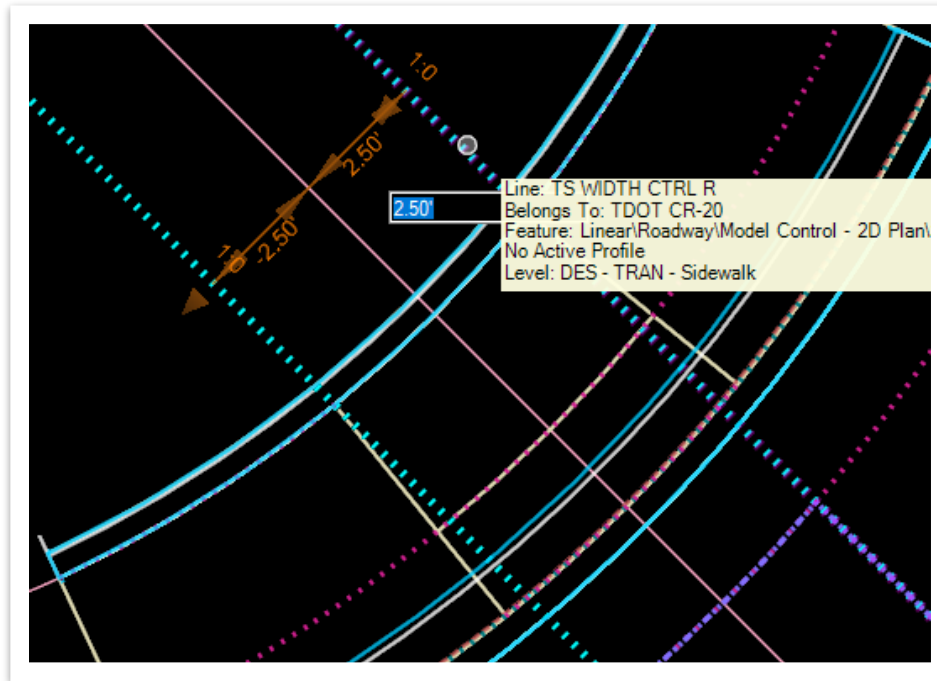
- **CR-22 COMB STD SW** – COMBINATION CURB RAMP



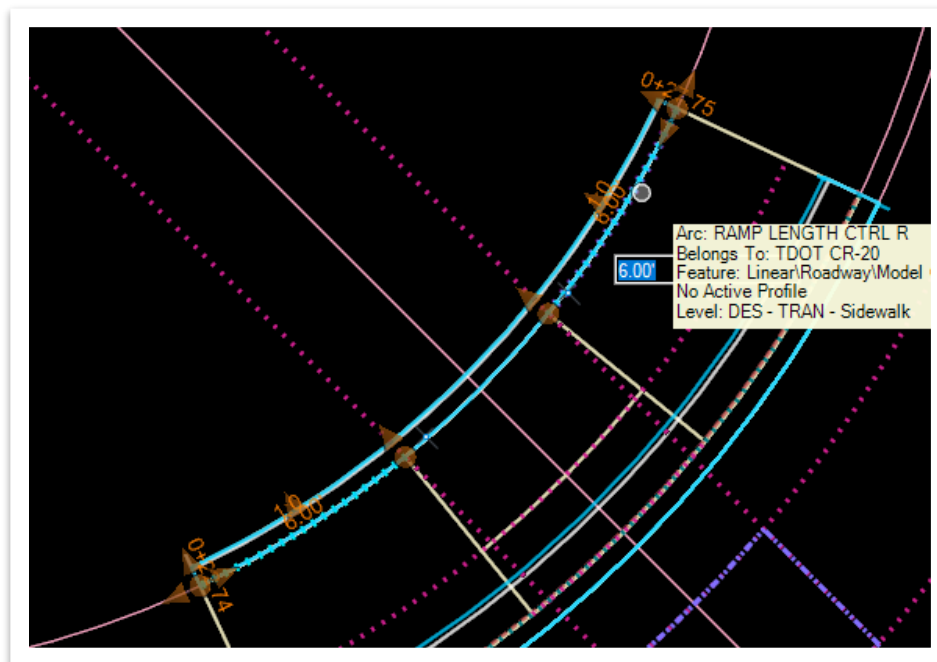
Most of the procedure for **Parallel Curb Ramp** civil cells will be similar regardless of the specific civil cell chosen. The following guidance applies to all parallel curb ramp civil cells, except as noted in the steps below, even though the screenshots show the **CR-20** civil cell.

1. Begin by drawing a curb ramp centerline along the centerline of the proposed ramp location using the **Line Between Points** tool (**OpenRoads Modeling >> Geometry >> Horizontal >> Lines**). This line does not need any profile data. **Note:** *For parallel curb ramps, the angle of the center line is not critical, but the point at which the **RAMP CL** crosses the **SW BACK TOP** element will determine the location of the turning space. It is therefore best practice to draw the **RAMP CL** perpendicular to the curb at the center of the desired turning space location.*
2. Open the **Place Civil Cell** tool (**OpenRoads Modeling >> Model Detailing >> Civil Cells**). In the **Pick Civil Cell** window, select the appropriate civil cell from the dgnlib and click **OK**. Then, select the following reference lines in order: **CR FLOWLINE**, **CR BACK TOP**, [include **SW FRONT TOP** for **CR-22**] **SW BACK TOP**, and **RAMP CL - NO PROFILE**, along with the corridor to be clipped, if applicable. **Note:** *The user may need to reverse the direction of one or more reference lines during placement.*

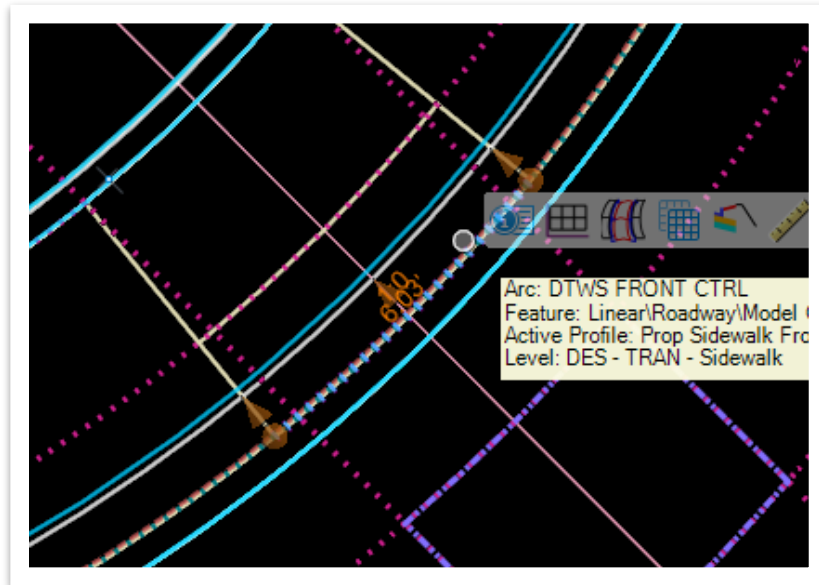
3. Adjust the civil cell to match the proposed design.
  - a. Modify the turning space width using the **TS WIDTH CTRL R** and **TS WIDTH CTRL L** elements.



- b. Modify the ramp lengths using the **RAMP LENGTH CTRL L** and **RAMP LENGTH CTRL R** elements. This will automatically adjust the slope of the ramp.



- c. **For CR-20 civil cells only:** The default civil cell settings use a **1.50%** turning space with a **5.00%** slope across the **6-in** curb width, which will apply to most design scenarios. However, the user may modify the slope of the turning space by adjusting the slope of **DTWS FRONT CTRL** (controls slope from **CR FLOWLINE** across the **6-in** curb width), **DTWS BACK CTRL** (controls slope across the **2-ft** DTWS length), and **TS BACK** (controls slope from DTWS to back of turning space) in the element **Properties**. **Note:** *Depending on the element being modified, the default slope may not be 5.00%.*



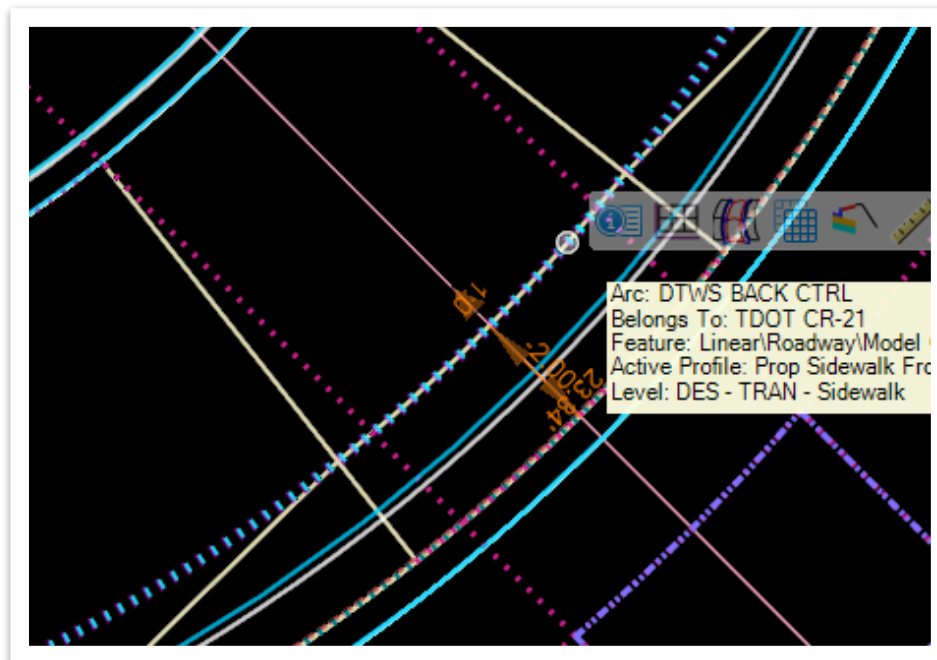
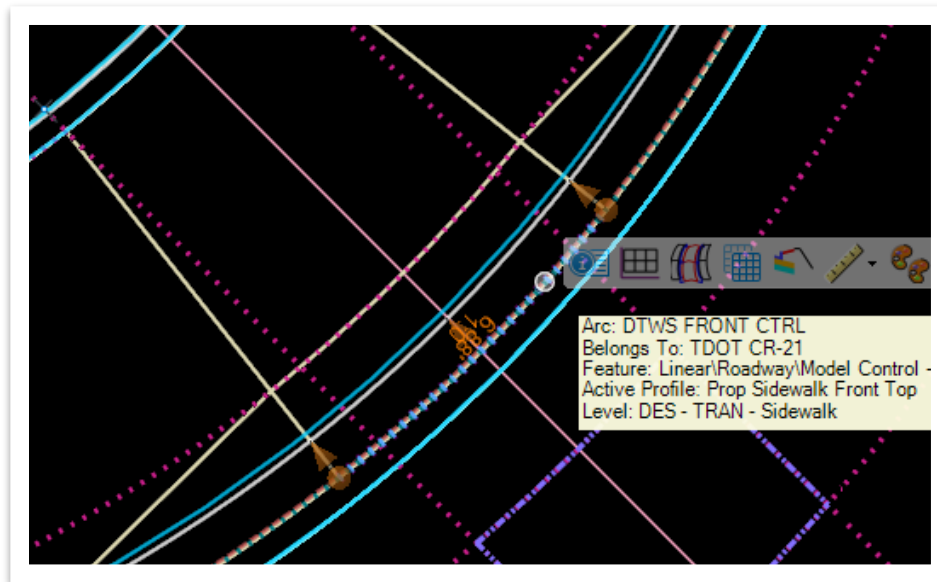
Parallel Curb Ramps: CR-20, CR-21, CR-22, and CR-23

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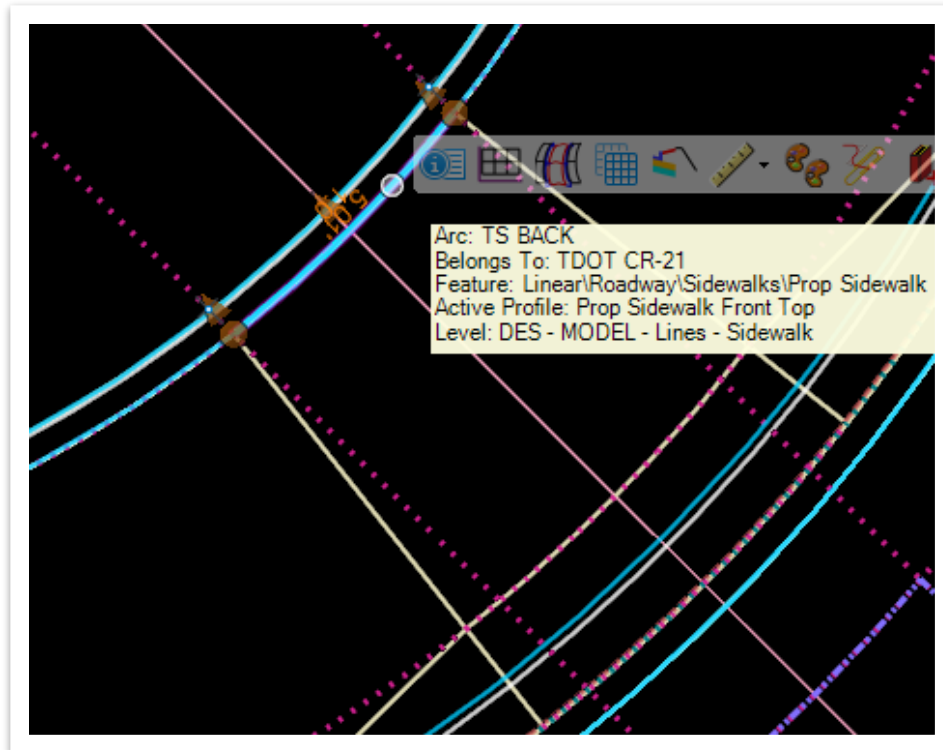


Profile By Projecting 3D Element Simple Slope Rule ^	
Slope	1.50%
Vertical Offset	0.00'
Profile Adjustment	None
Point Selection On Depen	All

- d. **For CR-21 COMB WIDE SW only:** Modify the slope of the center ramp by adjusting the slope of **DTWS FRONT CTRL** (controls slope from **CR FLOWLINE** across the **6-in** curb width) and **DTWS BACK CTRL** (controls slope across the **2-ft** DTWS length) in the element **Properties**. The user may modify the slope of the turning space from the default **1.50%** by adjusting the **TS BACK** element. **Note:** Depending on the element being modified, the default slope may not be **5.00%**.

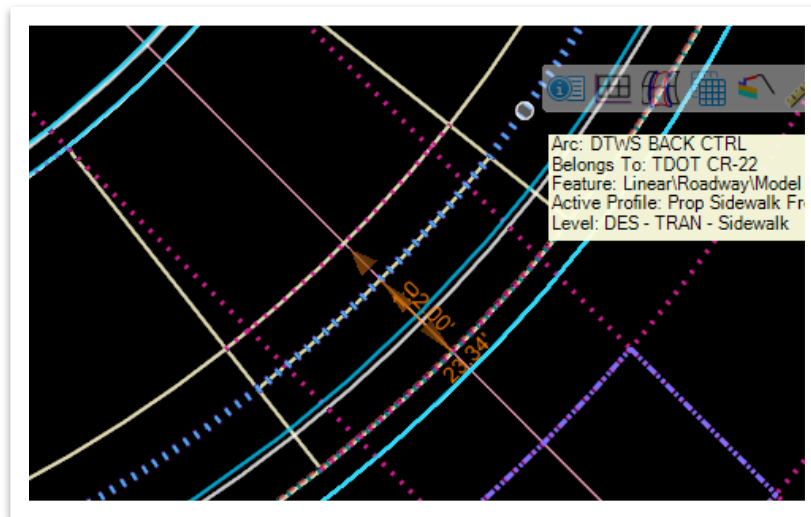
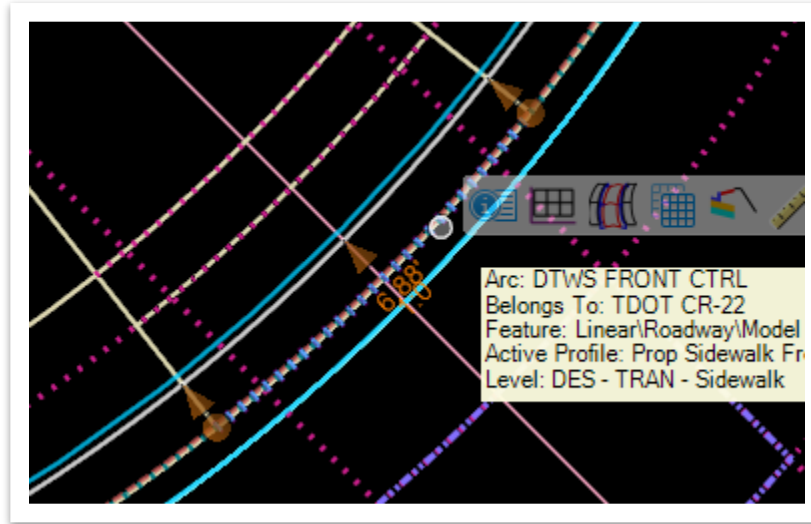


Parallel Curb Ramps: CR-20, CR-21, CR-22, and CR-23

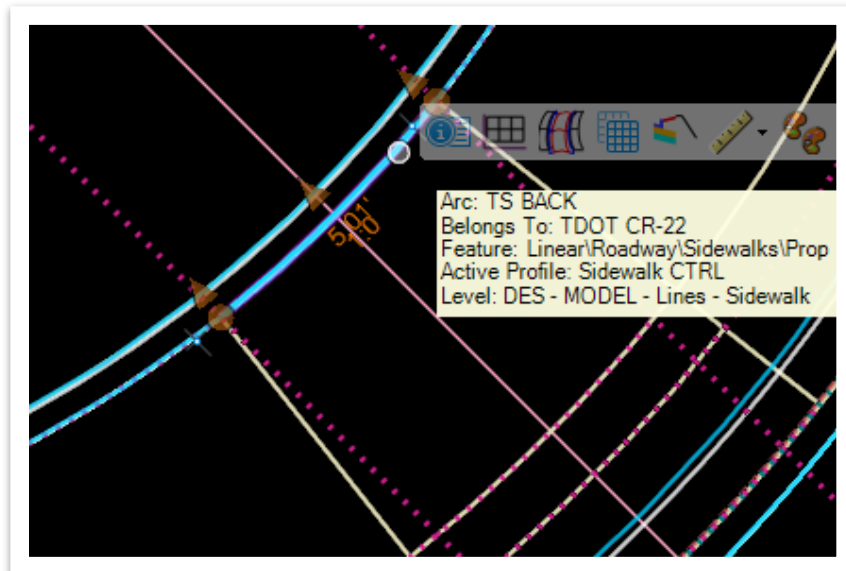
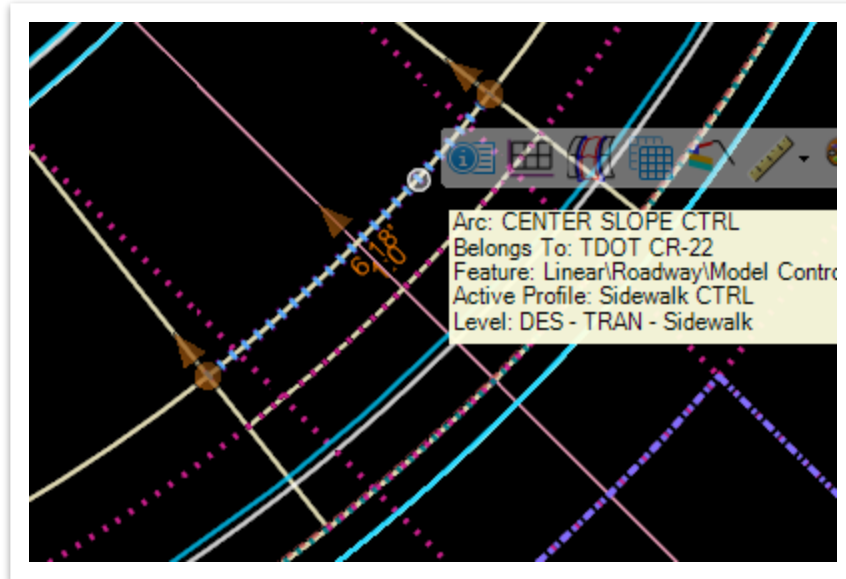


Profile By Projecting 3D Element Simple Slope Rule ^	
Slope	5.00%
Vertical Offset	0.00'
Profile Adjustment	None
Point Selection On Depei	All

- e. **For CR-22 COMB STD SW only:** Modify the slope of the center ramp by adjusting the slope of **DTWS FRONT CTRL** (controls slope from **CR FLOWLINE** across the **6-in** curb width), **DTWS BACK CTRL** (controls slope across the **2-ft** DTWS length), and **CENTER SLOPE CTRL** in the element **Properties**. The user may modify the slope of the turning space from the default **1.50%** by adjusting the **TS BACK** element. **Note:** *Depending on the element being modified, the default slope may not be 5.00%.*

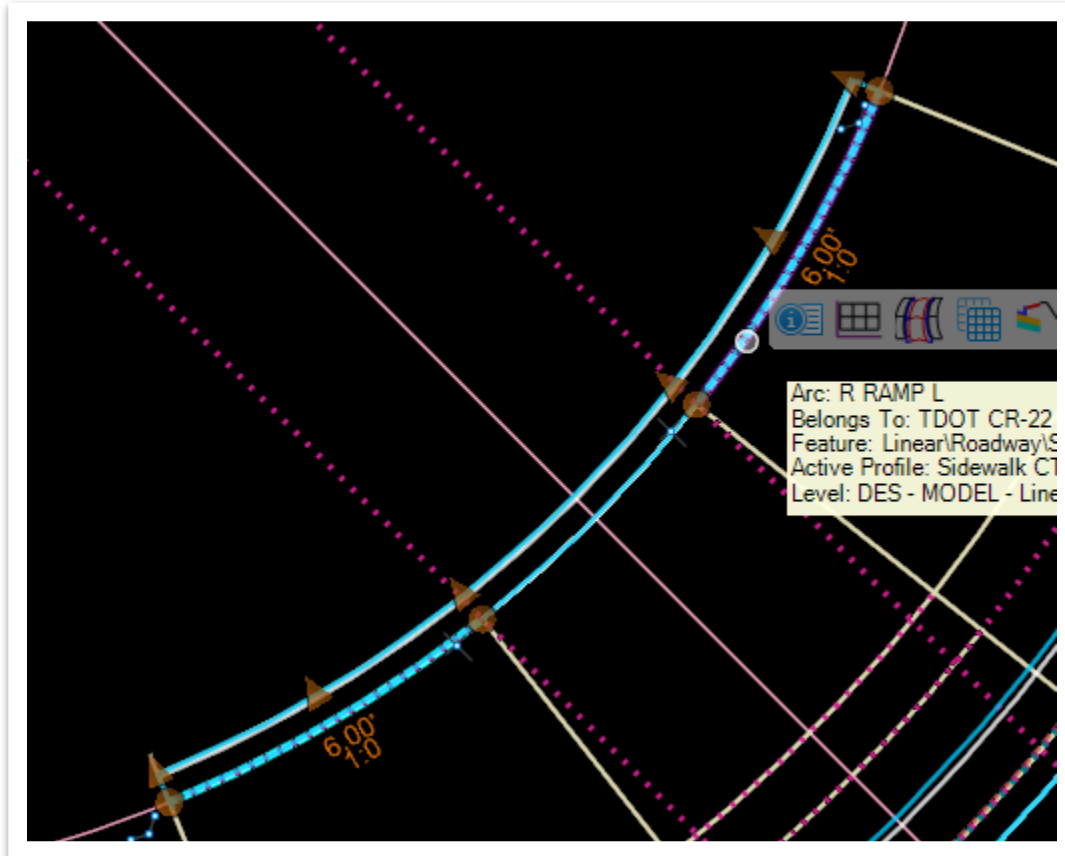


Parallel Curb Ramps: CR-20, CR-21, CR-22, and CR-23



Profile By Projecting 3D Element Simple Slope Rule	
Slope	5.00%
Vertical Offset	0.00'
Profile Adjustment	None
Point Selection On Depel	All

4. Check that all slopes meet the design intent and ADA standards. Since the ramp lengths were modified directly, their respective slopes will always need to be checked. To do this, select each of the following elements and view their slopes under **Profile Line Between Points Rule** in the element **Properties: R RAMP L, L RAMP R** (the inside edge of each ramp, which will have a steeper slope than the outside edge due to the decreased radius).



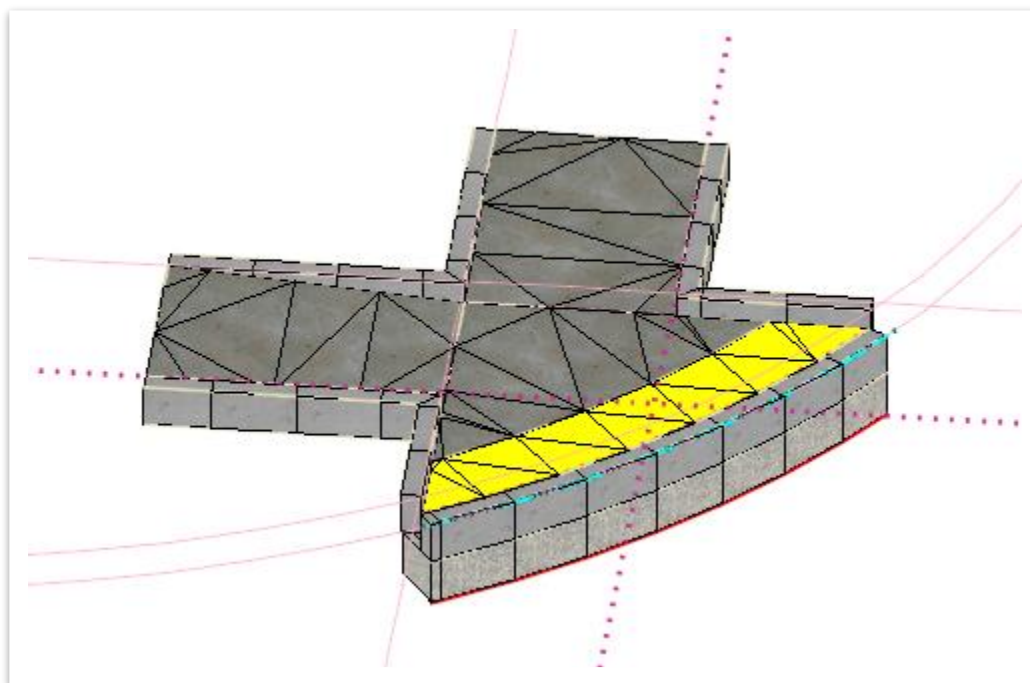
5. If the center ramp slope was set to be greater than **5.00%** in **Step 3d or 3e**, the user must use a **parametric constraint** on the C&G linear template in the intersection civil cell or another modeling tool to eliminate any grade break greater than **13.33%**, while making sure that the **CR FLOWLINE** slope meets the criteria of standard drawings [CR-GTL-1](#) and [CR-GTL-2](#).

## Bi-Directional Curb Ramps: CR-30 through CR-34

The bi-directional ramps require fewer adjustments after civil cell placement than the perpendicular and parallel ramps, but the user must ensure that the sidewalk is modeled correctly before placing the civil cells. Detailed explanations are found beneath the heading for each civil cell below.

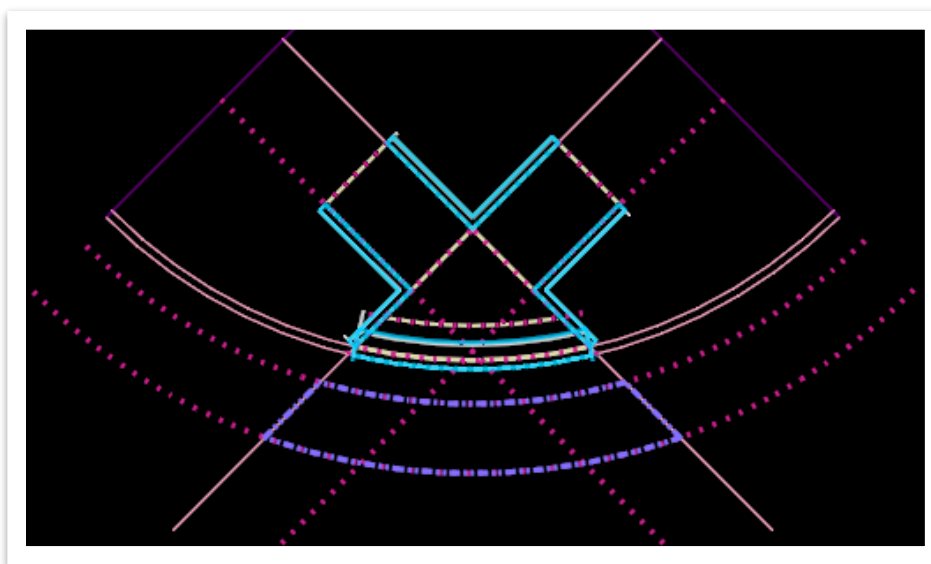
### CR-30 DUAL CROSSING

#### CURB RAMPS IN CURVE BI-DIRECTIONAL DUAL CROSSING

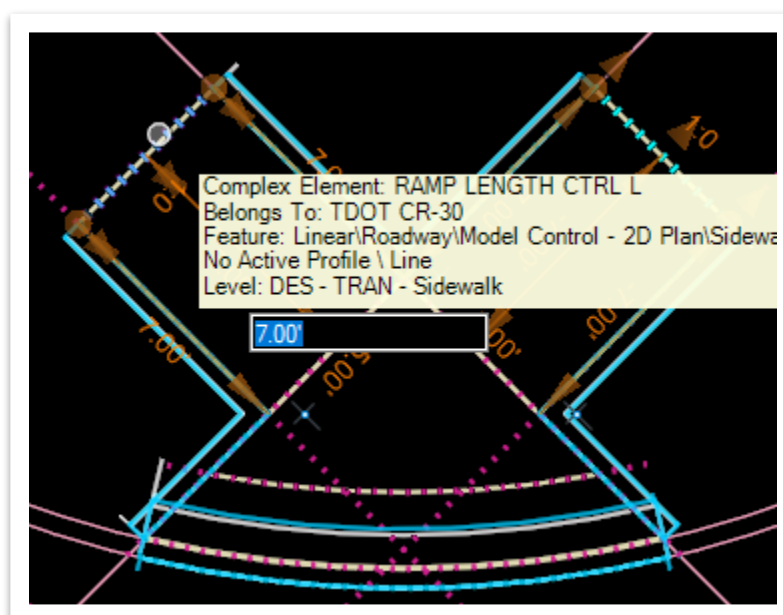


The **CR-30 DUAL CROSSING** civil cell requires four reference lines to place: **CR FLOWLINE**, **CR BACK TOP**, **SW BACK TOP [LEFT]**, and **SW BACK TOP [RIGHT]**. It does not require the user to draw a proposed ramp centerline. In a typical workflow, the **CR FLOWLINE** and **CR BACK TOP** elements will usually be elements of an intersection civil cell. The **SW BACK TOP [LEFT]**, and **SW BACK TOP [RIGHT]** elements must be parallel to the mainline and sideroad alignments, respectively, so the user should select the **SW BACK TOP** elements from the two corridors and not from the intersection civil cell. Alternatively, the user can manually draw two reference lines representing the proposed back of sidewalk elements, but they must have active profiles matching the desired sidewalk tie-in elevations.

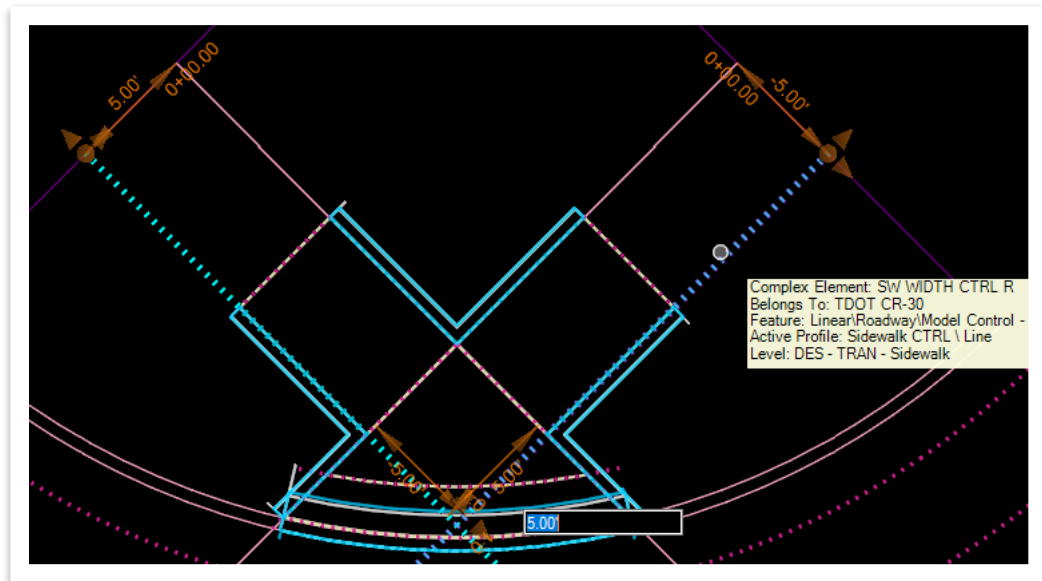
1. Open the **Place Civil Cell** tool (**OpenRoads Modeling >> Model Detailing >> Civil Cells**). In the **Pick Civil Cell** window, select the **CR-30 DUAL CROSSING** civil cell from the dgnlib and click **OK**. Then, select the following reference lines in order: **CR FLOWLINE**, **CR BACK TOP**, **SW BACK TOP [LEFT]**, and **SW BACK TOP [RIGHT]**, along with the corridor to be clipped, if applicable. **Note:** *The user may need to reverse the direction of one or more reference lines during placement. To place correctly, all lines should be oriented from left to right when viewed in the standard orientation shown below.*



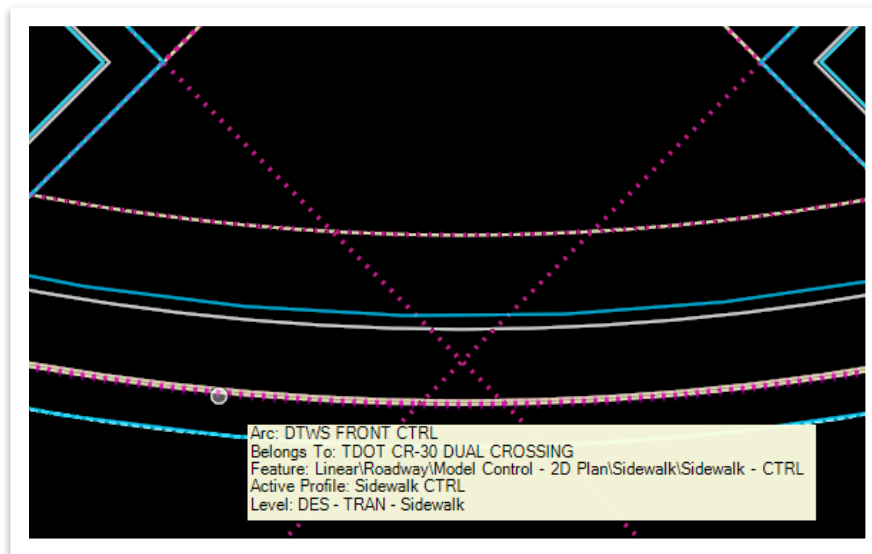
2. Adjust the civil cell to match the proposed design.
  - a. Modify the ramp lengths using the **RAMP LENGTH CTRL R** and **RAMP LENGTH CTRL L** elements. This will automatically adjust the slope of the ramps.



- b. Modify the ramp and sidewalk widths to match the front edge of sidewalk using the **SW WIDTH CTRL R** and **SW WIDTH CTRL L** elements. This will automatically adjust the turning space dimensions.

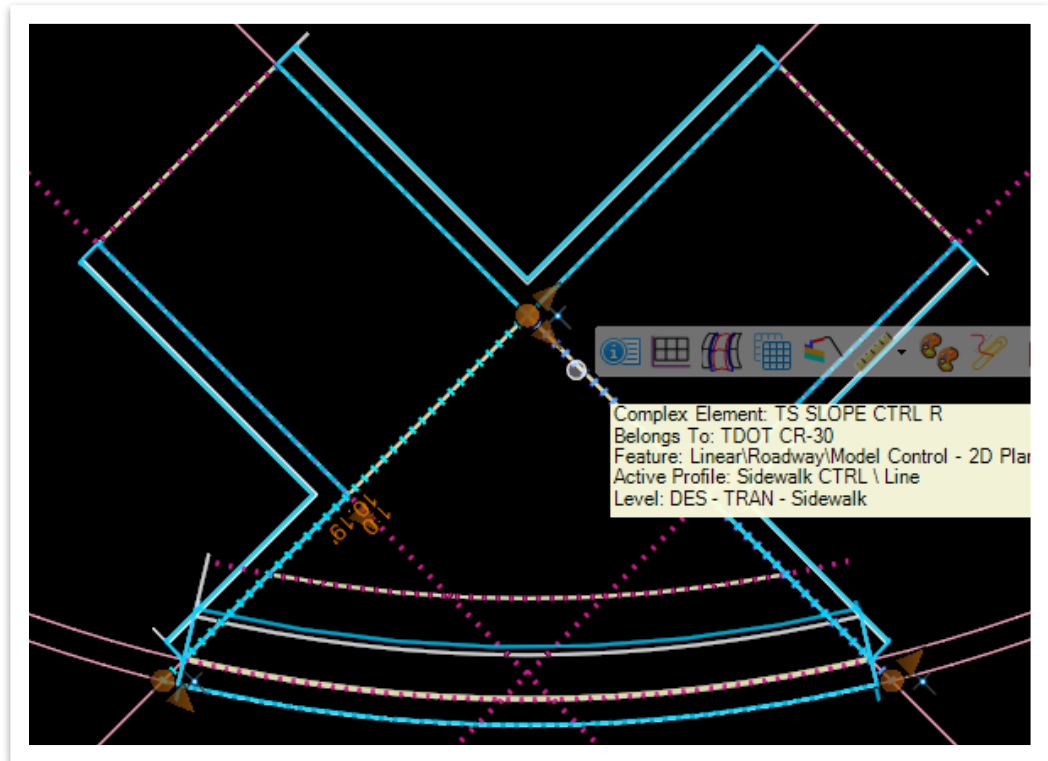


- c. The slope from **CR FLOWLINE** across the **6-in** curb width is **5.00%** by default. If needed, modify the slope of the **DTWS FRONT CTRL** element in **Properties**.



Profile By Projecting 3D Element Simple Slope Rule	
Slope	5.00%
Vertical Offset	0.00'
Profile Adjustment	None
Point Selection On Deper	All

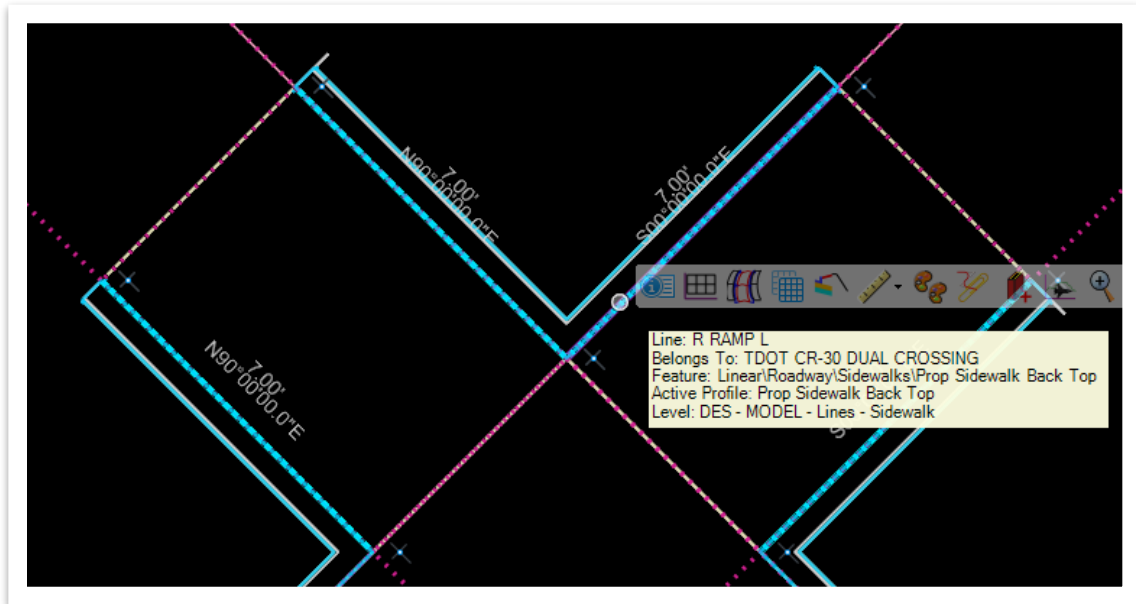
- d. The turning space slope is **1.50%** radially from the **DTWS FRONT CTRL** element by default. If needed, modify the slope of turning space by adjusting the slope of the **TS SLOPE CTRL R** and **TS SLOPE CTRL L** elements in **Properties**, or by drawing a new profile in the respective profile views.



Profile By Projecting 3D Element Simple Slope Rule ^	
Slope	1.50%
Vertical Offset	0.00'
Profile Adjustment	None
Point Selection On Depen	All

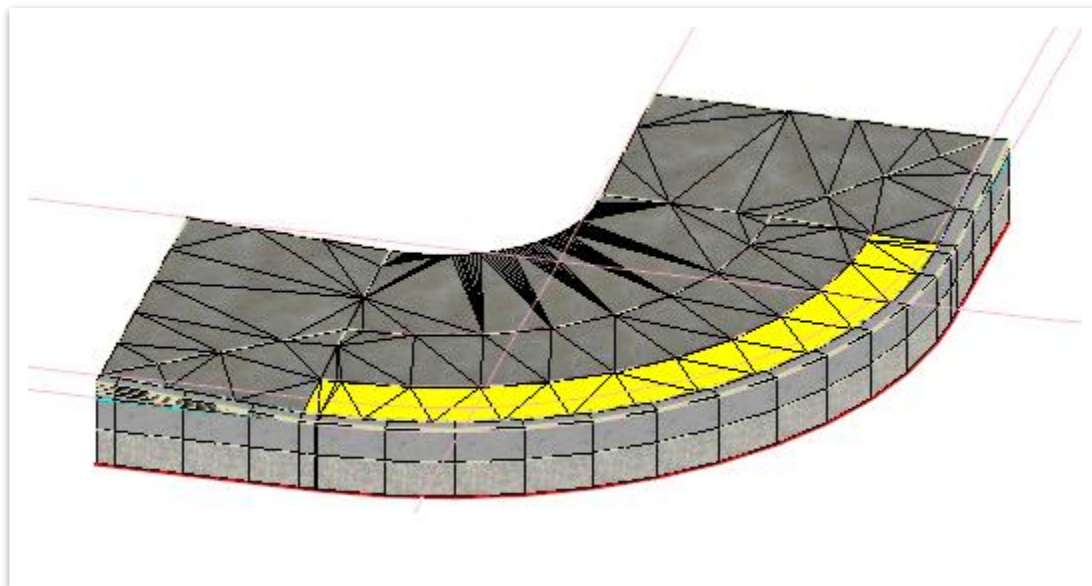
## Bi-Directional Curb Ramps: CR-30 through CR-34

3. Check that all slopes meet the design intent and ADA standards. Since the ramp lengths were modified directly, their respective slopes will always need to be checked. To do this, select each of the following elements and view their slopes under **Profile Line Between Points Rule** in the element **Properties: R RAMP R, R RAMP L, L RAMP R, and L RAMP L**. **Note:** *The left and right edges of the ramp may have different slopes depending on project-specific conditions.*



## CR-31 BLENDED TRANSITION

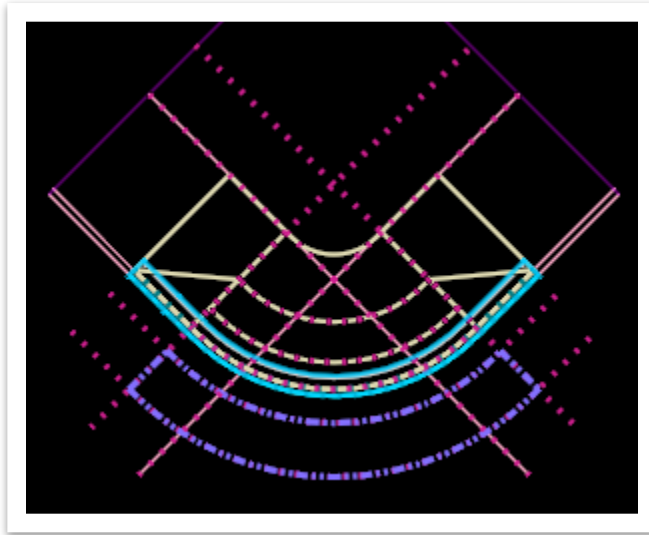
### BLENDED TRANSITION BI-DIRECTIONAL



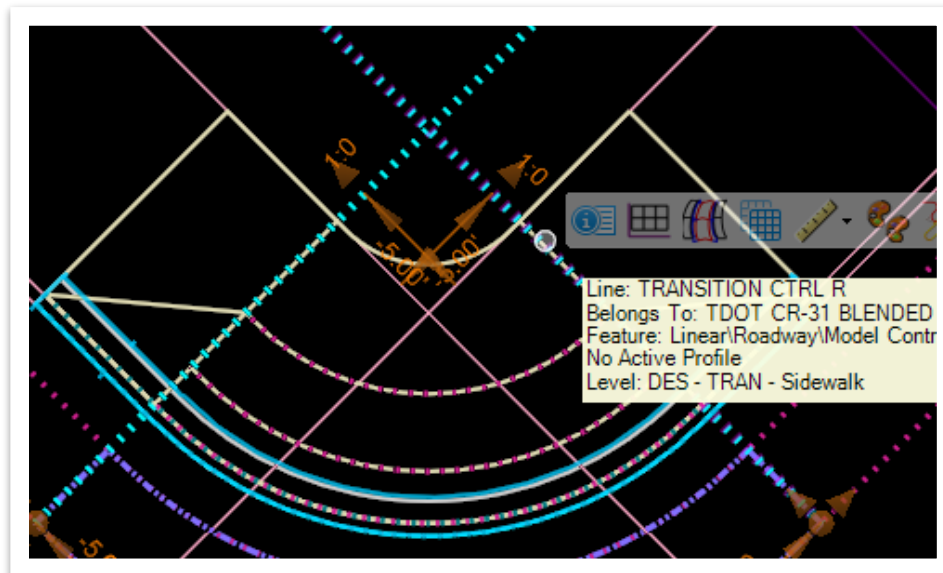
The **CR-31 BLENDED TRANSITION** civil cell requires four reference lines to place: **CR FLOWLINE**, **CR BACK TOP**, **SW BACK TOP [LEFT]**, and **SW BACK TOP [RIGHT]**. It does not require the user to draw a proposed ramp centerline. In a typical workflow, the **CR FLOWLINE** and **CR BACK TOP** elements will need to be created using dummy elements, as shown in [General Procedure Step 9](#). The **SW BACK TOP [LEFT]** and **SW BACK TOP [RIGHT]** elements must be parallel to the mainline and sideroad alignments, respectively, so the user should select the **SW BACK TOP** elements from the two corridors and not from the intersection civil cell. Alternatively, the user can manually draw two reference lines representing the proposed back of sidewalk elements, but they must have active profiles matching the desired sidewalk tie-in elevations.

In addition to the shared transition area at the intersection of the two sidewalks, the **CR-31 BLENDED TRANSITION** civil cell includes surface templates along the tangent portions of both roadway corridors, beyond the limits of payment shown on the standard drawing, as part of the **FLARE L** and **FLARE R** surfaces. Modifying the flare length will adjust the amount of sidewalk to be controlled by the civil cell. This allows the blended transition to work in many more design scenarios, since the shared turning space (**TS** surface) does not need to be at curb height.

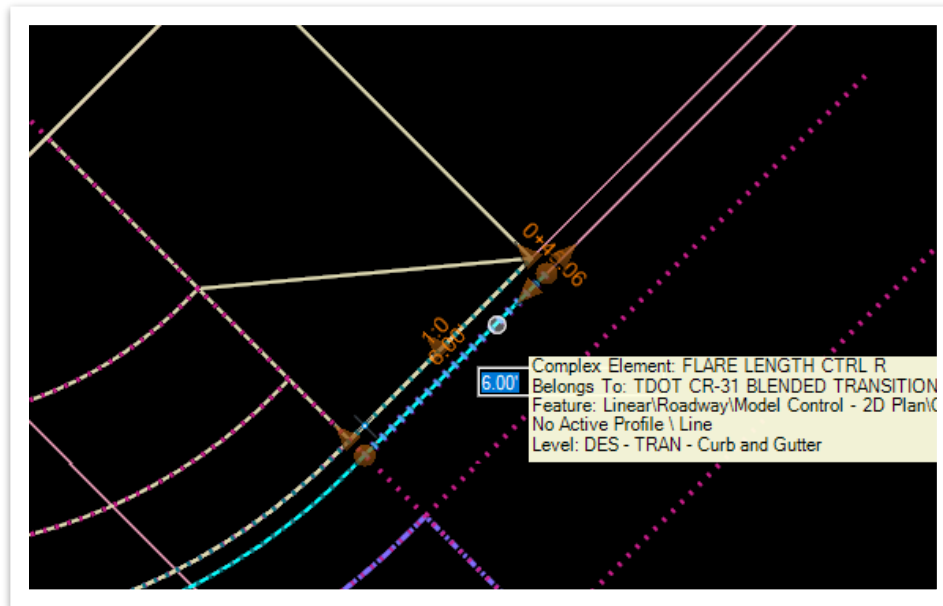
1. Open the **Place Civil Cell** tool (**OpenRoads Modeling >> Model Detailing >> Civil Cells**). In the **Pick Civil Cell** window, select the **CR-31 BLENDED TRANSITION** civil cell from the dgnlib and click **OK**. Then, select the following reference lines in order: **CR FLOWLINE**, **CR BACK TOP**, **SW BACK TOP [LEFT]**, and **SW BACK TOP [RIGHT]**, along with the corridor to be clipped, if applicable. **Note:** *The user may need to reverse the direction of one or more reference lines during placement. To place correctly, all lines should be oriented from left to right when viewed in the standard orientation shown below.*



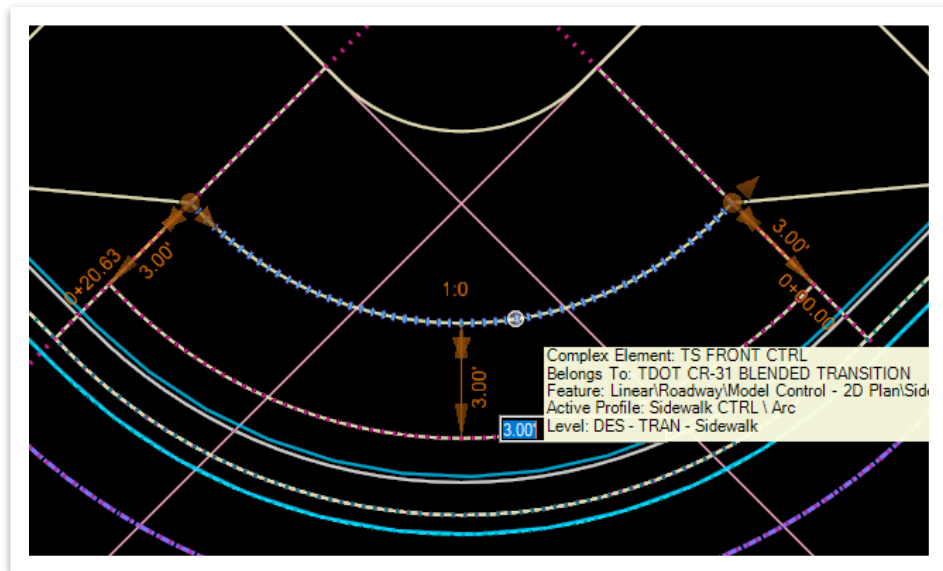
2. Adjust the civil cell to match the proposed design.
  - a. Modify the location of the blended transitions using the **TRANSITION CTRL R** and **TRANSITION CTRL L** elements.



- b. Modify the flare lengths as desired using the **FLARE LENGTH CTRL R** and **FLARE LENGTH CTRL L** elements. This will automatically adjust the slope of the flare and the sidewalk tie-ins.

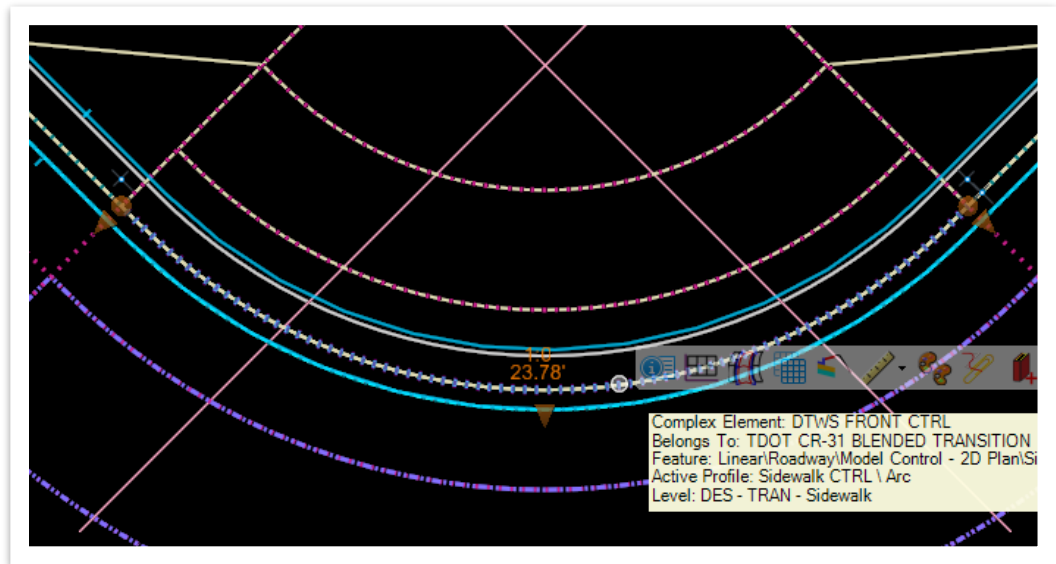


- c. Modify the length and slope of the blended ramp using the **TS FRONT CTRL** element.



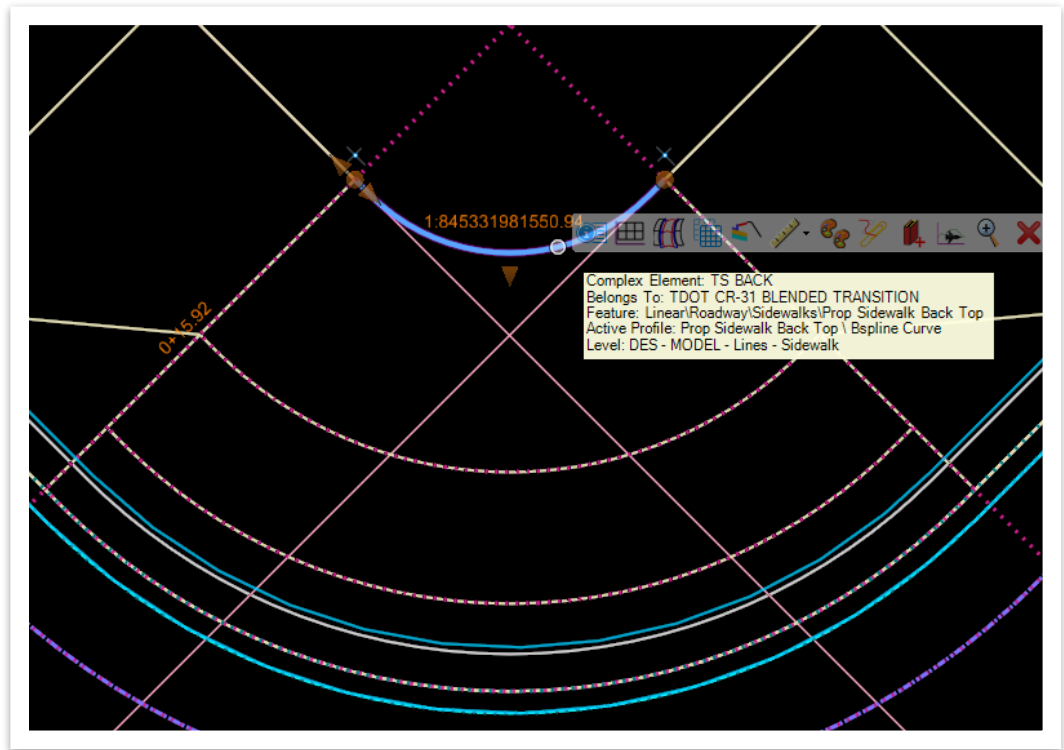
Profile By Projecting 3D Element Simple Slope Rule ^	
Slope	5.00%
Vertical Offset	0.00'
Profile Adjustment	None
Point Selection On Depe	All

- d. The slope from **CR FLOWLINE** across the **6-in** curb width is **5.00%** by default. If needed, modify the slope of the **DTWS FRONT CTRL** element in **Properties**.



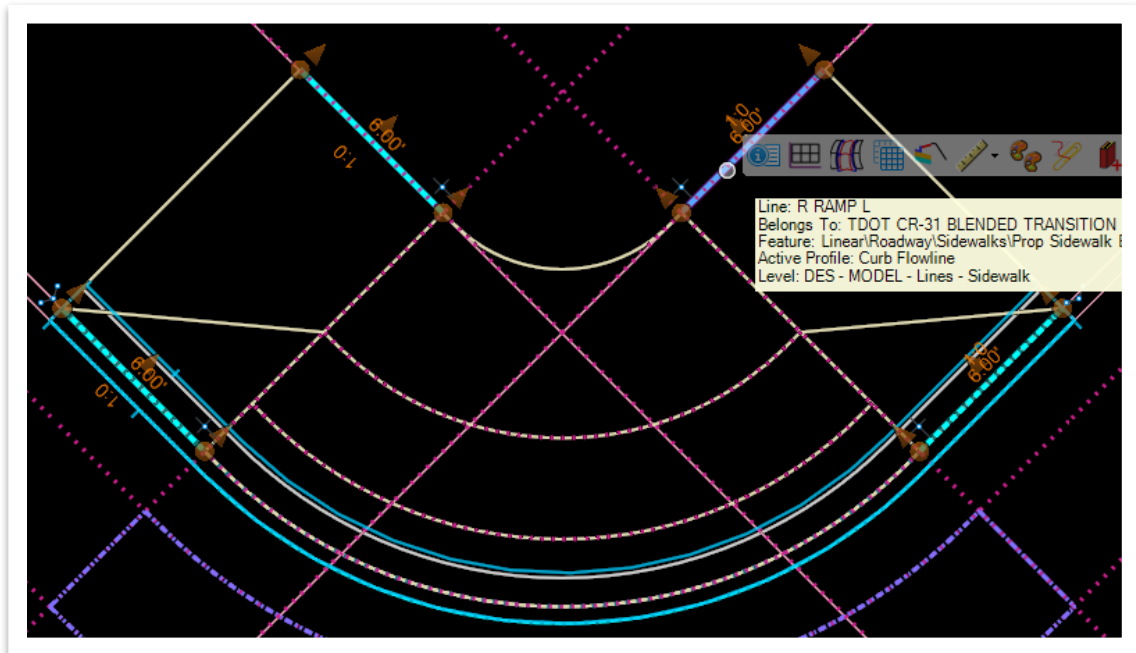
Profile By Projecting 3D Element Simple Slope Rule	
Slope	5.00%
Vertical Offset	0.00'
Profile Adjustment	None
Point Selection On Depel	All

- e. The turning space slope is **1.50%** radially from the **TS FRONT CTRL** element by default. If needed, modify the slope of turning space by adjusting slope of the **TS BACK** element in the **Properties**.



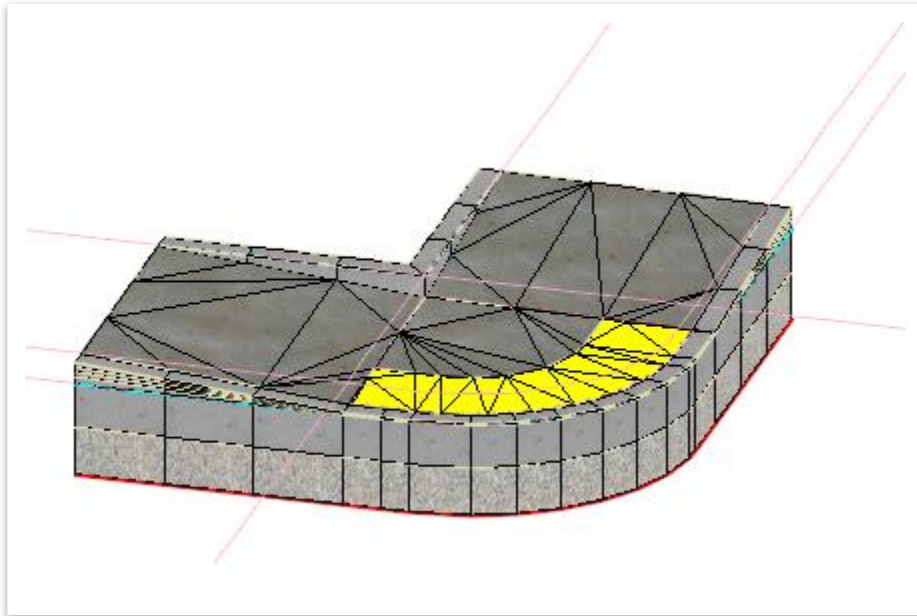
Profile By Projecting 3D Element Simple Slope Rule	
Slope	1.50%
Vertical Offset	0.00'
Profile Adjustment	None
Point Selection On Depen	All

3. Check that all slopes meet the design intent and ADA standards. Since the ramp and flare lengths were modified directly, their respective slopes will always need to be checked. To do this, select each of the following elements and view their slopes under **Profile Line Between Points Rule** in the element **Properties: R RAMP R, R RAMP L, L RAMP R, and L RAMP L**.



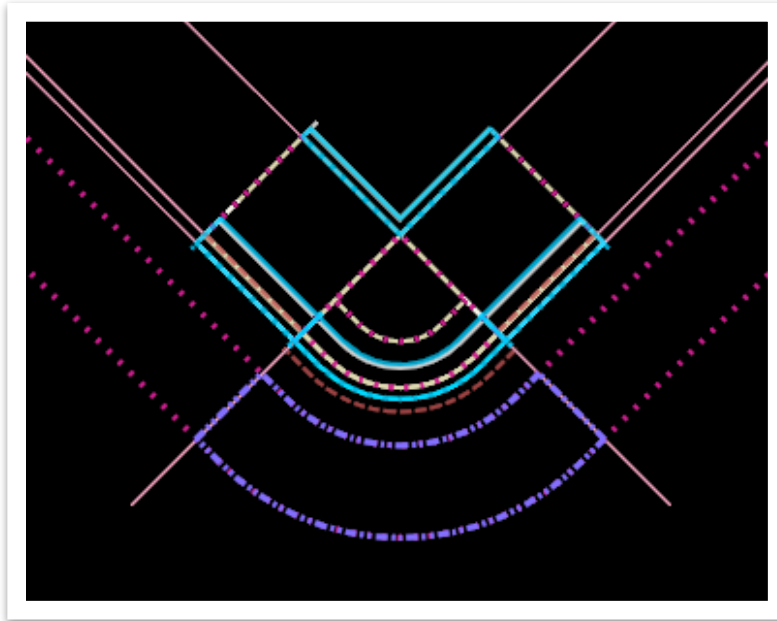
## CR-32 LOWERED CORNER

### LOWERED CORNER RAMP

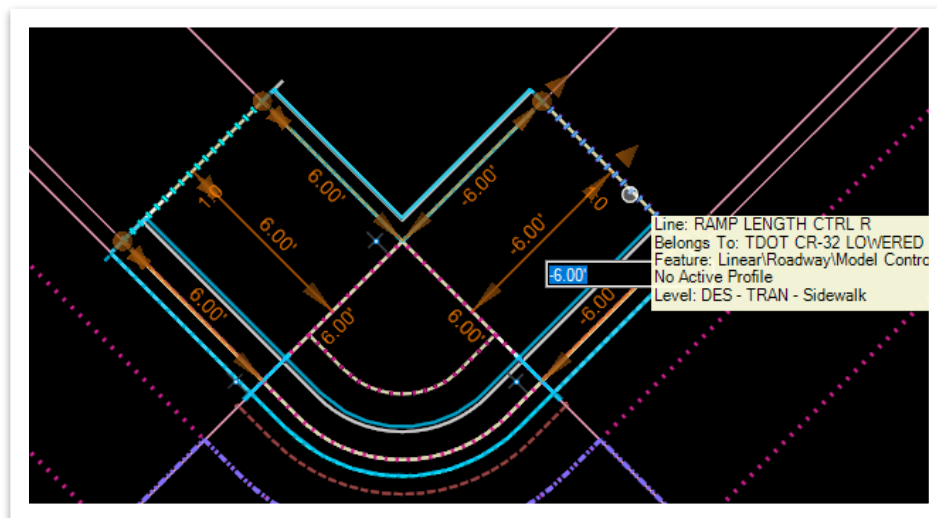


The [CR-32 LOWERED CORNER](#) civil cell requires four reference lines to place: **CR FLOWLINE**, **CR BACK TOP**, **SW BACK TOP [LEFT]**, and **SW BACK TOP [RIGHT]**. It does not require the user to draw a proposed ramp centerline. In a typical workflow, the **CR FLOWLINE** and **CR BACK TOP** elements will need to be created using dummy elements, as shown in [General Procedure Step 9](#). The **SW BACK TOP [LEFT]** and **SW BACK TOP [RIGHT]** elements must be parallel to the mainline and sideroad alignments, respectively, so the user should select the **SW BACK TOP** elements from the two corridors and not from the intersection civil cell. Alternatively, the user can manually draw two reference lines representing the proposed back of sidewalk elements, but they must have active profiles matching the desired sidewalk tie-in elevations.

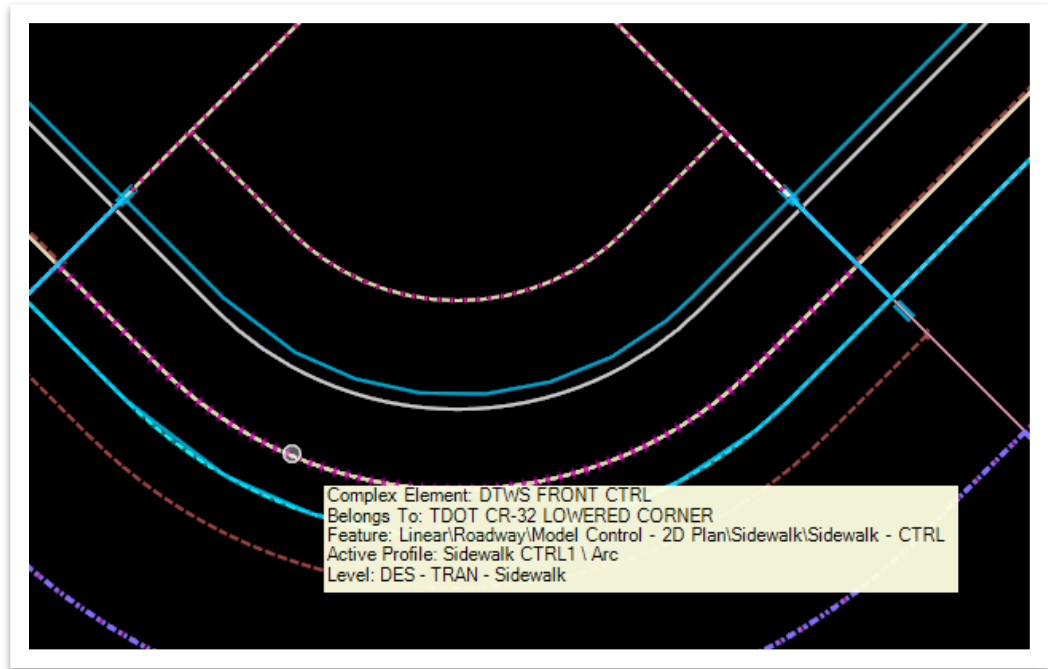
1. Open the **Place Civil Cell** tool (**OpenRoads Modeling >> Model Detailing >> Civil Cells**). In the **Pick Civil Cell** window, select the **CR-32 LOWERED CORNER** civil cell from the dgnlib and click **OK**. Then, select the following reference lines in order: **CR FLOWLINE**, **CR BACK TOP**, **SW BACK TOP [LEFT]**, and **SW BACK TOP TOP [RIGHT]**, along with the corridor to be clipped, if applicable. **Note:** *The user may need to reverse the direction of one or more reference lines during placement. To place correctly, all lines should be oriented from left to right when viewed in the standard orientation shown below.*



2. Adjust the civil cell to match the proposed design.
  - a. Modify the ramp lengths using the **RAMP LENGTH CTRL R** and **RAMP LENGTH CTRL L** elements. This will automatically adjust the slope of the ramps.

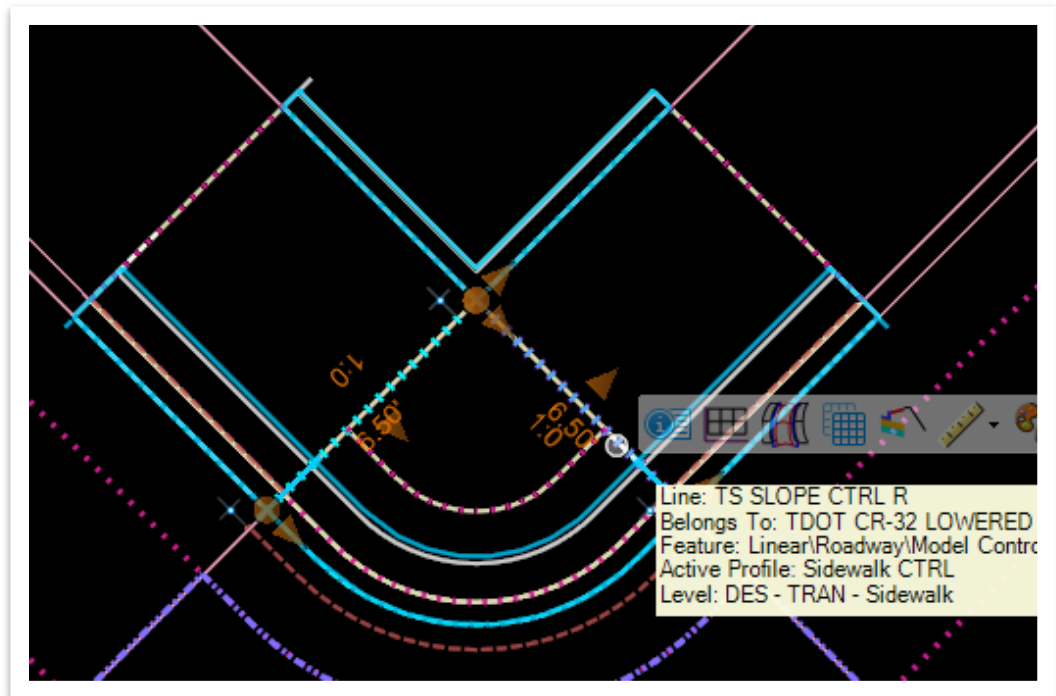


- b. The slope from **CR FLOWLINE** across the **6-in** curb width is **1.50%** by default. If needed, modify the slope of the **DTWS FRONT CTRL** element in **Properties**.



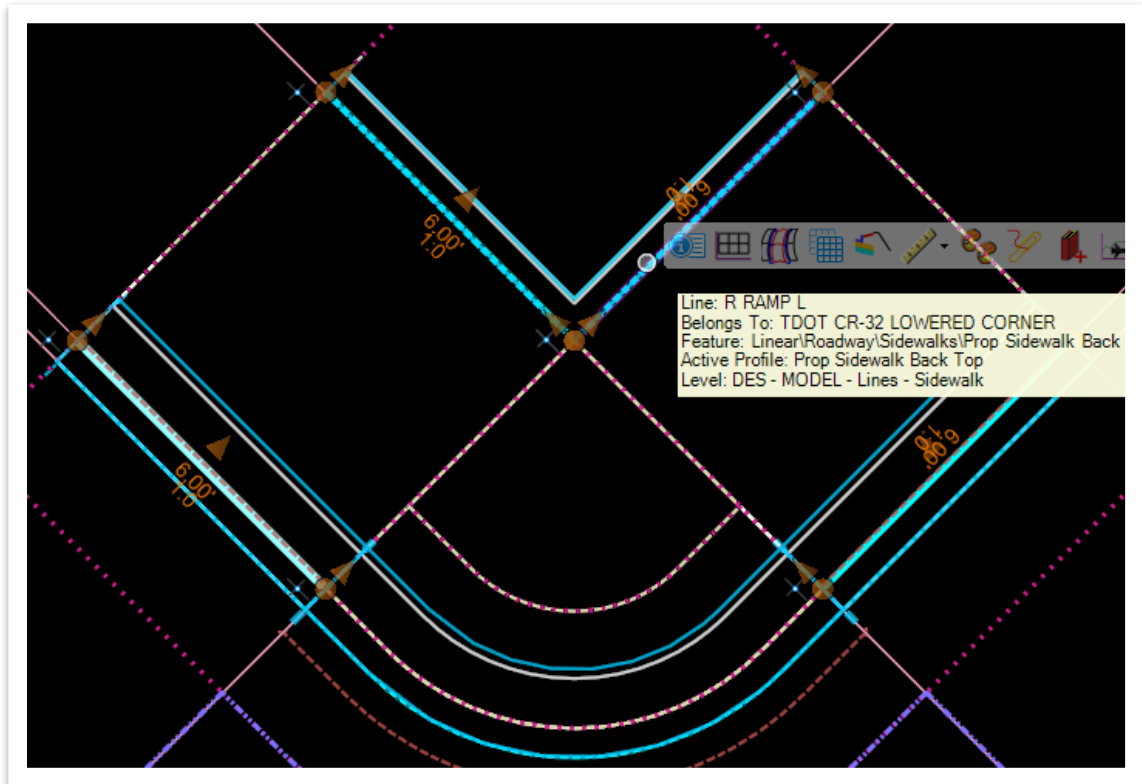
Profile By Projecting 3D Element Simple Slope Rule ^	
Slope	1.50%
Vertical Offset	0.00'
Profile Adjustment	None
Point Selection On Depen	All

- c. The turning space slope is **1.50%** radially from the **DTWS FRONT CTRL** element by default. If needed, modify the slope of turning space by adjusting the slope of the **TS SLOPE CTRL R**, **TS SLOPE CTRL L**, and **DTWS BACK CTRL** elements in **Properties**. **Note:** *If the intersection **CR FLOWLINE** has not been designed to meet curb ramp standards, the 1.50% slope of the turning space may create a conflict with the 1.50% cross slope maximum of the left and right ramps.*



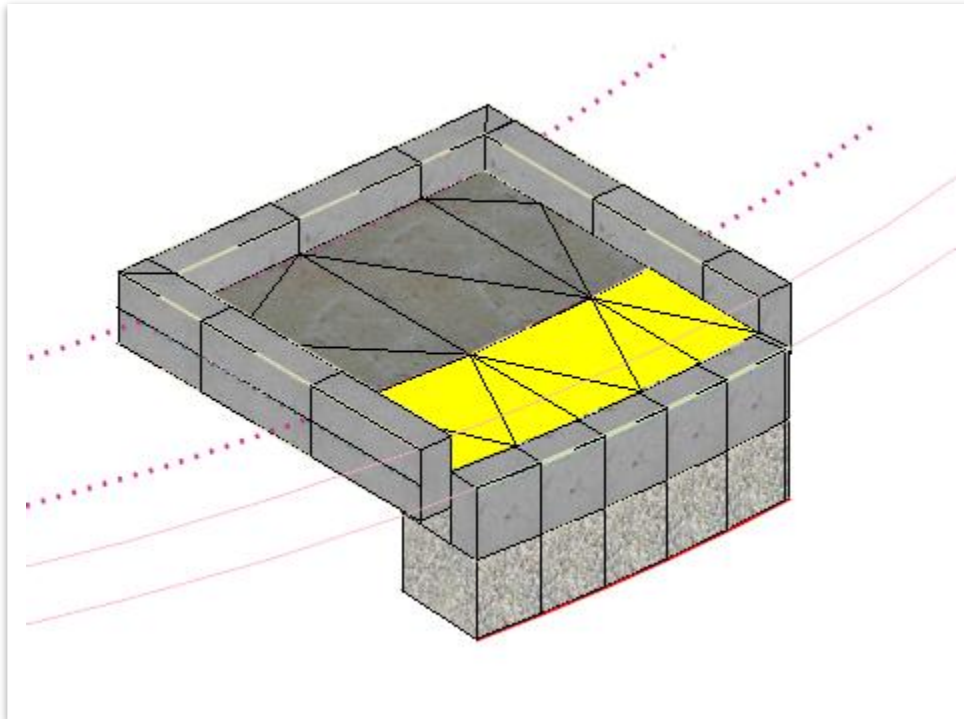
Profile By Projecting 3D Element Simple Slope Rule	
Slope	1.50%
Vertical Offset	0.00'
Profile Adjustment	None
Point Selection On Depe	All

3. Check that all slopes meet the design intent and ADA standards. Since the ramp lengths were modified directly, their respective slopes will always need to be checked. To do this, select each of the following elements and view their slopes under **Profile Line Between Points Rule** in the element **Properties: R RAMP R, R RAMP L, L RAMP R, and L RAMP L**. *Note: The left and right edges of the ramp may have different slopes depending on project-specific conditions.*



## CR-33 SINGLE CROSSING

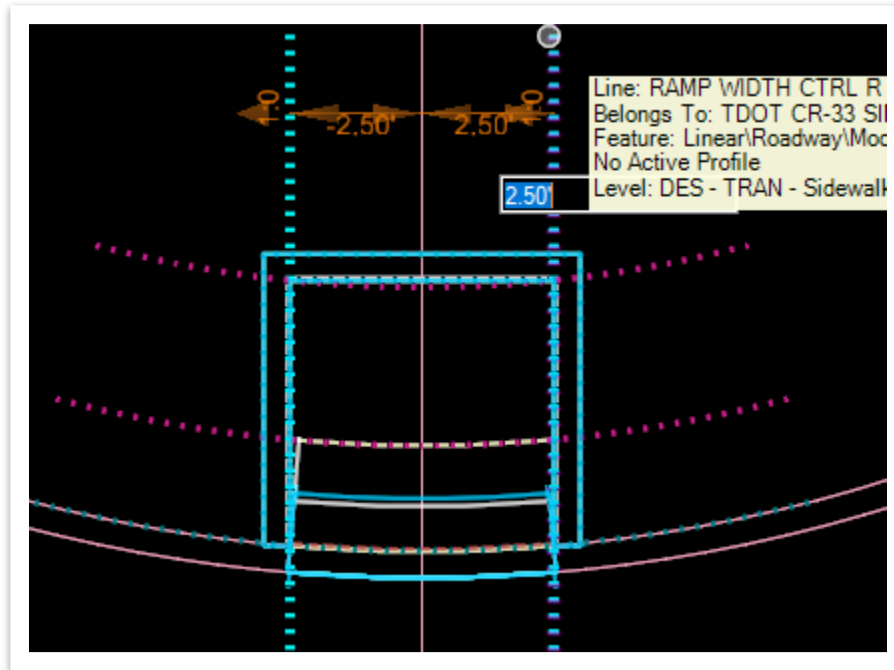
### SINGLE CROSSING CURB RAMP IN CURVE



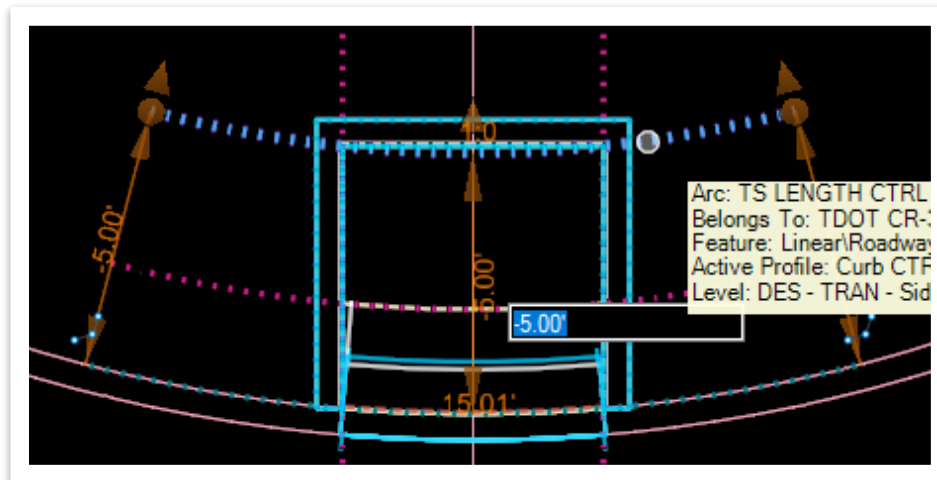
The [CR-33 SINGLE CROSSING](#) civil cell may be placed at any location by manually drawing the proposed ramp centerline location.

1. Prior to placement, the user should ensure that the slope along the gutter flowline will be **2.00% or less (1.50% desirable)** at the proposed pedestrian crossing location.
2. Begin by drawing a curb ramp centerline along the centerline of the proposed ramp location using the **Line Between Points** tool (**OpenRoads Modeling >> Geometry >> Horizontal >> Lines**). This line does not need any profile data.
3. Open the **Place Civil Cell** tool (**OpenRoads Modeling >> Model Detailing >> Civil Cells**). In the **Pick Civil Cell** window, select the appropriate civil cell from the dgnlib and click **OK**. Then, select the following reference lines in order: **CR FLOWLINE**, **CR BACK TOP**, and **RAMP CL - NO PROFILE**, along with the corridor to be clipped, if applicable. **Note:** *The user may need to reverse the direction of one or more reference lines during placement.*

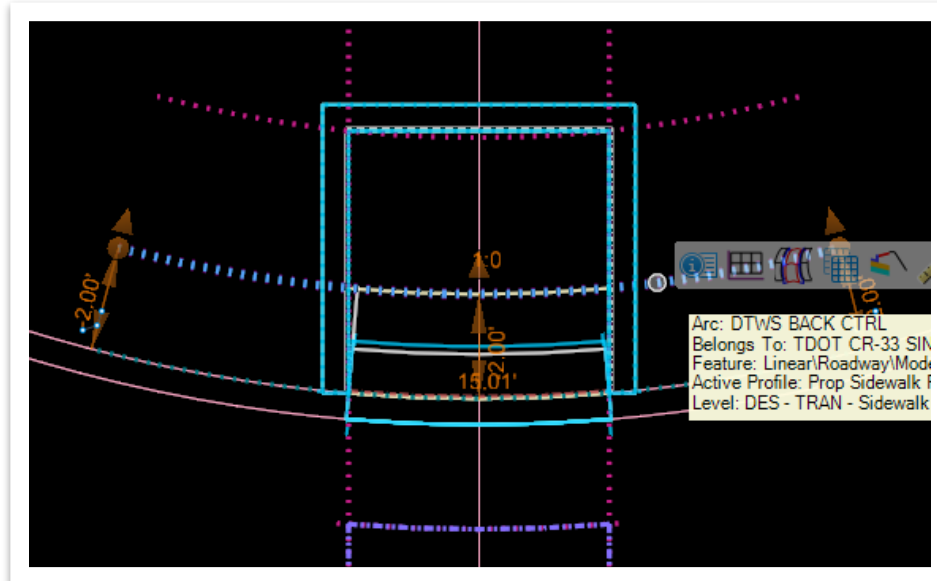
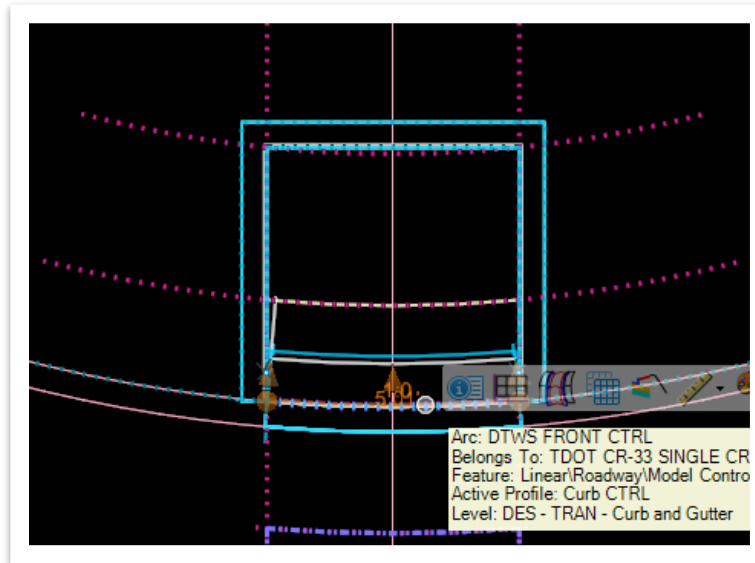
4. Adjust the civil cell to match the proposed design.
  - a. Modify the ramp width using the **RAMP WIDTH CTRL R** and **RAMP WIDTH CTRL L** elements.



- b. Modify the turning space length using **TS LENGTH CTRL**.



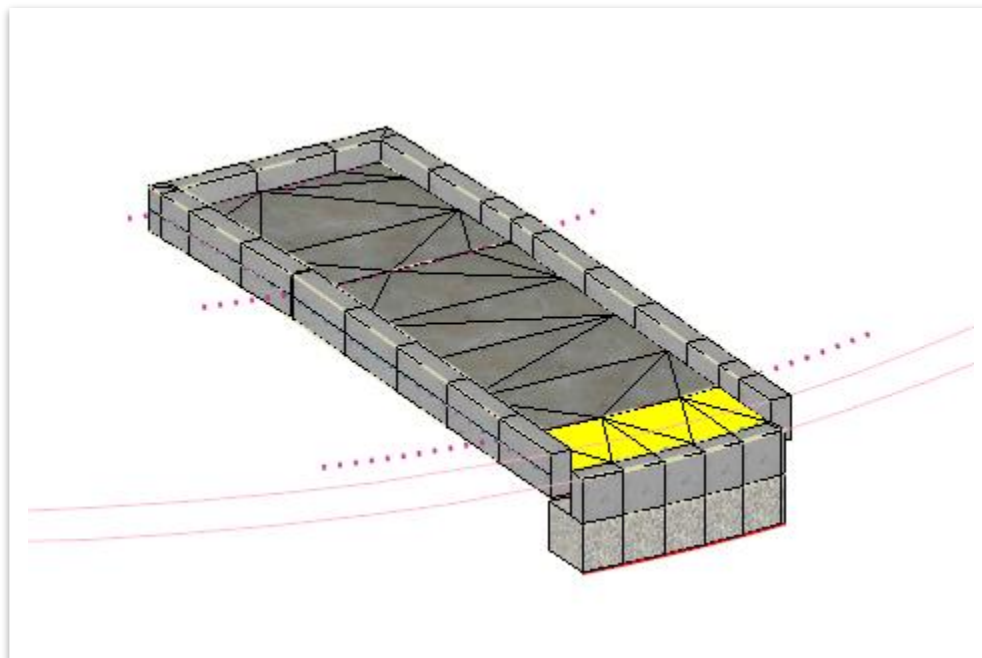
- c. If needed, modify the slope of turning space by adjusting the slope in the **Properties** of the following elements: **DTWS FRONT CTRL** (controls slope from **CR FLOWLINE** across the **6-in** curb width), **DTWS BACK CTRL** (controls slope across the **2-ft** DTWS length), and **TS LENGTH CTRL** (controls slope from **DTWS BACK CTRL** to the end of the turn space). Each of these is set at **1.50%** by default and will usually not need to be changed.



Profile By Projecting 3D Element Simple Slope Rule ^	
Slope	1.50%
Vertical Offset	0.00'
Profile Adjustment	None
Point Selection On Depen	All

## CR-34 SINGLE CROSSING WITH RAMP

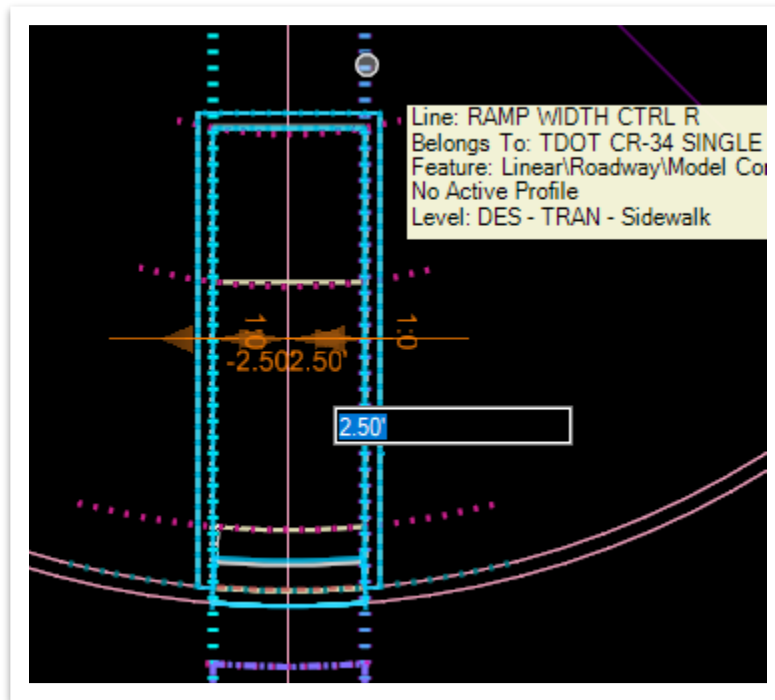
### SINGLE CROSSING CURB RAMP IN CURVE



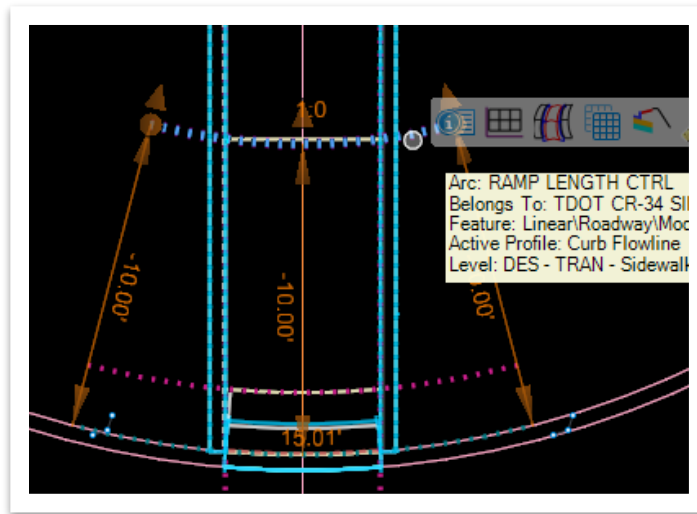
The [CR-34 SINGLE CROSSING WITH RAMP](#) civil cell may be placed at any location by manually drawing the proposed ramp centerline location. **Note:** *The CR-34 civil cell will only work for ramps that are approximately perpendicular to the curb line, matching the intent of the standard drawing.*

1. Prior to placement, the user should ensure that the slope along the gutter flowline will be **2.00% or less (1.50% desirable)** at the proposed pedestrian crossing location. This must also include any modification needed to reduce the gutter pan slope per standard drawing [CR-GTL-1](#) and [CR-GTL-2](#), which will be required in situations where the curb ramp slope must be greater than **5.00%** and the available right-of-way does not allow for the construction of a **2-ft** transition area (refer to **Step 6**). The curb ramp civil cell will match the cross slope along the **CR FLOWLINE** element provided to it.
2. Begin by drawing a curb ramp centerline along the centerline of the proposed ramp location using the **Line Between Points** tool (**OpenRoads Modeling >> Geometry >> Horizontal >> Lines**). This line does not need any profile data.
3. Open the **Place Civil Cell** tool (**OpenRoads Modeling >> Model Detailing >> Civil Cells**). In the **Pick Civil Cell** window, select the appropriate civil cell from the dgnlib and click **OK**. Then, select the following reference lines in order: **CR FLOWLINE**, **CR BACK TOP**, and **RAMP CL - NO PROFILE**, along with the corridor to be clipped, if applicable. **Note:** *The user may need to reverse the direction of one or more reference lines during placement.*

4. Adjust the civil cell to match the proposed design.
  - a. Modify the ramp width using the **RAMP WIDTH CTRL R** and **RAMP WIDTH CTRL L** elements.

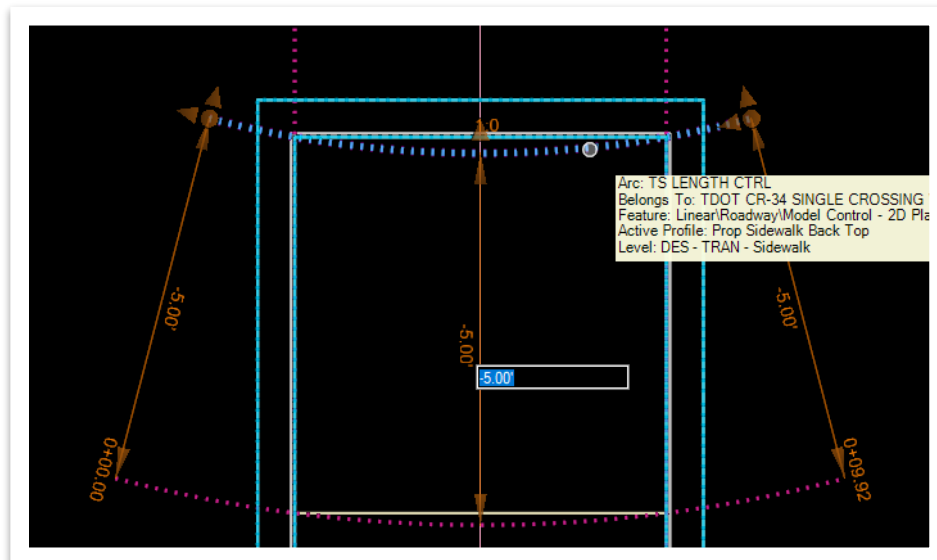


- b. Modify the ramp length to adjust the front edge of sidewalk using the **RAMP LENGTH CTRL** element. This will automatically adjust the slope of the ramp. **Note:** By default, the elevation of the turning space is controlled by projecting a 1.50% slope up from the **CR BACK TOP** element based on typical TDOT details. This may be adjusted by the user in the **Properties** of the **RAMP LENGTH CTRL** element, or by manually drawing a profile within **RAMP LENGTH CTRL** at the desired elevation.

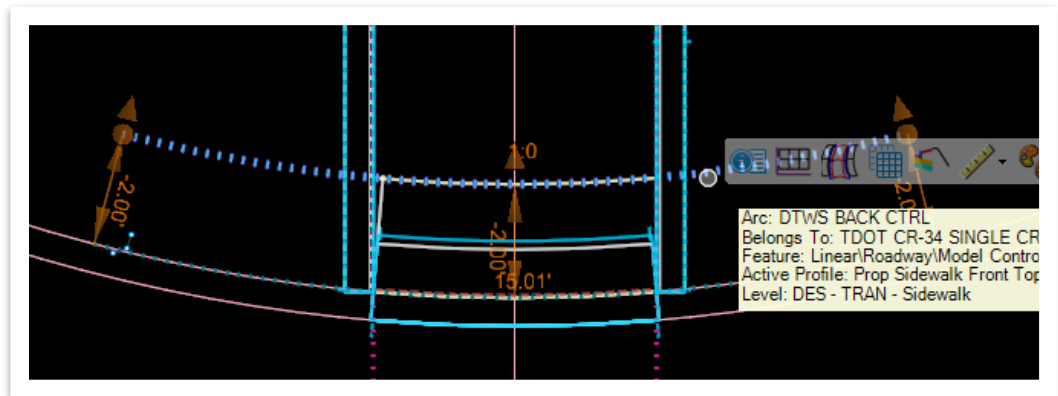
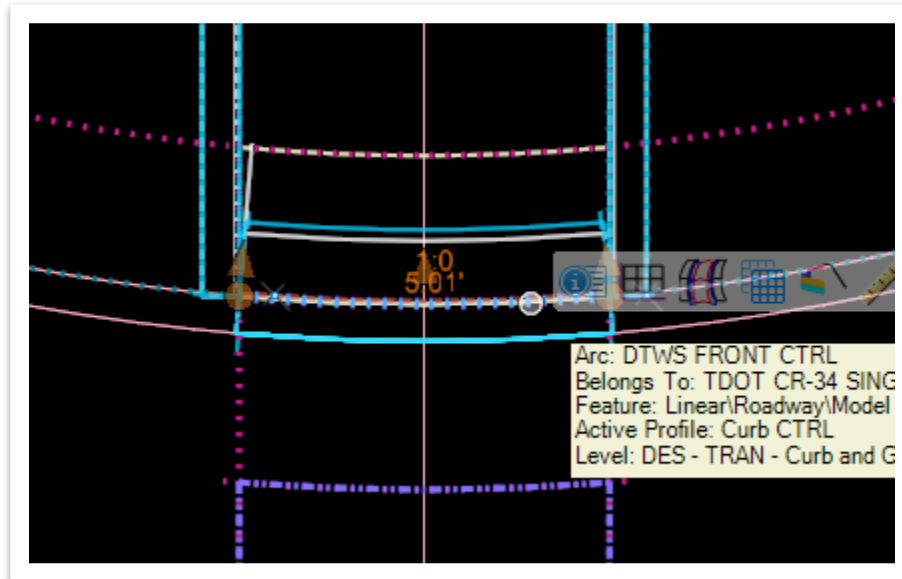


Profile By Projecting 3D Element Simple Slope Rule ^	
Slope	1.50%
Vertical Offset	0.00'
Profile Adjustment	None
Point Selection On Depen	All

- c. Modify the turning space length using **TS LENGTH CTRL**.

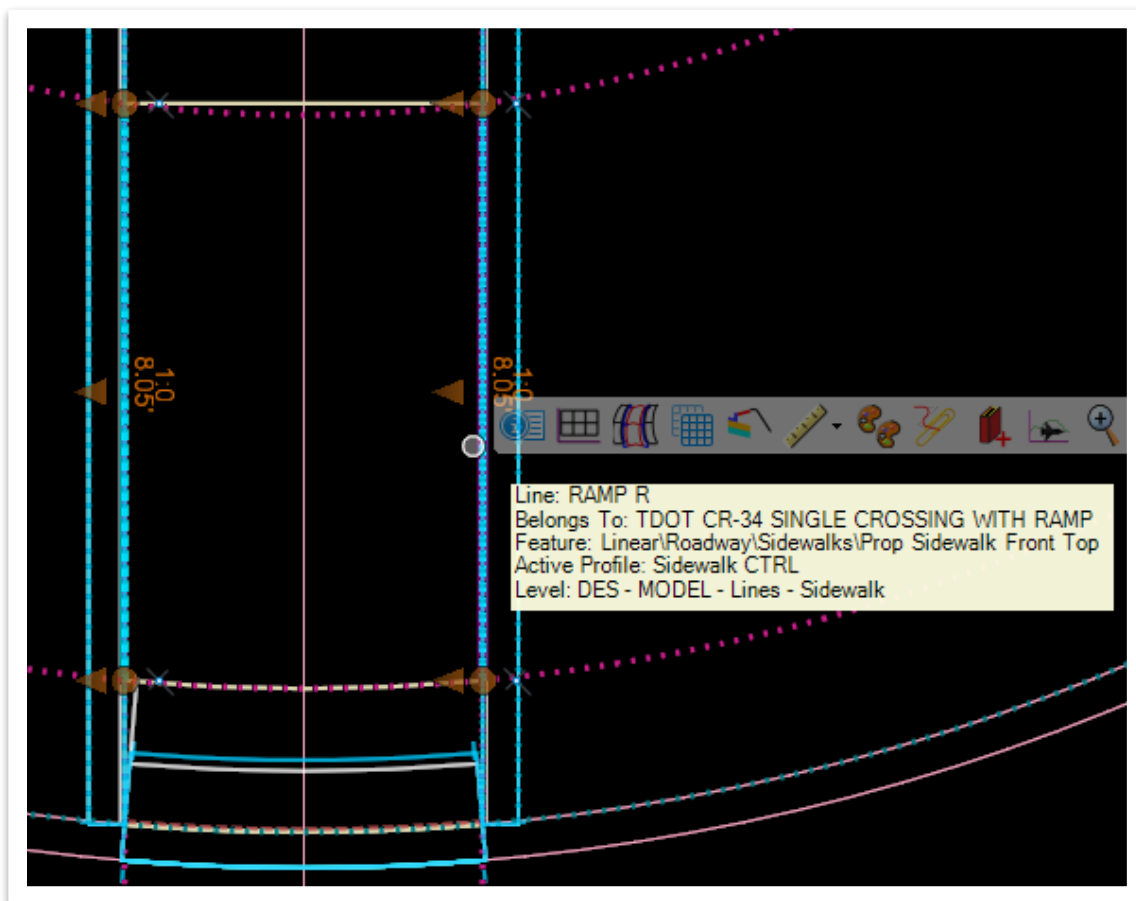


- d. Modify the slope of transition area by adjusting the slope of both **DTWS FRONT CTRL** (controls slope from **CR FLOWLINE** across the **6-in** curb width) and **DTWS BACK CTRL** (controls slope across the **2-ft** DTWS length) in the element **Properties**. **Note:** *This step may need to be iterated until the slope of the transition area matches the slope of the ramp, if the **2.00%** transition is intended to be removed.*



Profile By Projecting 3D Element Simple Slope Rule	
Slope	2.00%
Vertical Offset	0.00'
Profile Adjustment	None
Point Selection On Depen	All

5. Check that all slopes meet the design intent and ADA standards. Since the ramp length and flare lengths were modified directly, their respective slopes will always need to be checked. To do this, select each of the following elements and view their slopes under **Profile Line Between Points Rule** in the element **Properties: RAMP R, RAMP L**. **Note:** *The left and right edges of the ramp may have different slopes depending on project-specific conditions.*

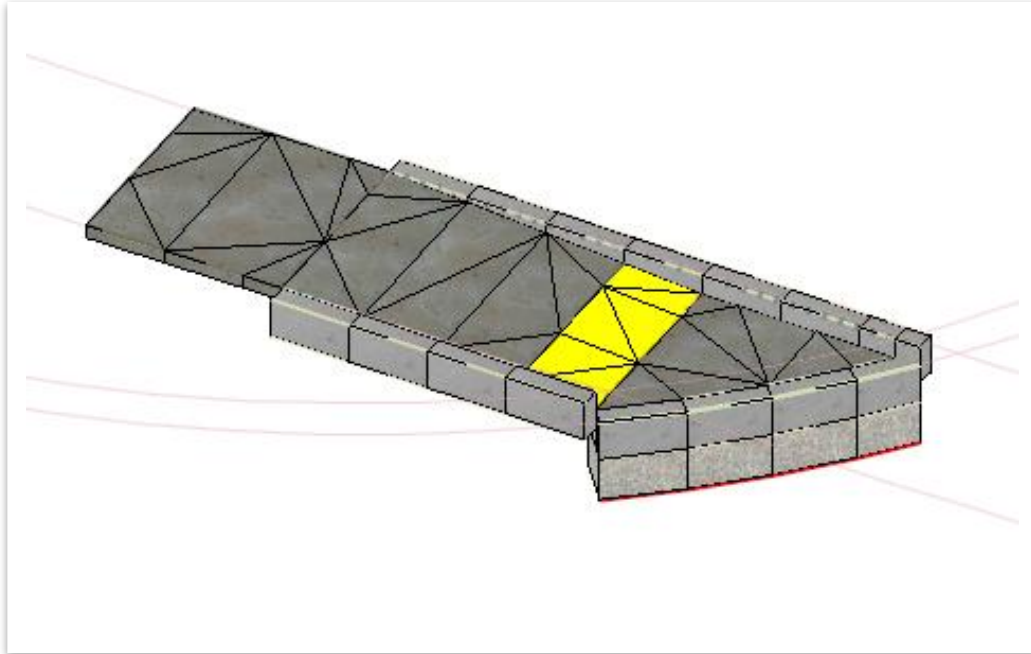


6. If the default **2-ft** transition area was removed in **Step 4d**, the user must use a **parametric constraint** on the C&G linear template in the intersection civil cell or another modeling tool to eliminate any grade break greater than **13.33%**, while making sure that the **CR FLOWLINE** slope meets the criteria of standard drawings [CR-GTL-1](#) and [CR-GTL-2](#).

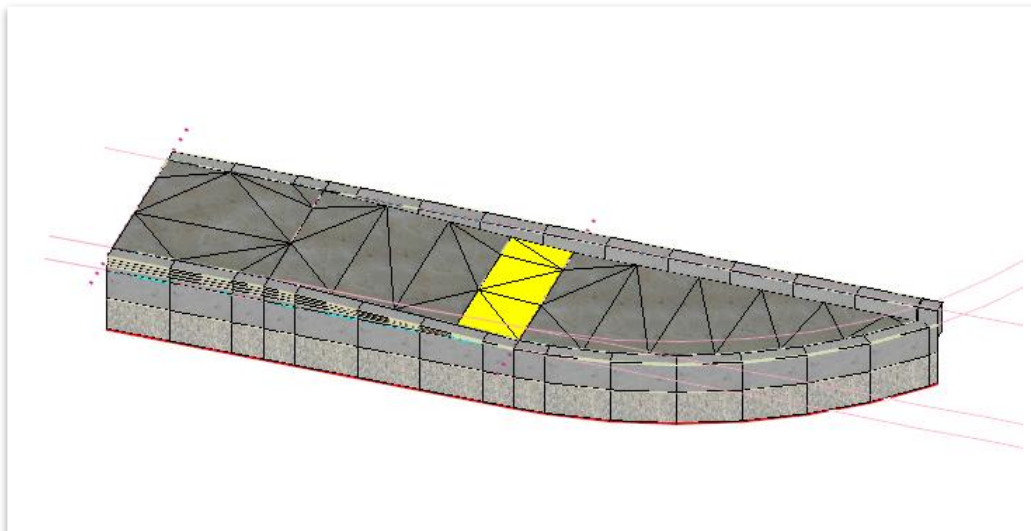
## Mono-Directional Curb Ramps: CR-40

The two types of **CR-40 MONO-DIRECTIONAL SINGLE CROSSWALK** curb ramp civil cells are listed below:

- **CR-40 GRASS STRIP [LEFT] and [RIGHT] – MONO-DIRECTIONAL SINGLE CROSSWALK CURB RAMP**



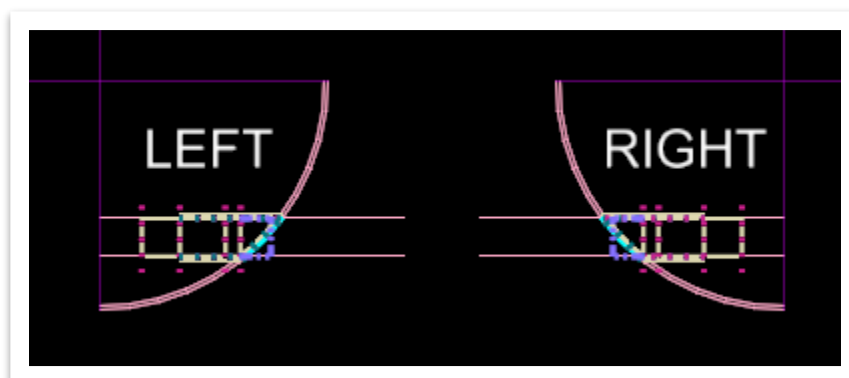
- **CR-40 BACK OF CURB [LEFT] and [RIGHT] – MONO-DIRECTIONAL SINGLE CROSSWALK CURB RAMP**



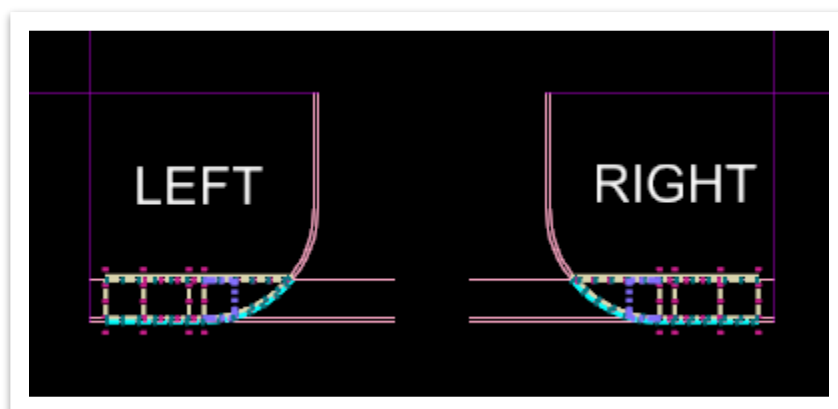
Most of the procedure for [CR-40 MONO-DIRECTIONAL SINGLE CROSSWALK](#) civil cells will be similar regardless of the specific civil cell chosen. The following guidance applies to all mono-directional curb ramp civil cells, except as noted in the steps below, even though the screenshots show the **CR-40 GRASS STRIP [RIGHT]** civil cell.

The **CR-40** curb ramp civil cells do not require the user to draw a proposed ramp centerline. Reference prompts with **INT** indicate to select elements from an intersection civil cell, while reference prompts with **CORRIDOR** indicate to select elements from the corridor that the pedestrian will travel along.

1. Prior to placement, the user should ensure that the slope along the gutter flowline will be **2.00% or less (1.50% desirable)** at the proposed pedestrian crossing location. This must also include any modification needed to reduce the gutter pan slope per standard drawing [CR-GTL-1](#) and [CR-GTL-2](#). The curb ramp civil cell will match the cross slope along the **CR FLOWLINE** reference element provided to it.
2. Open the **Place Civil Cell** tool (**OpenRoads Modeling >> Model Detailing >> Civil Cells**). In the **Pick Civil Cell** window, select the appropriate civil cell from the dgnlib. Choose the **[LEFT]** or **[RIGHT]** option based on the diagrams below.
  - a. **CR-40 GRASS STRIP [LEFT] and [RIGHT]**

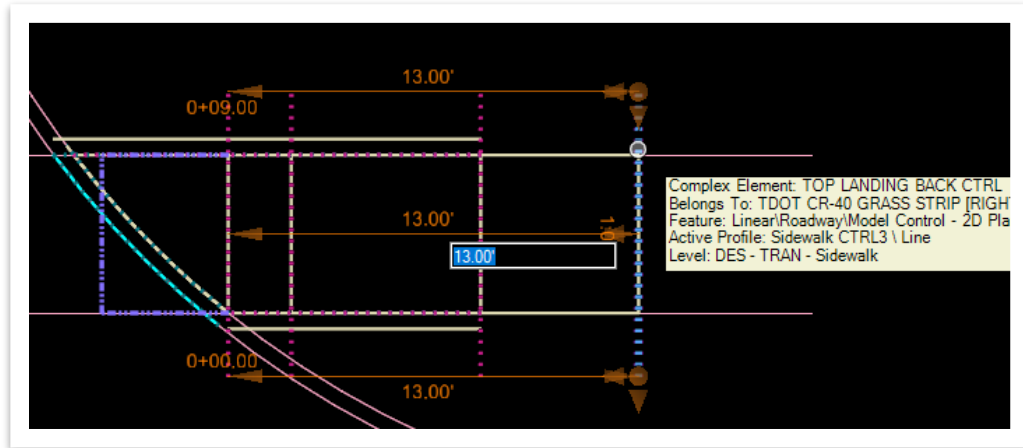


- a. **CR-40 GRASS STRIP [LEFT] and [RIGHT]**
  - b. **CR-40 BACK OF CURB [LEFT] and [RIGHT]**

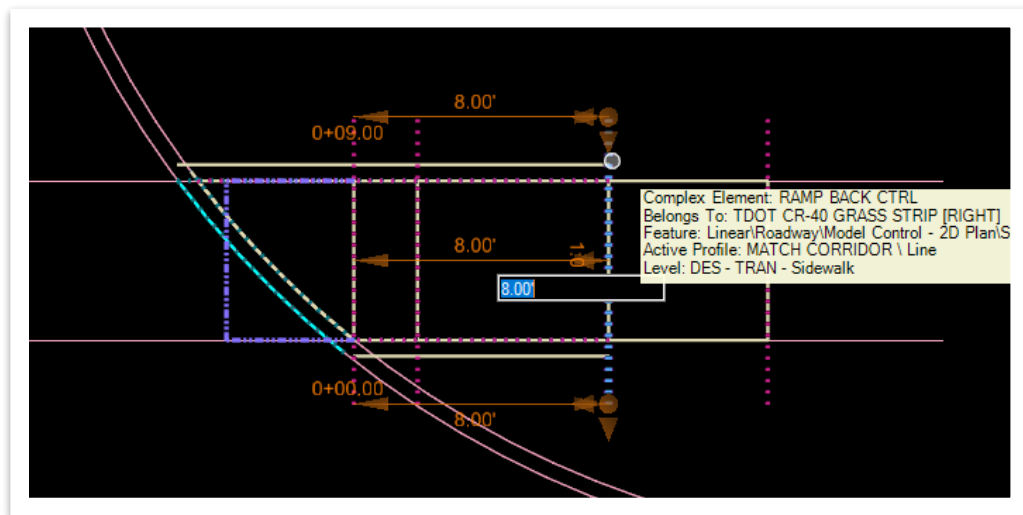


3. **For CR-40 GRASS STRIP [LEFT] and [RIGHT] Only:** Select the following reference lines in order: **INT CR FLOWLINE**, **INT CR BACK TOP**, **CORRIDOR SW FRONT TOP**, and **CORRIDOR SW BACK TOP**.
  - a. Adjust the reference line directions if necessary.
    - i. In the **[LEFT]** option, when the intersection is viewed at the top of the screen as shown in **Step 2a**, the **INT** and **CORRIDOR** reference lines should both be oriented from left to right.
    - ii. In the **[RIGHT]** option, **INT** reference lines should still be oriented from left to right, but **CORRIDOR** reference lines should be oriented from right to left.
4. **For CR-40 BACK OF CURB [LEFT] and [RIGHT] Only:** Select the following reference lines in order: **INT CR FLOWLINE**, **INT CR BACK TOP**, **CORRIDOR CR FLOWLINE**, **CORRIDOR CR BACK TOP**, and **CORRIDOR SW BACK TOP**.
  - a. Adjust the reference line directions if necessary.
    - i. In the **[LEFT]** option, when the intersection is viewed at the top of the screen as shown in **Step 2a**, the **INT** and **CORRIDOR** reference lines should both be oriented from left to right.
    - ii. In the **[RIGHT]** option, **INT** reference lines should still be oriented from left to right, but **CORRIDOR** reference lines should be oriented from right to left.

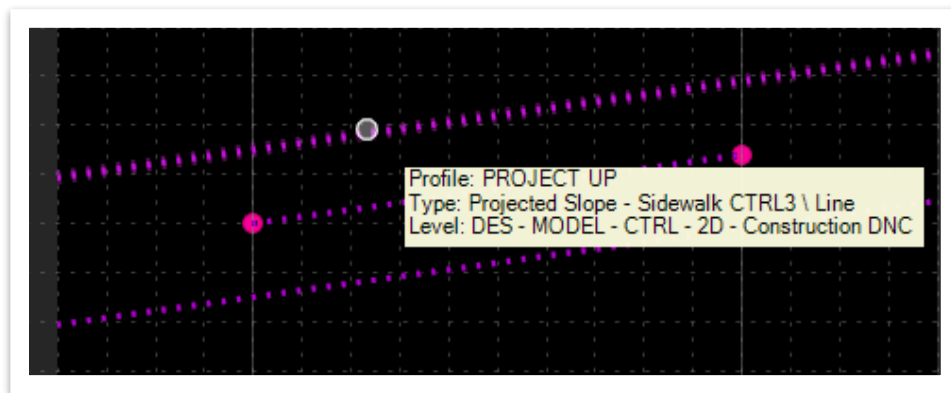
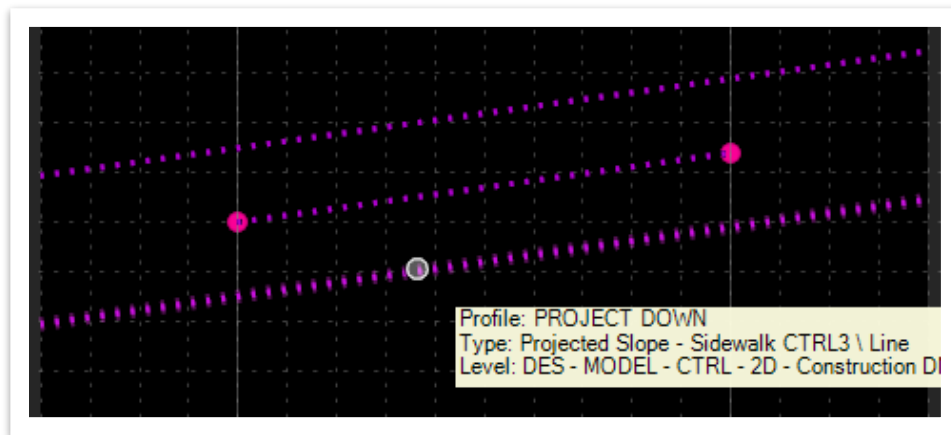
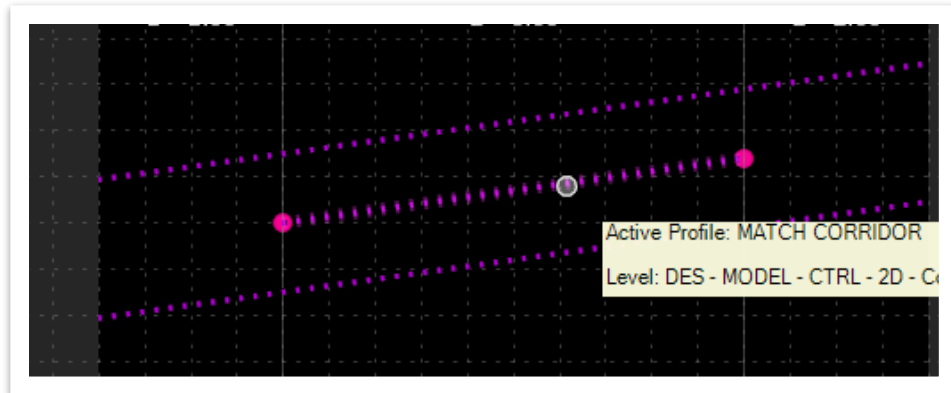
5. Adjust the civil cell to match the proposed design.
  - a. Modify the top landing location using the **TOP LANDING BACK CTRL** element. This element will automatically match the **SW FRONT TOP** and **SW BACK TOP** elevations to tie to the proposed corridor.



- b. Modify the ramp length using the **RAMP BACK CTRL** element.

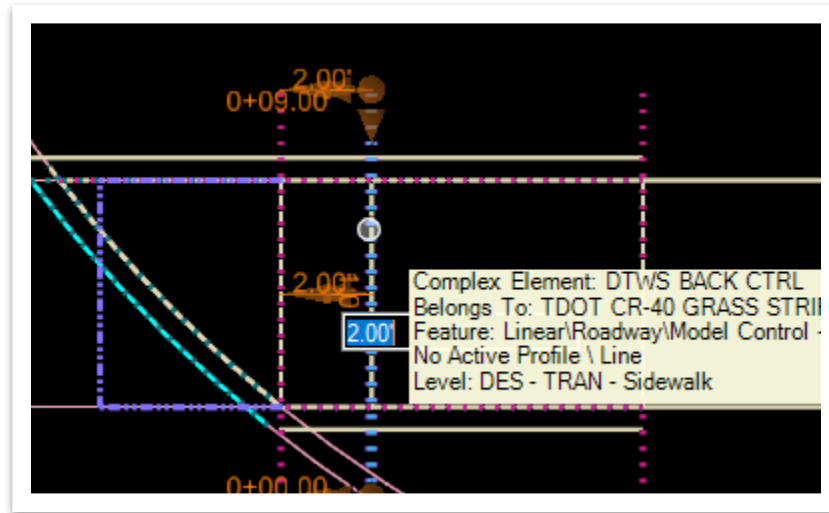


- c. Use the same **RAMP BACK CTRL** element to modify the slope of the top landing. By default, the active **MATCH CORRIDOR** profile matches the elevation of **SW FRONT TOP** and **SW BACK TOP**. However, if the roadway profile is greater than 2.00%, this may result in a non-compliant landing. If that is the case, open the profile view of **RAMP BACK CTRL** and set active either the **PROJECT DOWN** or **PROJECT UP** profile, which are built by projecting the **TOP LANDING BACK CTRL** element up or down at 1.50%, respectively. The user may also adjust the 1.50% value as desired in the element **Properties**. **Note:** *The relative position of the **MATCH CORRIDOR**, **PROJECT UP**, and **PROJECT DOWN** elements in the screenshots on the next page will vary with project-specific geometry.*

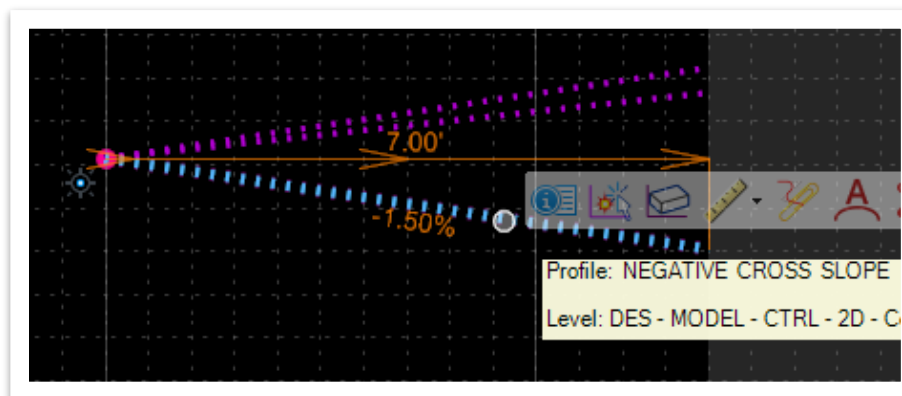
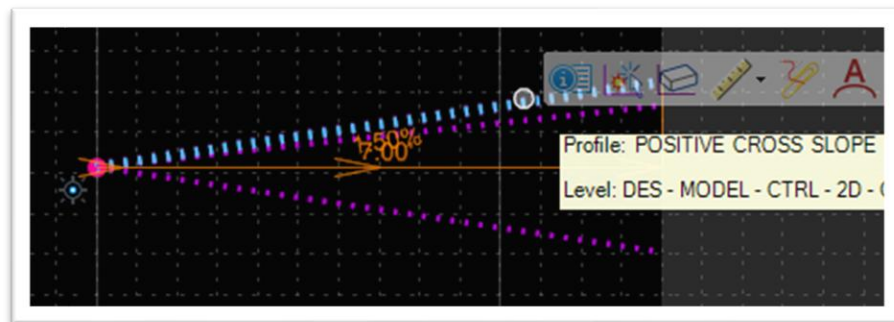
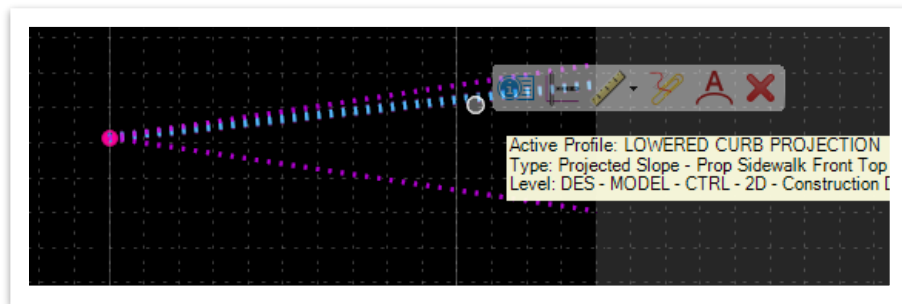
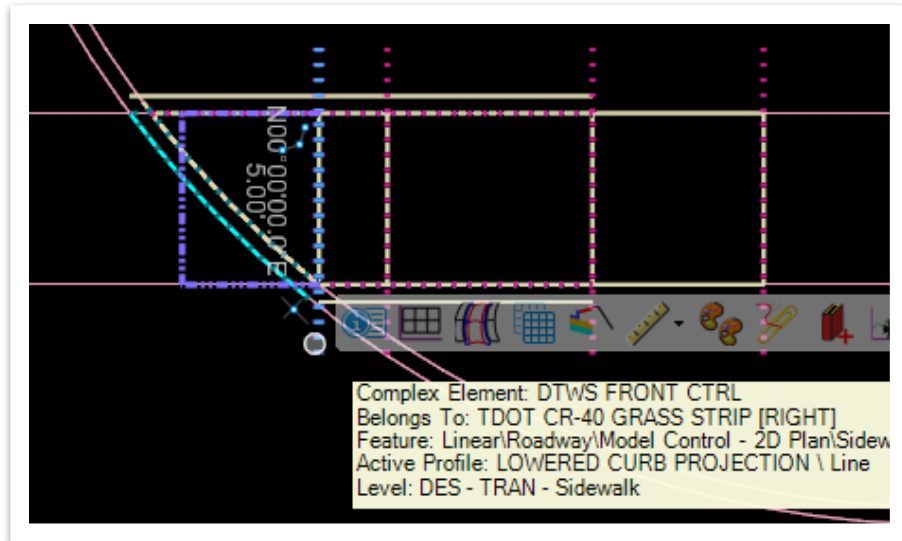


Profile By Projecting 3D Element Simple Slope Rule ^	
Slope	1.50%
Vertical Offset	0.00'
Profile Adjustment	None
Point Selection On Depen	All

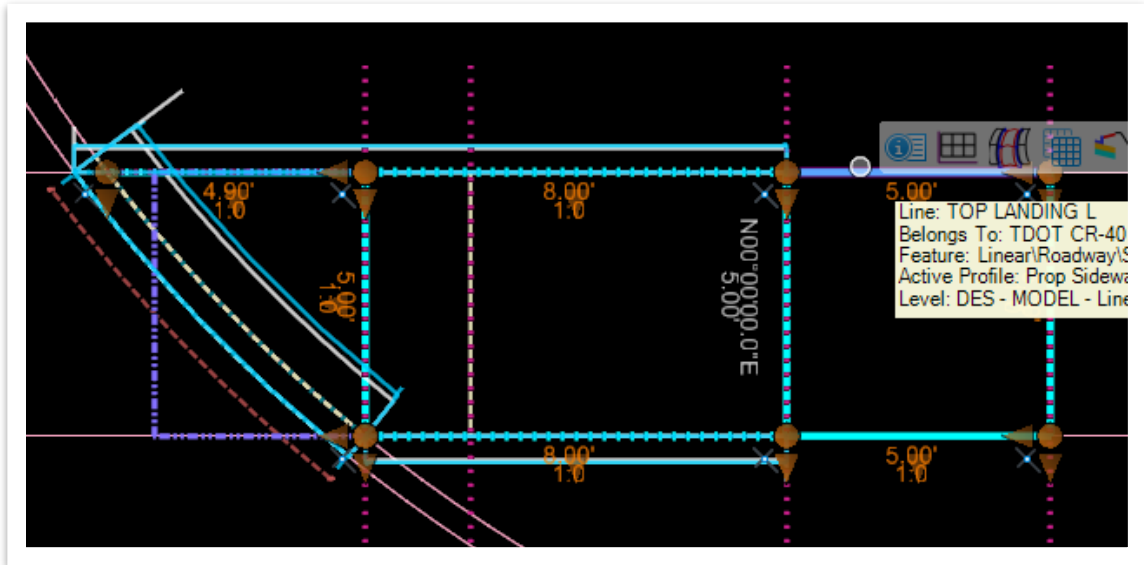
- d. For these civil cells, the DTWS slope is fixed at the same slope as the ramp. The DTWS width may be modified using **DTWS BACK CTRL** if desired.



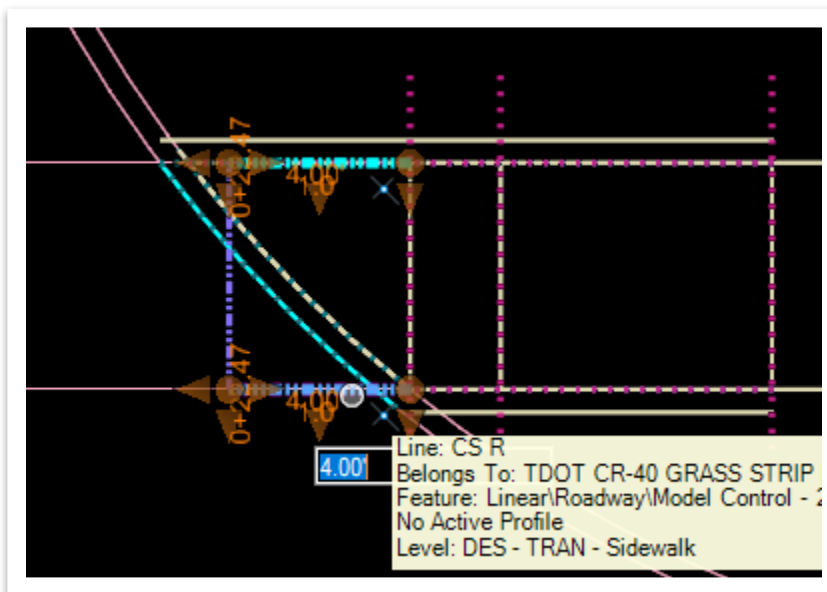
- e. Modify the slope of the bottom landing using the **DTWS FRONT CTRL** element. By default, the active **LOWERED CURB PROJECTION** profile projects up at a **1.50%** slope from the lowered curb. For most scenarios, if the curb return has been designed to provide a **1.50%** cross slope (refer to **Step 1**), the bottom landing will be compliant. However, the user must confirm the bottom landing meets standard drawing criteria and may modify this profile as needed. To assist with these edits, the profile of **DTWS FRONT CTRL** includes two alternative profiles, **POSITIVE CROSS SLOPE** and **NEGATIVE CROSS SLOPE**, representing cross slopes of **1.50%** up or down from the intersection point with the curb. The user may set either profile active and manually adjust the 1.50% slopes as needed. **Note:** *The relative position of the LOWERED CURB PROJECTION, POSITIVE CROSS SLOPE, and NEGATIVE CROSS SLOPE elements in the screenshots on the next page will vary with project-specific geometry.*



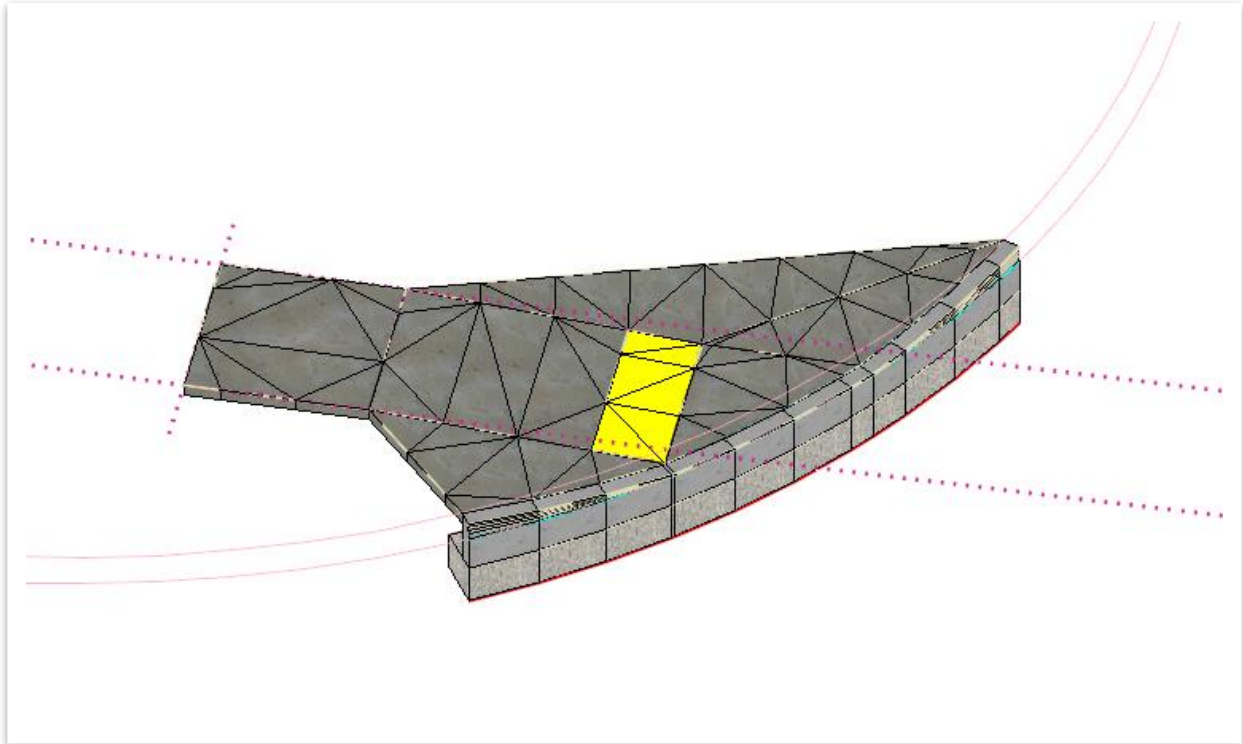
- Check that all slopes meet the design intent and ADA standards. Since the ramp and landing slopes are affected by multiple length and slope values adjusted in the previous steps, all respective slopes will always need to be checked. To do this, select each of the following elements and view their slopes under **Profile Line Between Points Rule** in the element **Properties**: **BOT LANDING (L OR R)**, **RAMP SLOPE CHECK R**, **RAMP SLOPE CHECK L**, **TOP LANDING L**, **TOP LANDING R**, **DTWS FRONT**, **RAMP BACK**, and **TOP LANDING BACK**. *Note: Left and right edges may have different slopes depending on project-specific conditions.*



- By default, clear space elements are drawn **4 ft** from the bottom of the ramp, mostly coinciding with the bottom landing area. If desired, the lengths of **CS L** and **CS R** can be modified directly.

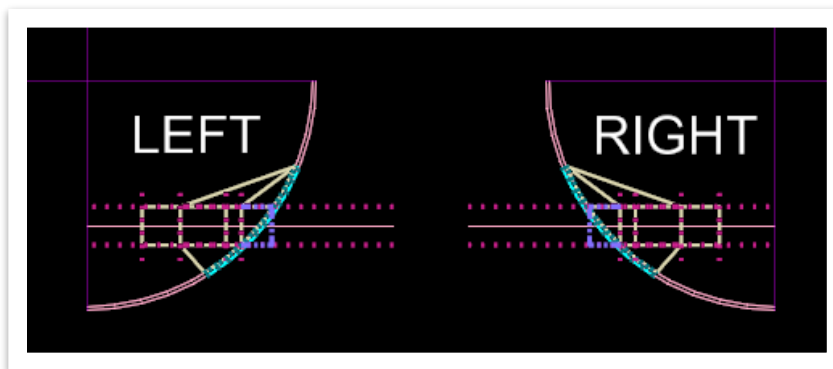


## Single Crossing Curb Ramp In Curve: CR-41

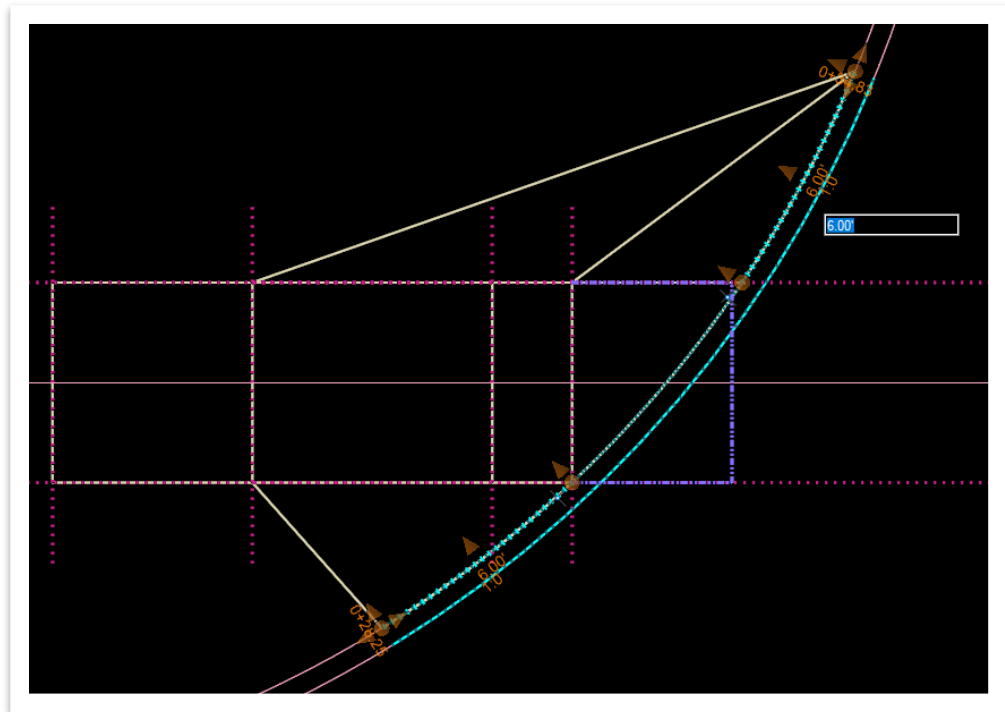


The **CR-41 FLARED [LEFT] and [RIGHT]** curb ramp civil cells may be placed at any location by manually drawing the proposed ramp centerline location. The following guidance applies to both the **CR-41 FLARED [LEFT]** and **[RIGHT]** curb ramp civil cells, even though the screenshots show the **CR-41 FLARED [LEFT]** civil cell.

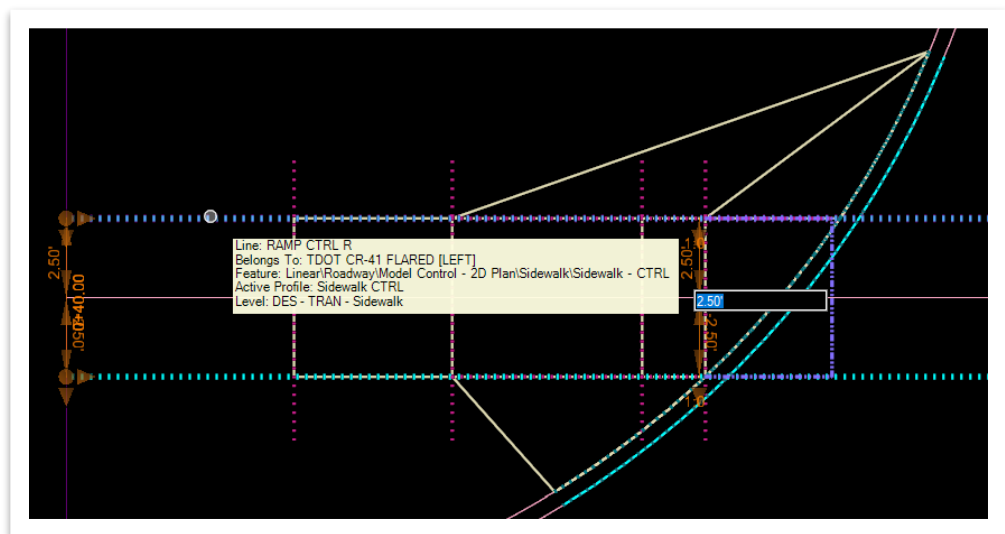
1. Begin by drawing a curb ramp centerline along the centerline of the proposed ramp location using the **Line Between Points** tool (**OpenRoads Modeling >> Geometry >> Horizontal >> Lines**). This line does not need any profile data.
2. Open the **Place Civil Cell** tool (**OpenRoads Modeling >> Model Detailing >> Civil Cells**). In the **Pick Civil Cell** window, select the appropriate civil cell from the dgnlib. Choose the **[LEFT]** or **[RIGHT]** option based on the diagram below.



3. Select the following reference lines in order: **CR FLOWLINE**, **CR BACK TOP**, and **RAMP CL - NO PROFILE**, along with the corridor to be clipped, if applicable. **Note:** *The user may need to reverse the direction of one or more reference lines during placement.*
4. Adjust the civil cell to match the proposed design.
  - a. Modify the flare lengths using the **FLARE LENGTH CTRL R** and **FLARE LENGTH CTRL L** elements.



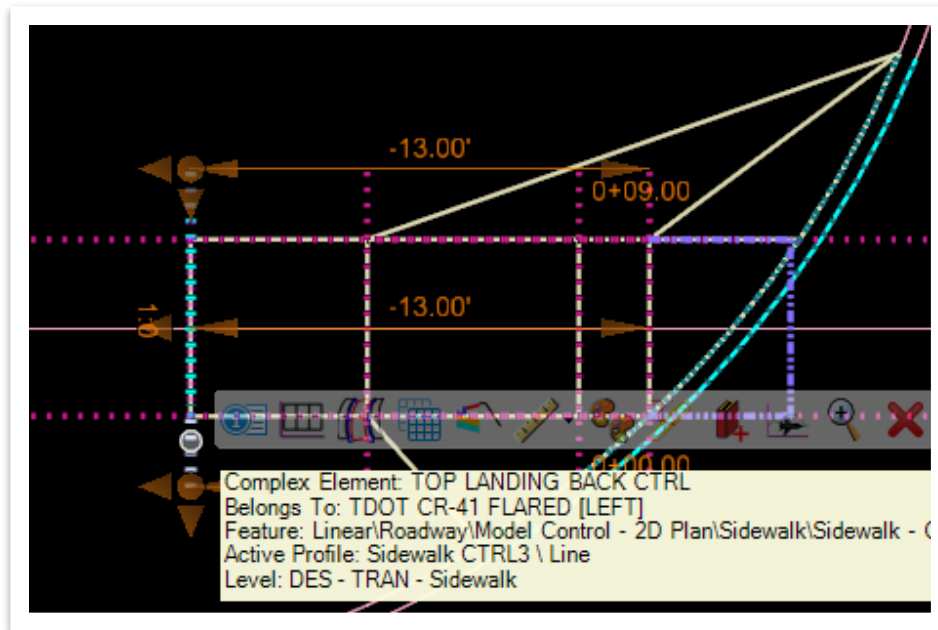
- b. Modify the ramp width using the **RAMP CTRL R** and **RAMP CTRL L** elements.



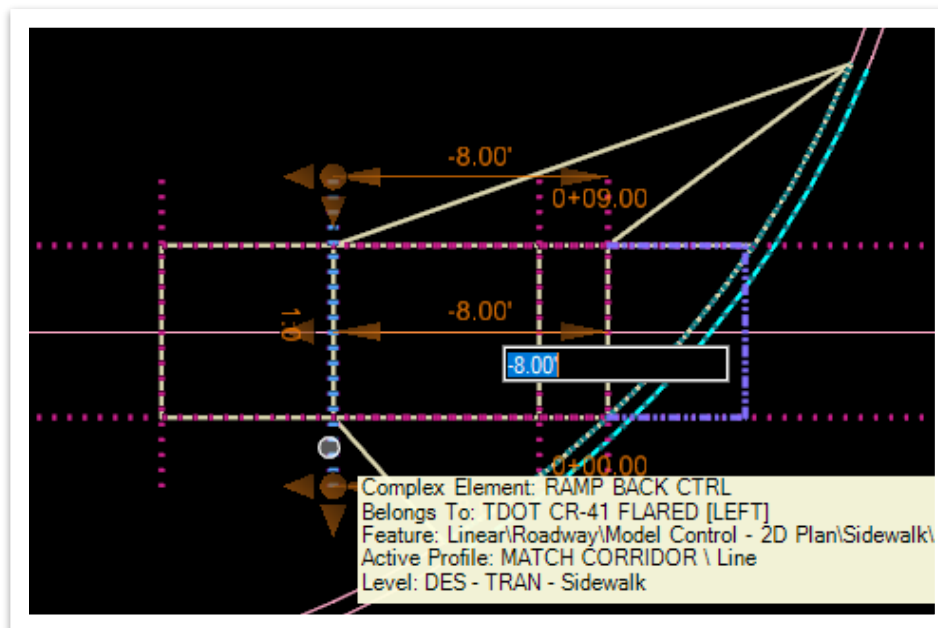
- c. Modify the profiles of **RAMP CTRL R** and **RAMP CTRL L** if desired. By default, the profile of the front edge **RAMP CTRL** element is a **1.50%** projection up from **CR BACK TOP** reference line. The back edge is **1.50%** up from the front edge (L vs. R varies depending on if the **[LEFT]** or **[RIGHT]** civil cell is used). These slopes should not need to be modified in most design scenarios, but the user may reprofile either or both of these elements if needed.

Profile By Projecting 3D Element Simple Slope Rule ^	
Slope	1.50%
Vertical Offset	0.00'
Profile Adjustment	None
Point Selection On Depen	All

- d. Modify the top landing location using the **TOP LANDING BACK CTRL** element. This element will automatically match the **SW FRONT TOP** and **SW BACK TOP** elevations to tie to the proposed corridor.

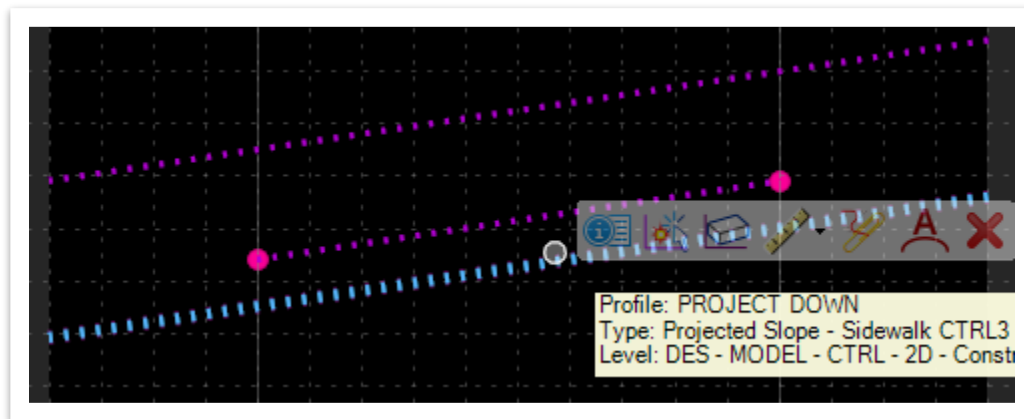
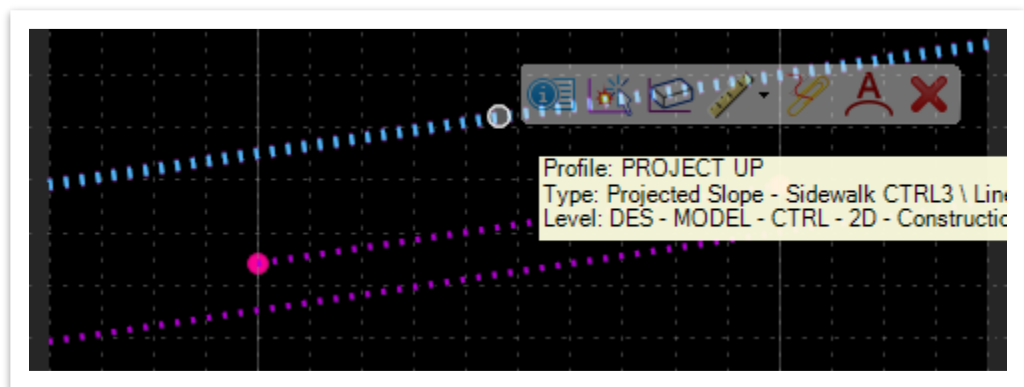
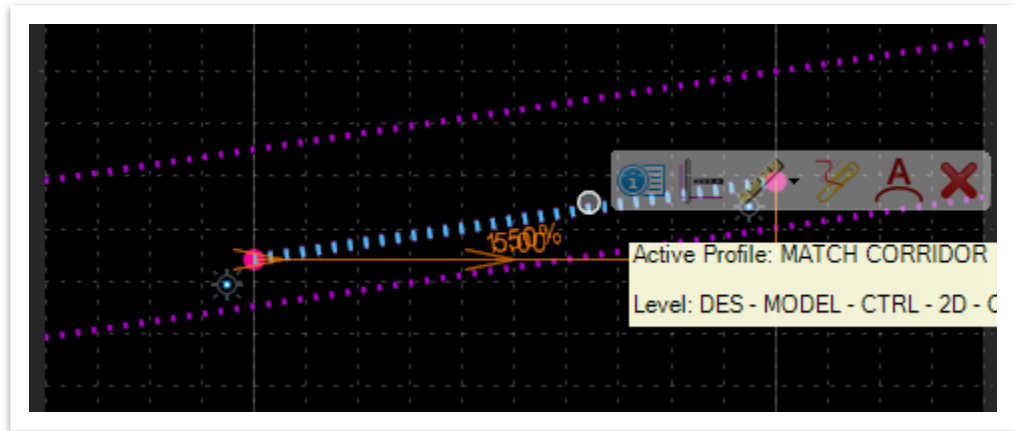


- e. Modify the ramp length using the **RAMP BACK CTRL** element.



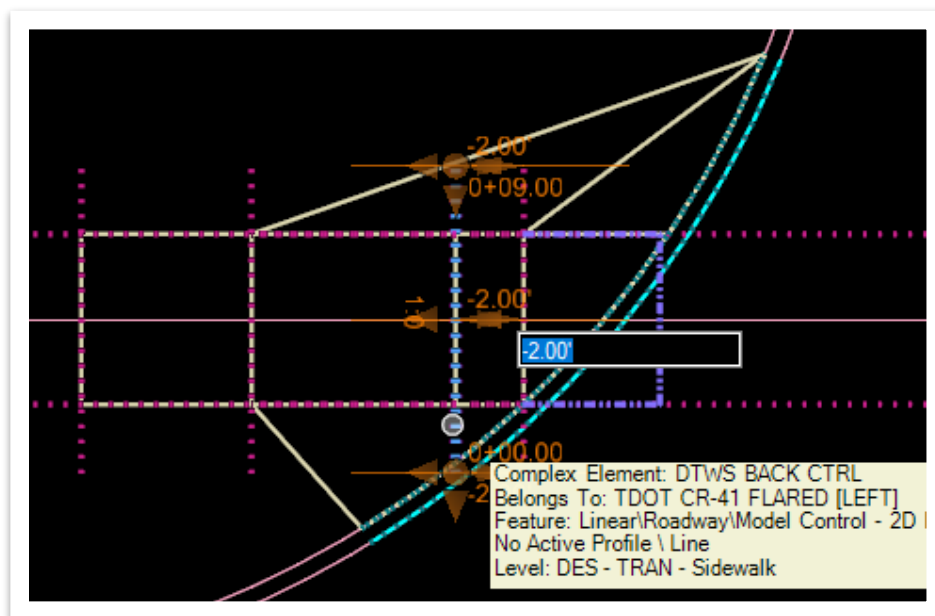
- f. Use the same **RAMP BACK CTRL** element to modify the slope of the top landing. By default, the active **MATCH CORRIDOR** profile matches the elevation of **SW FRONT TOP** and **SW BACK TOP**. However, if the roadway profile is greater than 2.00%, this may result in a non-compliant landing. If that is the case, open the profile view of **RAMP BACK CTRL** and **set active** either the **PROJECT DOWN** or **PROJECT UP** profile, which are built by projecting the **TOP LANDING BACK CTRL** element down or up at 1.50%, respectively. The user may also adjust the 1.50% value as desired in **Properties**. **Note:** *The relative position of the **MATCH CORRIDOR**, **PROJECT UP**, and **PROJECT DOWN** elements in the screenshots on the next page will vary with project-specific geometry.*

Single Crossing Curb Ramp In Curve: CR-41



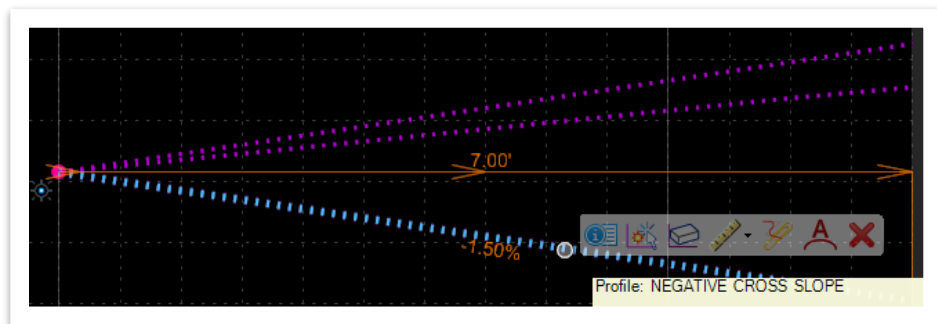
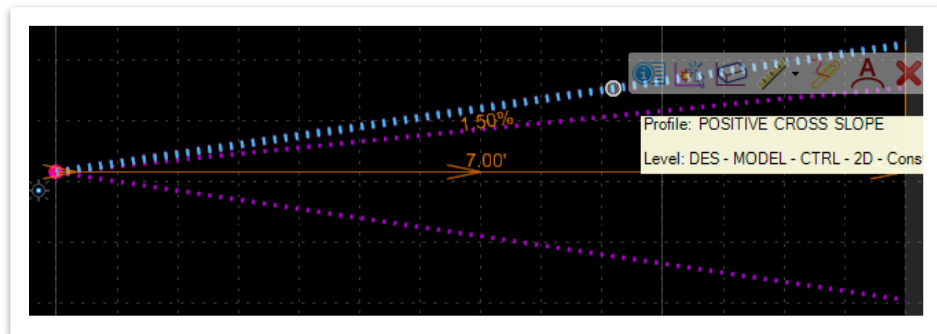
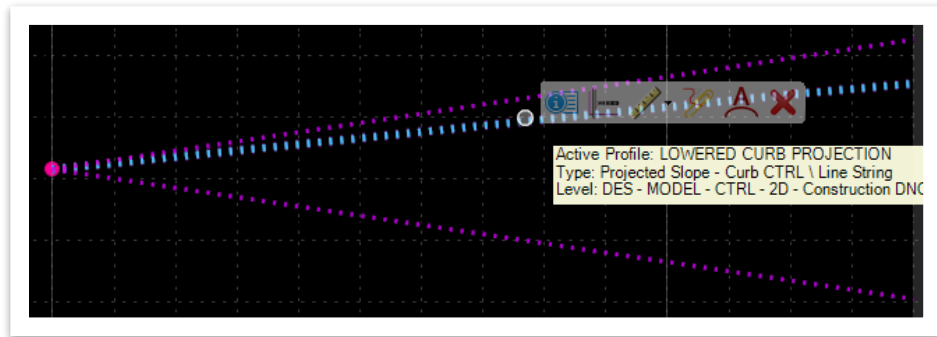
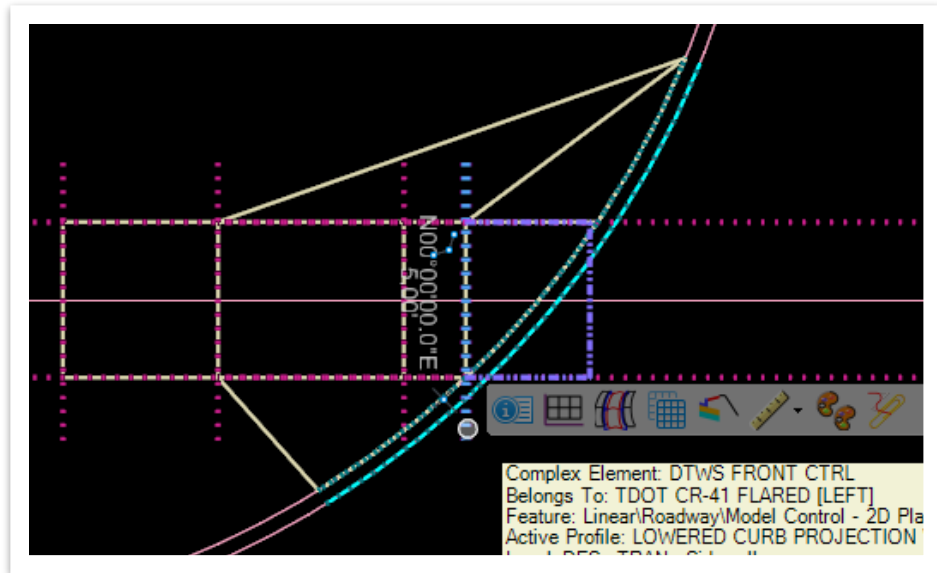
Profile By Projecting 3D Element Simple Slope Rule ^	
Slope	1.50%
Vertical Offset	0.00'
Profile Adjustment	None
Point Selection On Depen	All

- g. For these civil cells, the DTWS slope is fixed at the same slope as the ramp. The DTWS width may be modified using **DTWS BACK CTRL** if desired.

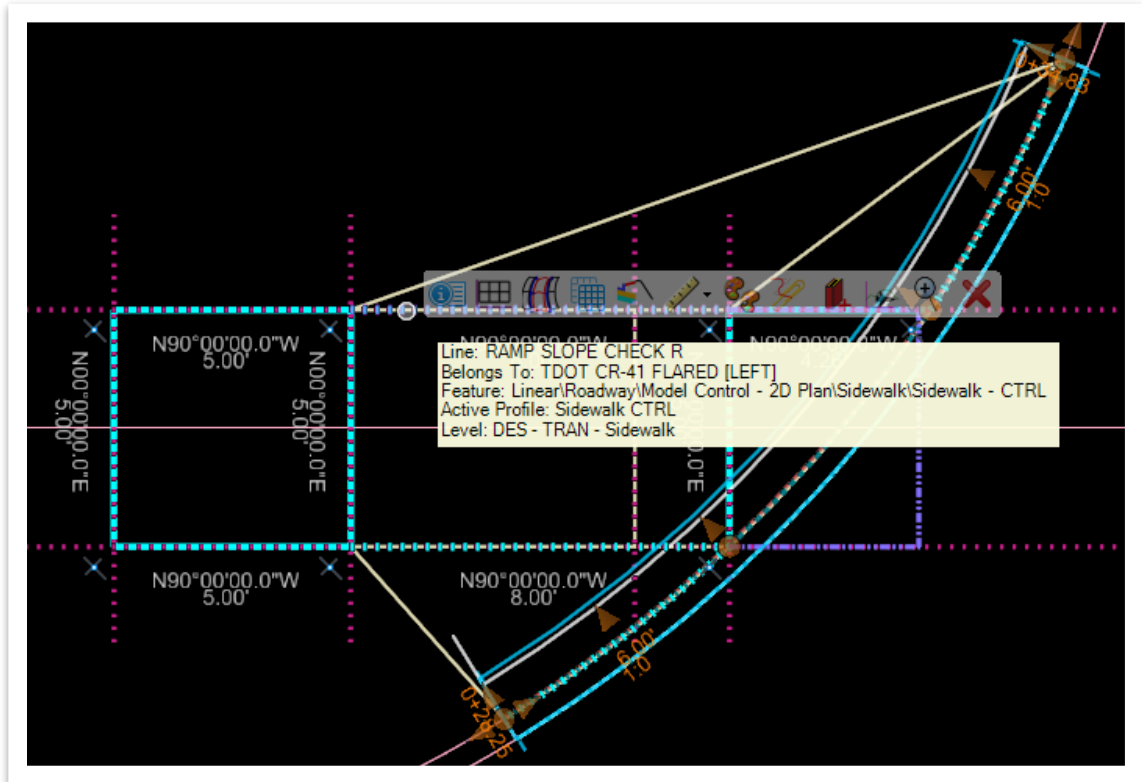


- h. Modify the slope of the bottom landing using the **DTWS FRONT CTRL** element. By default, the active **LOWERED CURB PROJECTION** profile projects up at a **1.50%** slope from the lowered curb. For most scenarios, if the curb return has been designed to provide a **1.50%** cross slope (refer to **Step 1**), the bottom landing will be compliant. However, the user must confirm the bottom landing meets standard drawing criteria and may modify this profile as needed. To assist with these edits, the profile of **DTWS FRONT CTRL** includes two alternative profiles, **POSITIVE CROSS SLOPE** and **NEGATIVE CROSS SLOPE**, representing cross slopes of **1.50%** up or down from the intersection point with the curb. The user may set either profile active and manually adjust the 1.50% slopes as needed. **Note:** *The relative position of the LOWERED CURB PROJECTION, POSITIVE CROSS SLOPE, and NEGATIVE CROSS SLOPE elements in the screenshots on the next page will vary with project-specific geometry.*

# Single Crossing Curb Ramp In Curve: CR-41

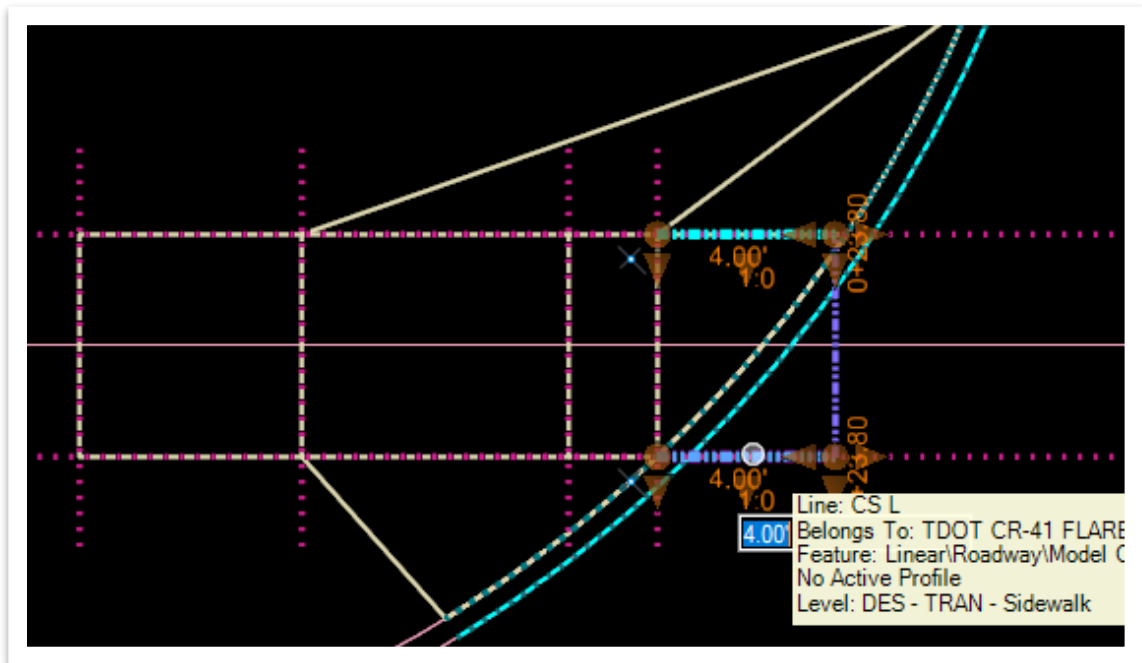


5. Check that all slopes meet the design intent and ADA standards. Since the ramp and landing slopes are affected by multiple length and slope values adjusted in the previous steps, all respective slopes will always need to be checked. To do this, select each of the following elements and view their slopes under **Profile Line Between Points Rule** in the element **Properties**: **BOT LANDING (L OR R)**, **RAMP SLOPE CHECK R**, **RAMP SLOPE CHECK L**, **TOP LANDING L**, **TOP LANDING R**, **DTWS FRONT**, **RAMP BACK**, **TOP LANDING BACK**, **FLARE CR R**, and **FLARE CR L**. *Note: Left and right edges may have different slopes depending on project-specific conditions.*



## Single Crossing Curb Ramp In Curve: CR-41

- By default, clear space elements are drawn **4 ft** from the bottom of the ramp, mostly coinciding with the bottom landing area. If desired, the lengths of **CS L** and **CS R** can be modified directly.



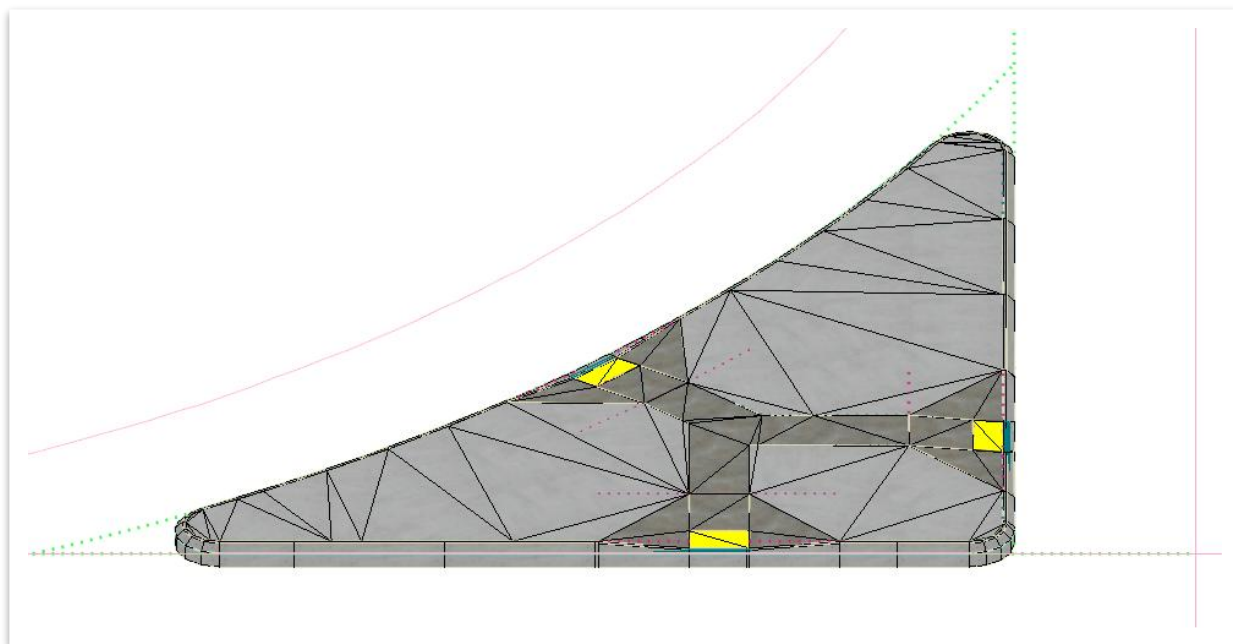
## Pedestrian Refuge Islands: CR-50 and CR-51

There are four pedestrian refuge island civil cells. The **CR-50 RIGHT TURN ISLAND WITH RAMPS** civil cell builds a typical pedestrian refuge island which includes three **CR-10** ramps modified to include median curb. For many projects, standalone islands may need to be modeled by the user. In those cases, the user should simply place as many individual **CR-50 RAMP ONLY** or **CR-10** civil cells as required after modeling the island using either a median opening civil cell or with manual surfaces and linear templates.

The **CR-51 PEDESTRIAN REFUGE** standard drawing details how pedestrian refuges should be designed and built when there is not enough space to install a full ramp up to the curb height. The **CR-51 RIGHT TURN ISLAND WITH CUT-THRU [LEFT]** and **[RIGHT]** and **CR-51 MEDIAN REFUGE** civil cells were designed for three common scenarios. The user may need to model more complex scenarios manually.

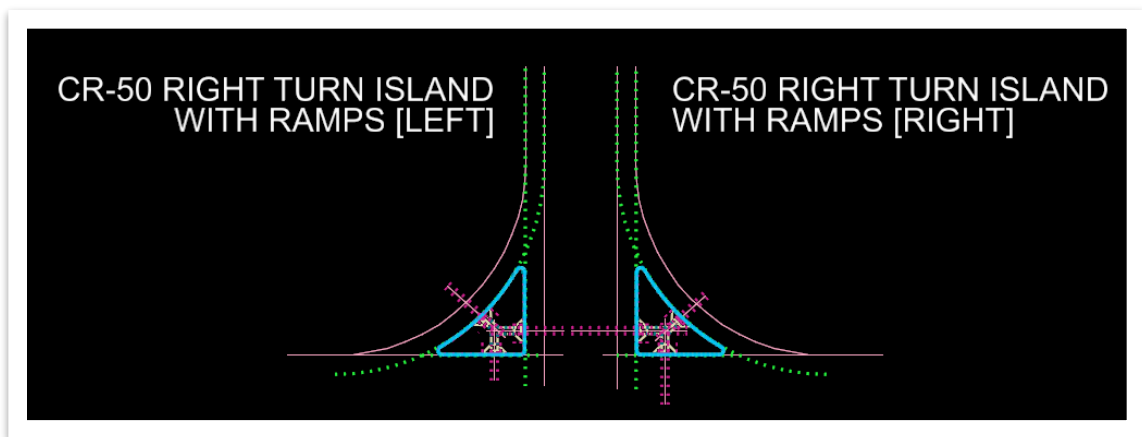
### CR-50 RIGHT TURN ISLAND WITH RAMPS

#### PEDESTRIAN REFUGE



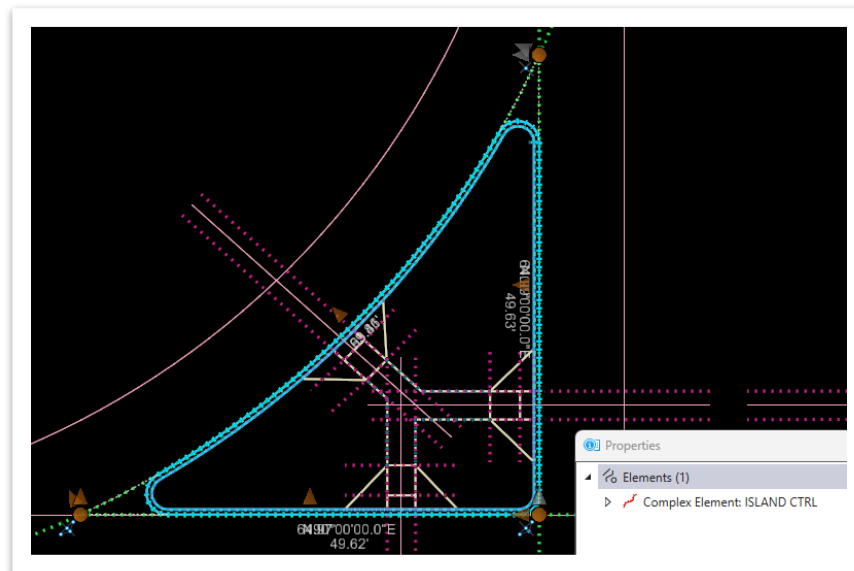
The following guidance applies to both the [LEFT] and [RIGHT] versions of the CR-50 RIGHT TURN ISLAND WITH RAMPS civil cell, even though the screenshots show the [LEFT] only. The **CR-50 RIGHT TURN ISLAND WITH RAMPS** civil cells require six reference lines to place: **MAINLINE EOP**, **SIDEROAD CL**, **INTERSECTION EOP**, **MAINLINE CROSSWALK CL - NO PROFILE**, **SIDEROAD CROSSWALK CL - NO PROFILE**, and **TURN LANE CROSSWALK CL - NO PROFILE**.

1. The ADA Ramp centerlines must be laid out manually before placing this civil cell. The ramp centerlines should not have a profile. The centerlines do not have to be perfect before placing the ramp, but it is helpful for the civil cell if the user has already planned out the intersection in 2D using MicroStation tools. **Note:** The three ramp centerline elements must extend past each other for the civil cell to place correctly.
  - a. It is recommended to start with the mainline ADA ramp centerline and align that with the theoretical cross walk location across the mainline.
  - b. Then, define the centerline of the sideroad ADA ramp that crosses the sideroad thru-lanes.
  - c. Finally, place the ADA ramp centerline that crosses the right-hand turn lane.
2. Open the **Place Civil Cell** tool (**OpenRoads Modeling >> Model Detailing >> Civil Cells**). In the **Pick Civil Cell** window, select the appropriate civil cell from the dgnlib. Choose the **[LEFT]** or **[RIGHT]** option based on the diagram below, oriented with the sideroad alignment running from bottom to top of the screen.

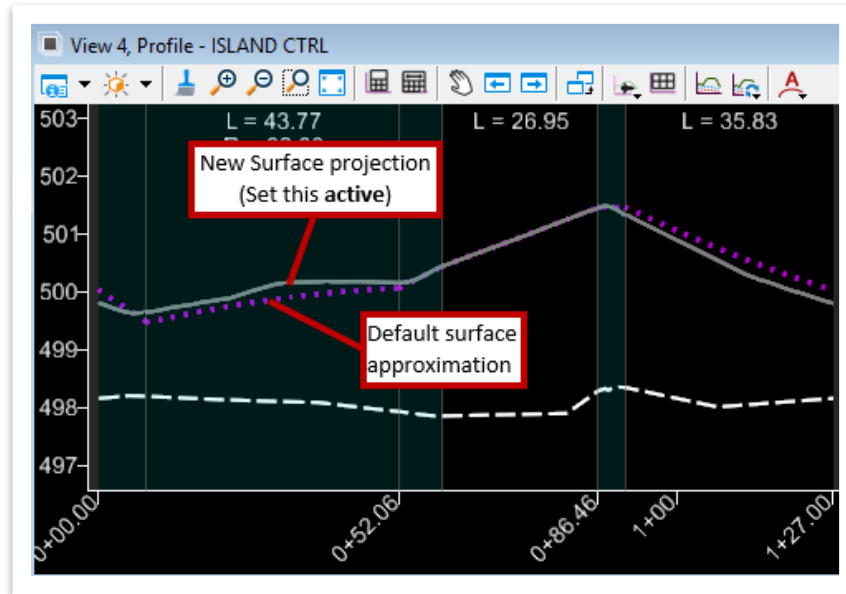


3. Select the following reference lines in order: **MAINLINE EOP**, **SIDEROAD CL**, **INTERSECTION EOP**, **MAINLINE CROSSWALK CL - NO PROFILE**, **SIDEROAD CROSSWALK CL - NO PROFILE**, and **TURN LANE CROSSWALK CL - NO PROFILE**, along with the corridor to be clipped, if applicable. **Note:** *The user may need to reverse the direction of one or more reference lines during placement.*
  - a. The mainline edge of pavement should be going from left to right.
  - b. The sideroad centerline should be going from bottom to top (i.e., away from the mainline).
  - c. The intersection Edge of pavement should be going from bottom to top (i.e., away from the centerline).
  - d. All ramp centerlines should be facing each other, into the island.

4. Review the placement in 2D and 3D to ensure that it placed correctly. If the cell does not look correct, the reference lines may need to be adjusted. If this is the case, the user may need to delete the civil cell and then place the civil cell again on the revised reference lines.
  - a. Make sure that enough space has been provided for the ADA ramps inside the island. This cell will break if the island is less than 8 ft deep in any direction. In instances with smaller islands, the **TDOT CR-51 LEFT TURN ISLAND WITH CUT-THRU [LEFT] or [RIGHT]** civil cell should be used.
  - b. This cell will also break if the ADA ramp centerlines on the mainline and the sideroad are closer than 7 ft from the mainline edge of pavement for the sideroad ADA centerline and 7 ft from the sideroad through lane for the mainline ADA centerline.
5. Adjust the civil cell to match the proposed design.
  - a. By default, the cell approximates the surface of the intersection cell. The first thing to do is to make sure it follows the proposed intersection surface exactly.
    - i. Do this by opening the profile model of the **ISLAND CTRL** element. Then use the **Quick Profile From Surface** tool (**OpenRoads Modeling >> Geometry >> Vertical >> Profile Creation**) and select the intersection terrain in the **3D** view to quickly pull that profile. **Right** click to accept that command.



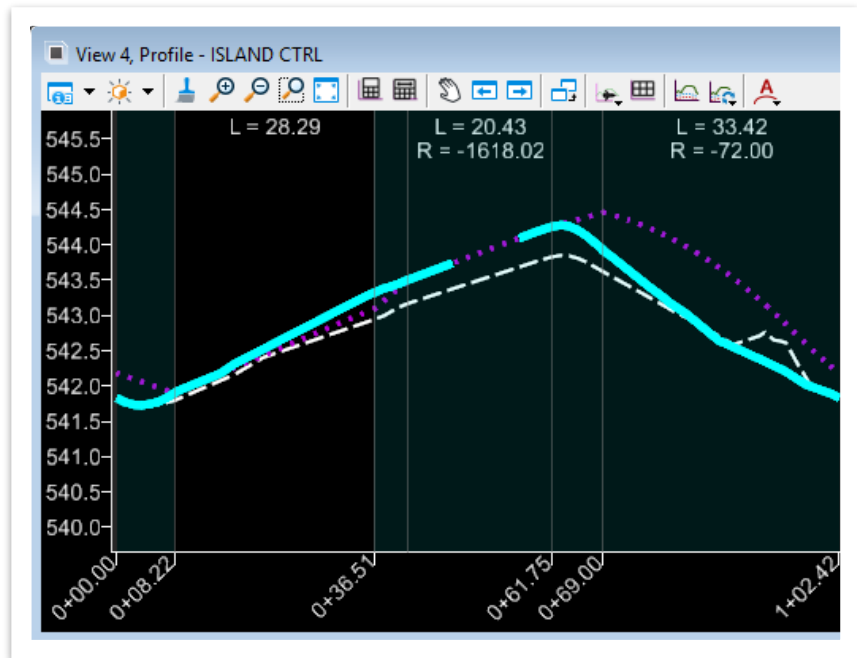
- ii. The surface profile will now show in the profile view. Set the surface profile to the **active** profile. **Note:** *The relative position of the default active profile and the newly projected profile will vary from the screenshot below depending on project-specific conditions.*



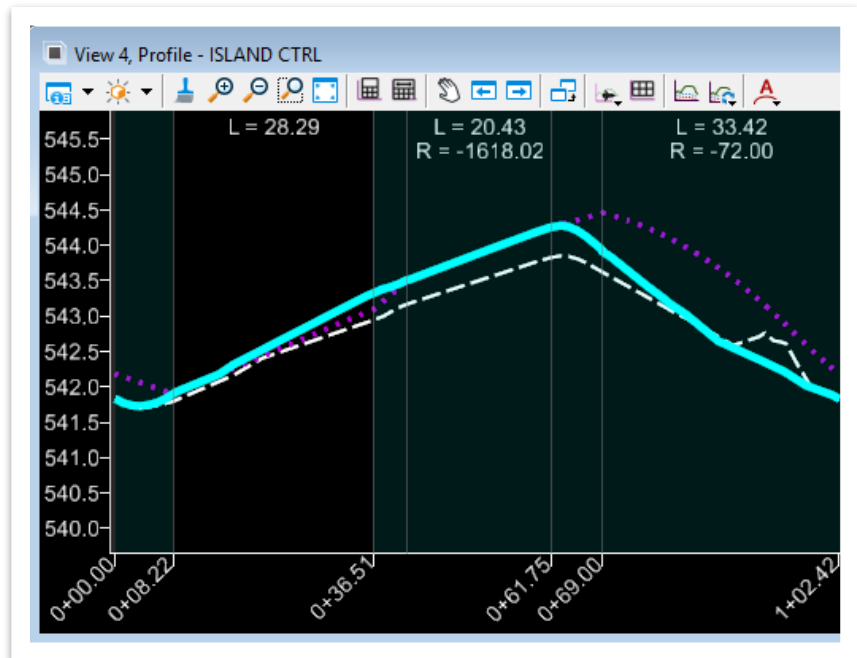
- iii. It is possible that the surface projection profile will have gaps, depending on the curvature of the mainline alignment, because the 3D line that defines the intersection surface boundary approximates a curve, but is in fact a line string. If gaps are present, select the surface projection profile and adjust its **Properties** under **Profile From Surface Rule** to have a **Horizontal Offset** of **0.01 ft**. **Note:** *if there are still gaps after adding this offset, try a negative offset value or increasing the magnitude of the offset to resolve the issue.*

Profile From Surface Rule	
Vertical Offset	0.00'
Horizontal Offset	0.01'
Start Distance	0+00.00
End Distance	1+02.42
Profile Adjustment	None
Drape Option	Triangles
Point Selection	All
Distance of interval	

- Before adding offset (different example shown):

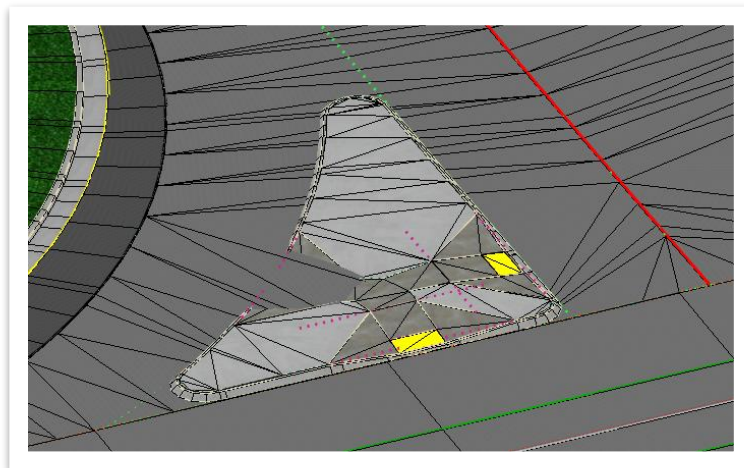


- After adding offset (different example shown):

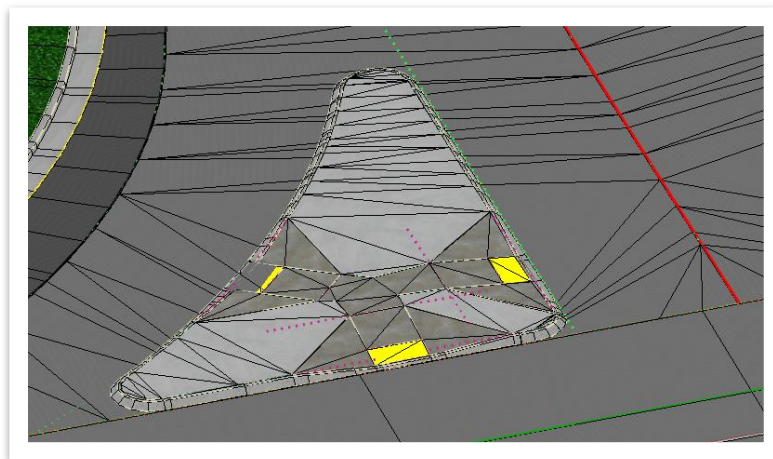


iv. Review the island in **3D** and notice that it aligns with the intersection terrain from the intersection civil cell.

- Before modifying profile:

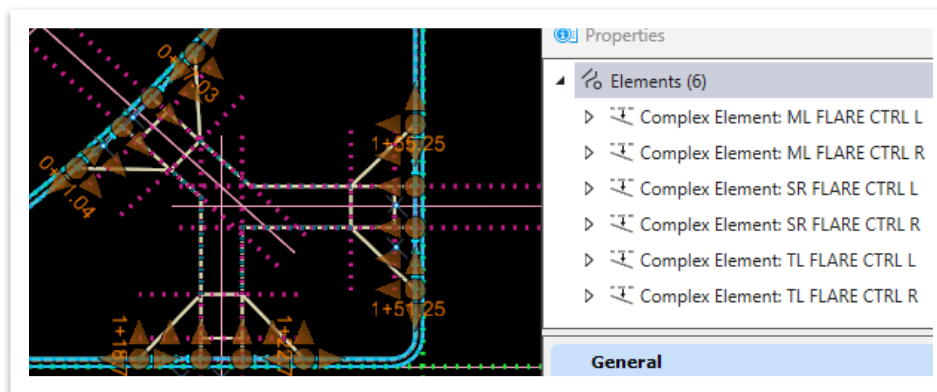


- After modifying profile:

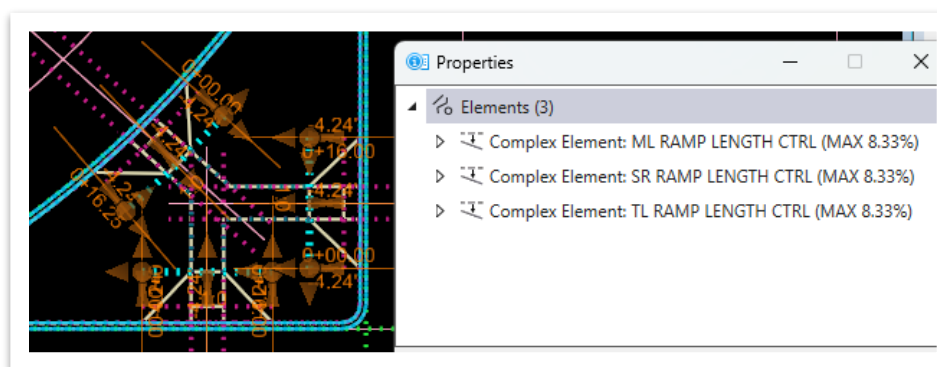


b. For **Steps 5c through 5e**, users may turn off all levels except **DES - TRAN - Sidewalk** to better see the controlling elements (screenshots show all levels turned on).

- c. Modify curb ramp flare lengths using the **FLARE CTRL** elements. These elements will have a prefix (**ML**, **SR**, or **TL**) and suffix (**L** or **R**) to differentiate them. By default, all ramp flares are set to **6 ft** long, which meets the ADA guidelines for level roadways. Users should review the profiles of all flare elements to ensure that the maximum slope is not exceeded. If it is, extend the length of the flare using the *manipulators*.

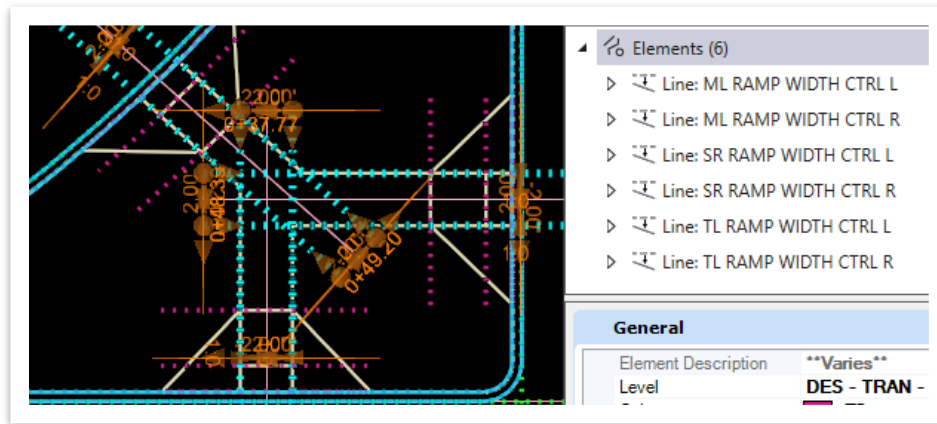


- d. Modify curb ramp lengths and slopes using the **RAMP LENGTH CTRL (MAX 8.33%)** elements. These elements will have a prefix (**ML**, **SR**, or **TL**) to differentiate them. By default, all curb ramps are **4.2 ft** long with **8.33%** slopes. The lengths may be adjusted using the *manipulators* and the slope may be adjusted in **Properties**. The proposed surface models will automatically update based on those resulting elevations.

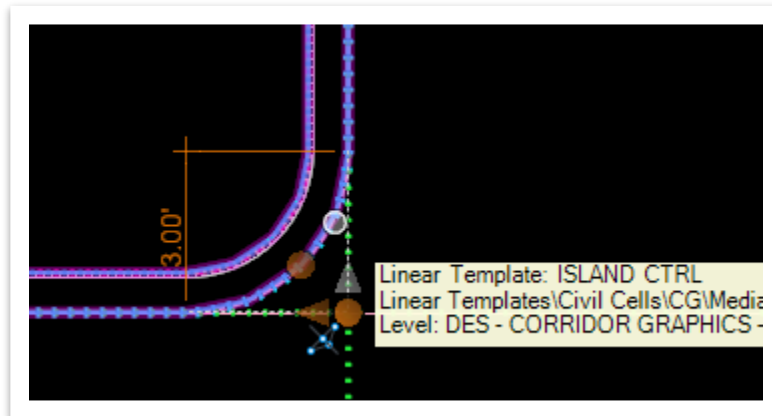


Profile By Projecting 3D Element Simple Slope...	
Slope	8.33%
Vertical Offset	0.00'
Profile Adjustment	None
Point Selection On Depe	All

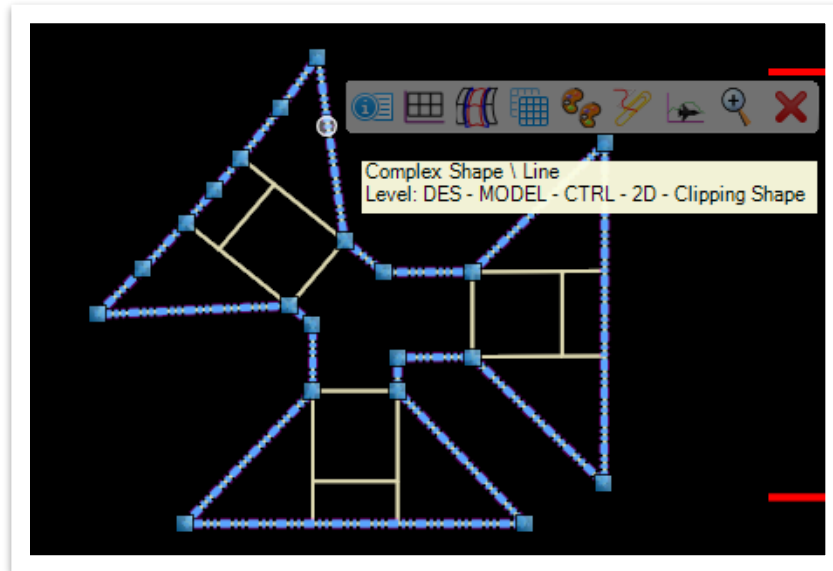
- e. Modify curb ramp widths using the **RAMP WIDTH CTRL** elements. By default, ramp widths are set to **4 ft**.



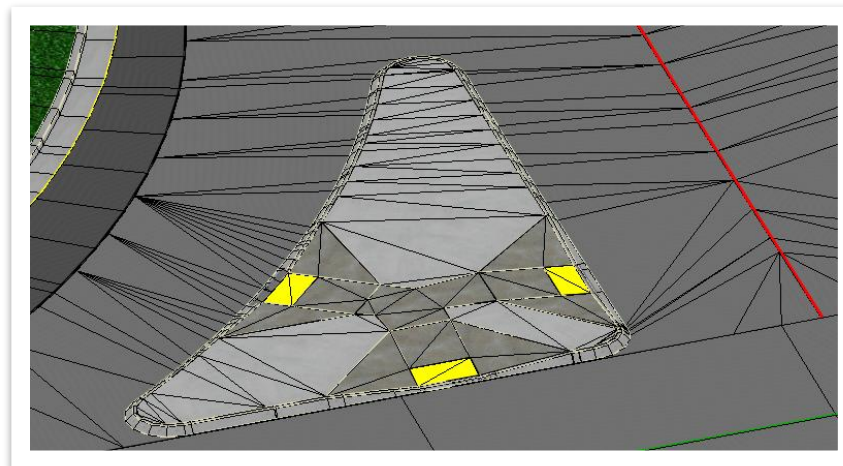
- f. To change the island corner radii, locate the **ISLAND CTRL** element. Each radius is set to **3 ft** by default. **Note:** For this step, turn back on the **DES - TRAN - Curb and Gutter** level if it was previously turned off.



- g. If necessary, clip a void in the intersection terrain model for where the ADA ramps are.
  - i. Create a closed shape by tracing the perimeter of the desired void using MicroStation tools. **Note:** *In the screenshot below, all levels are turned off except **DES MODEL - Lines - Sidewalk** and **DES - MODEL - CTRL - 2D - Clipping Shape**.*

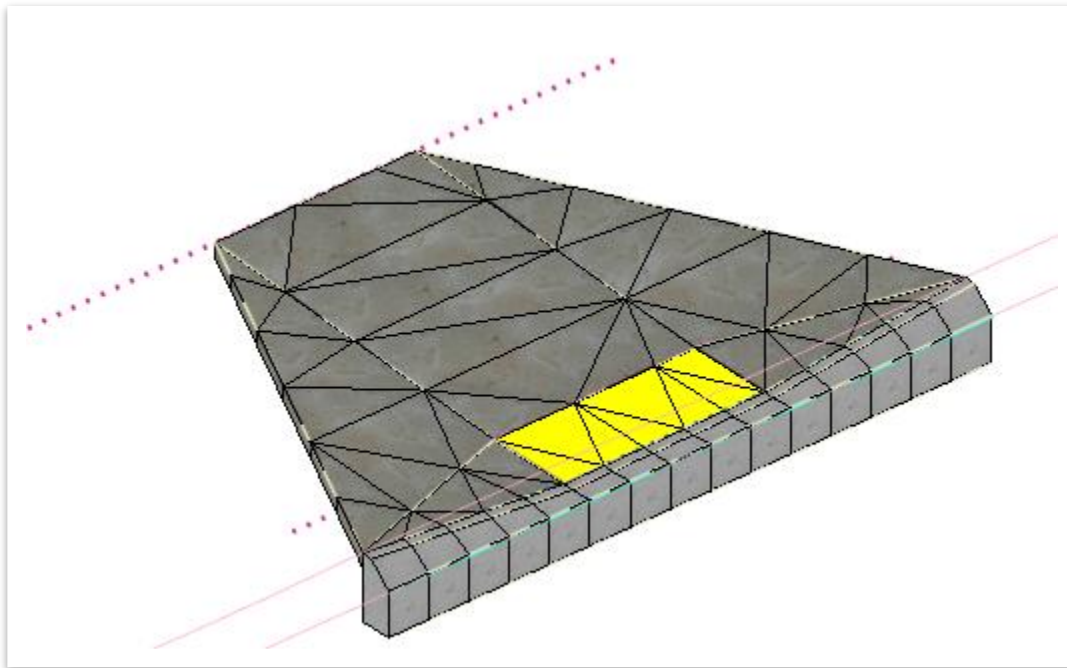


- ii. Open the terrain tab and select the **Add Features** tool (**OpenRoads Modeling >> Terrain >> Edit**). Set the feature type to **Drape Void**. Select the intersection terrain in the **3D** view and then select the closed shape in the **2D** view. This will take time to process.
    - iii. Review the model in **3D** to ensure the surface terrain was clipped appropriately.



## CR-50 RAMP ONLY

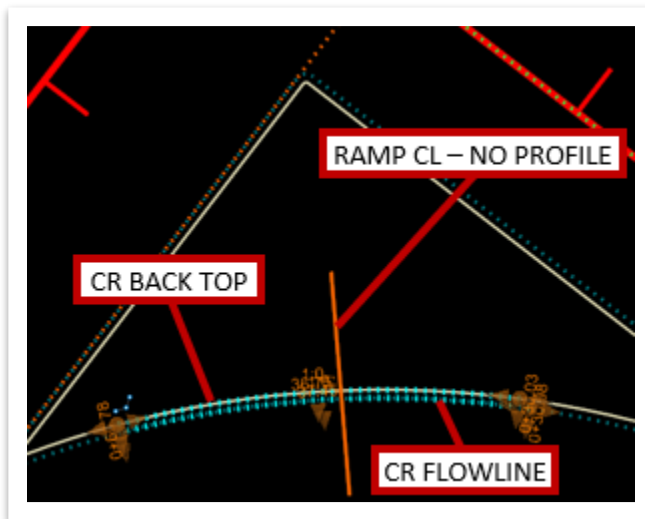
### PEDESTRIAN REFUGE



The **CR-50 RAMP ONLY** civil cell may be placed at any location by manually drawing the proposed ramp centerline location. This civil cell is essentially a **CR-10**, with two main differences: it has no turning space at the top and it uses the median curb linear template (**Linear Templates >> Civil Cells >> C&G >> MEDIAN C&G**). The user may use the **CR-10** in similar situations, if desired.

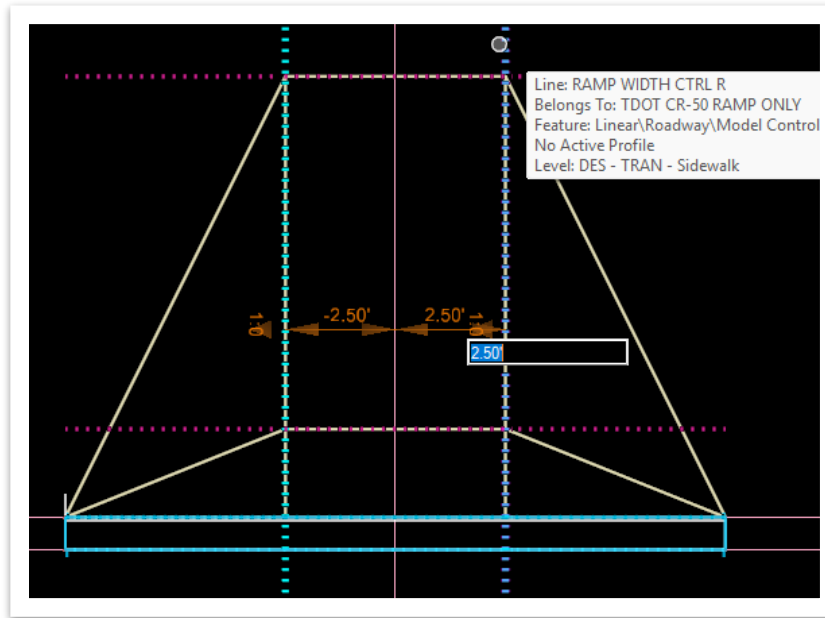
1. Prior to placement, the user should ensure that the slope along the gutter flowline will be **2.00% or less (1.50% desirable)** at the proposed pedestrian crossing location. The curb ramp civil cell will match the cross slope along the **CR FLOWLINE** reference element provided to it. **Note:** *This slope will be determined by the intersection civil cell surface template and may necessitate sideroad profile revisions.*
2. Begin by drawing a curb ramp centerline along the centerline of the proposed ramp location using the **Line Between Points** tool (**OpenRoads Modeling >> Geometry >> Horizontal >> Lines**). This line does not need any profile data.

3. Since the islands are closed elements, the user must now create dummy reference lines for **CR FLOWLINE** and **CR BACK TOP** based on the median geometry. Using the **C&G - CTRL** feature definition (**Linear >> Roadway >> Model Control 2D Plan >> Curb & Gutter**) with **Create 3D Automatically** turned on and the **Single Offset Partial** tool (**OpenRoads Modeling >> Geometry >> Horizontal >> Offsets and Tapers**), create a copy of the **ISLAND CTRL** and **CR BACK TOP** elements from the median civil cell. **Note:** *These dummy elements must extend at least 8 ft to either side of the ramp centerline for the civil cell to place correctly with the default 5-ft flares. If longer flares are needed, the dummy elements will also need to be extended.*

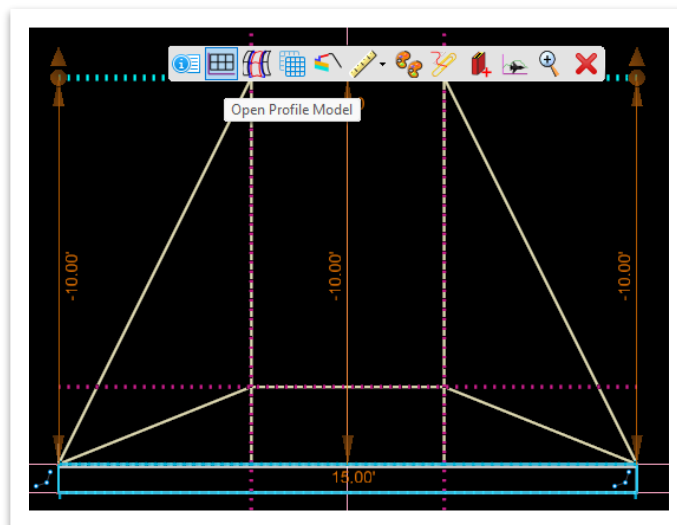


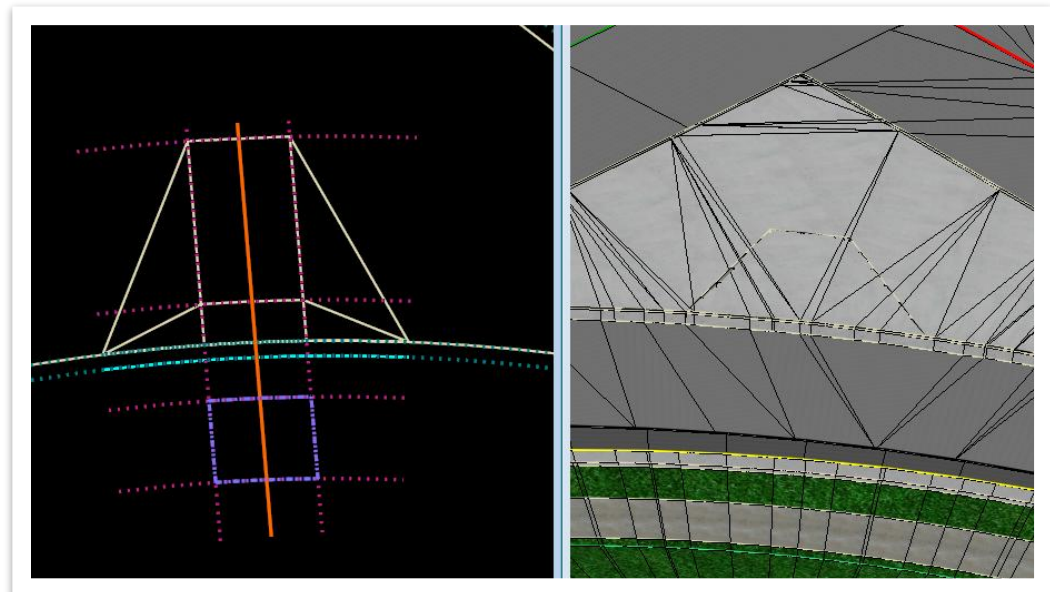
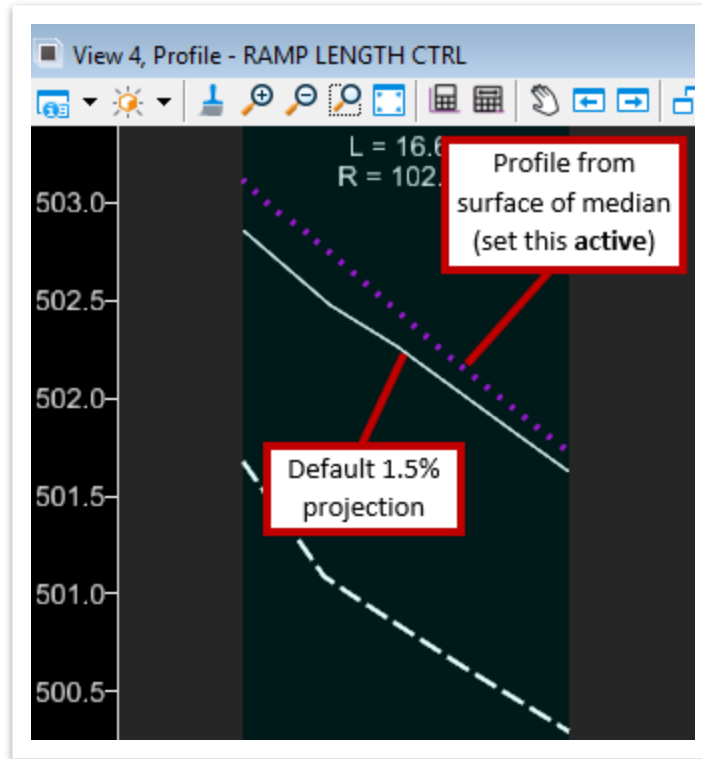
4. Open the **Place Civil Cell** tool (**OpenRoads Modeling >> Model Detailing >> Civil Cells**). In the **Pick Civil Cell** window, select the appropriate civil cell from the **dgnlib** and click **OK**. Then, select the following reference lines in order: **CR FLOWLINE**, **CR BACK TOP**, and **RAMP CL - NO PROFILE**. Select the median curb linear template when prompted for the corridor to be clipped. **Note:** *The user may need to reverse the direction of one or more reference lines during placement.*

5. Adjust the civil cell to match the proposed design.
  - a. Modify the ramp width using the **RAMP WIDTH CTRL R** and **RAMP WIDTH CTRL L** elements.

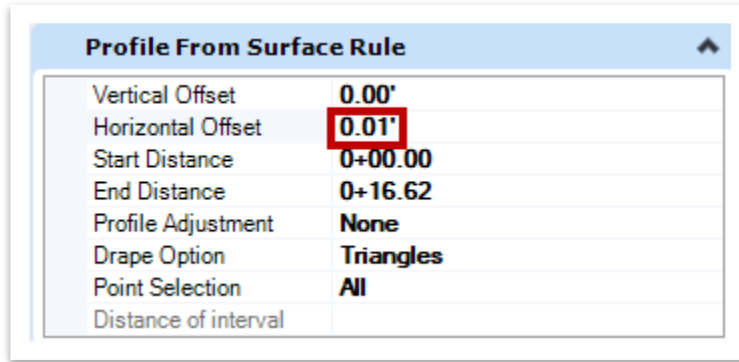


- b. Change the elevation of the top of the ramp to match the proposed island surface. By default, the elevation at the top of the ramp is controlled by projecting a **1.50%** slope up from the **CR BACK TOP** element. Using the **Quick Profile From Surface** tool (**OpenRoads Modeling >> Geometry >>> Vertical >> Profile Creation**) project the median surface onto the **RAMP LENGTH CTRL** element. Then, open the profile model of the **RAMP LENGTH CTRL** element and set the surface projection **active**.

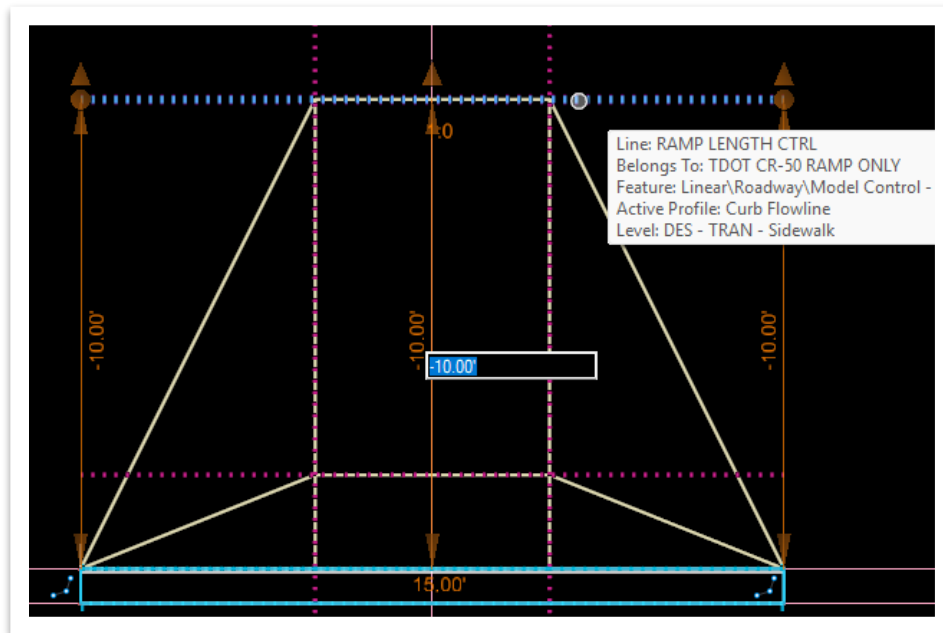




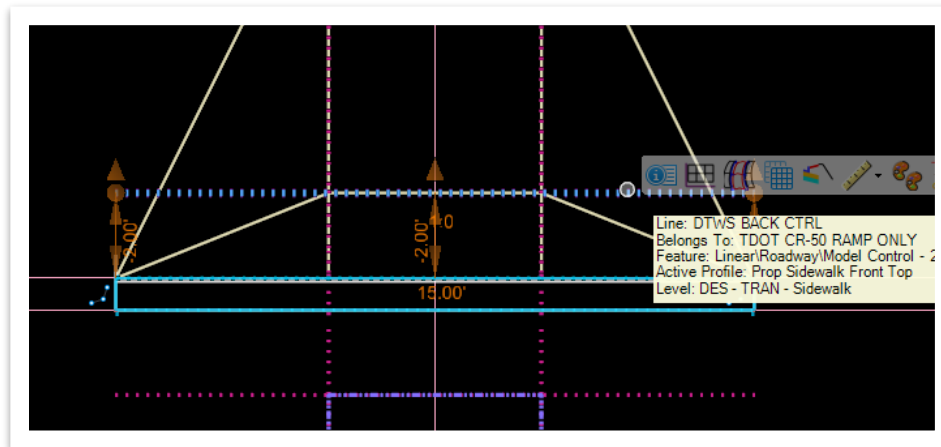
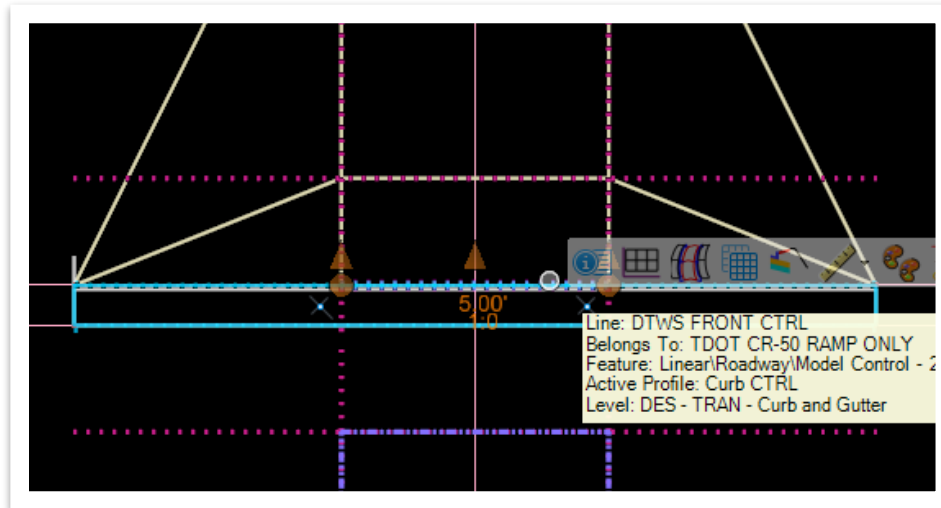
- c. It is possible that the surface projection profile will develop gaps when the island surface is clipped in a subsequent step because the 3D line that defines the island surface boundary approximates a curve, but is in fact a line string. To prevent this issue, select the surface projection profile and adjust its **Properties** under **Profile From Surface Rule** to have a **Horizontal Offset** of **0.01 ft**.



- d. Modify the ramp length using the same **RAMP LENGTH CTRL** element. This will automatically adjust the slope of the ramp based on the top of ramp elevation.

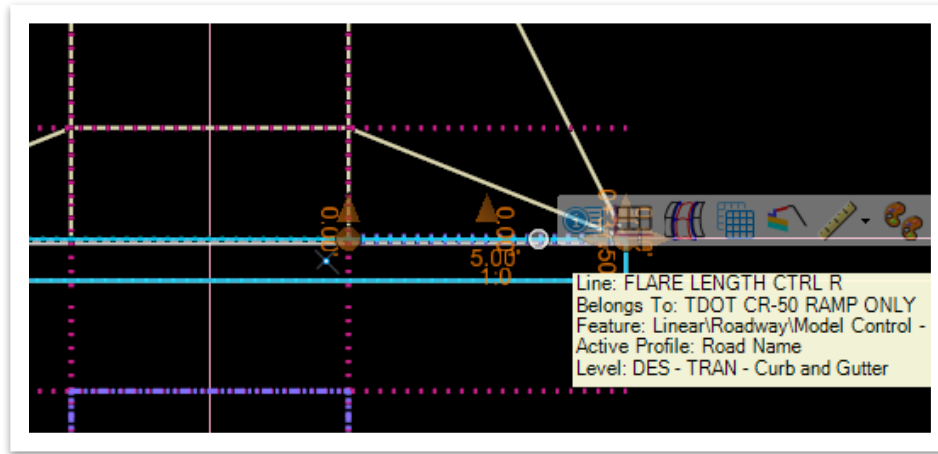


- e. Modify the slope of transition area by adjusting the slope of both **DTWS FRONT CTRL** (controls slope from **CR FLOWLINE** across the **6-in** curb width) and **DTWS BACK CTRL** (controls slope across the **2-ft** DTWS length) in **Properties**. **Note:** *This step may need to be iterated until the slope of the transition area matches the slope of the ramp, if the **2.00%** transition is intended to be removed.*

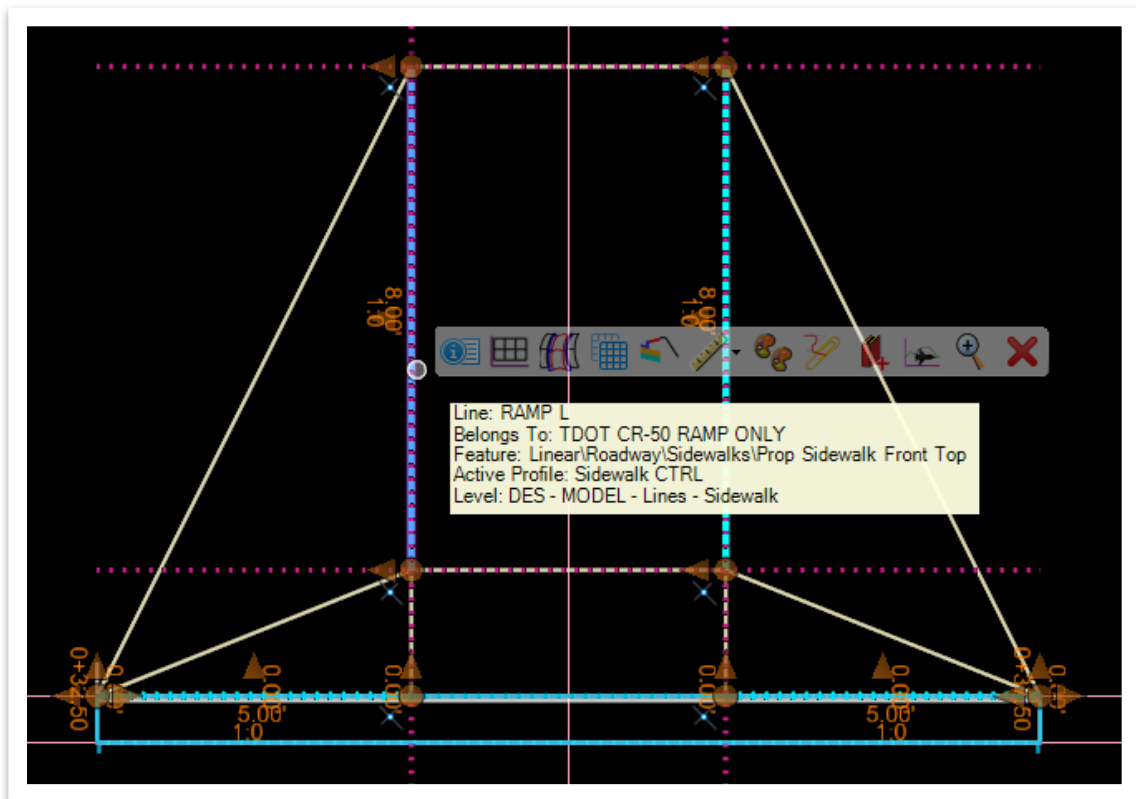


Profile By Projecting 3D Element Simple Slope Rule	
Slope	2.00%
Vertical Offset	0.00'
Profile Adjustment	None
Point Selection On Depen	All

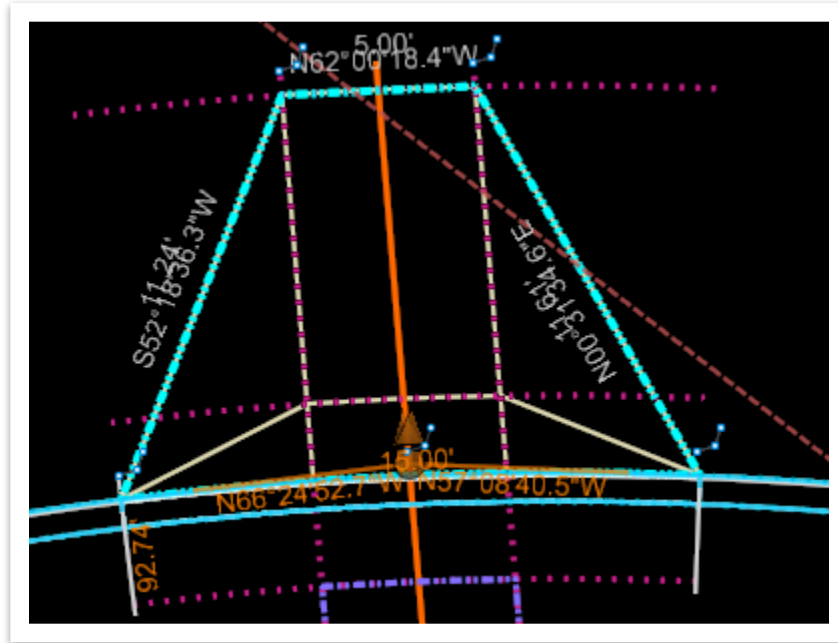
- f. Modify the flare width using the **FLARE LENGTH CTRL R** and **FLARE LENGTH CTRL L** elements.



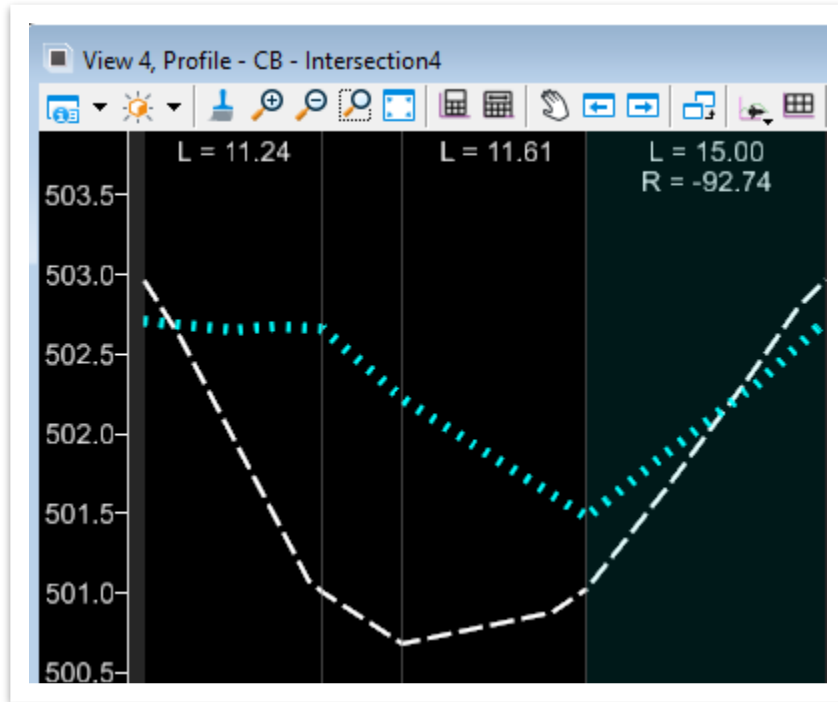
- 6. Check that all slopes meet the design intent and ADA standards. Since the ramp length and flare lengths were modified directly, their respective slopes will always need to be checked. To do this, select each of the following elements and view their slopes under **Profile Line Between Points Rule** in the element **Properties: RAMP R, RAMP L, FLARE LENGTH CTRL R, FLARE LENGTH CTRL L**. *Note: The left and right edges of the ramp may have different slopes depending on project-specific conditions.*



7. Since the island and intersection pavement surfaces are terrain models, each with a surface template drop, we need to draw a clipping shape to create a void in the island surface for the curb ramp.
  - a. Trace the perimeter of the desired void using **Geometry** tools and the **Clipping Boundary – Intersection** feature definition (**Linear >> Roadway >> Model Control - 2D Plan >> Clipping**). Then use the **Complex by Element** tool (**OpenRoads Modeling >> Geometry >> Horizontal >> Complex Geometry**) to create one complex perimeter element.

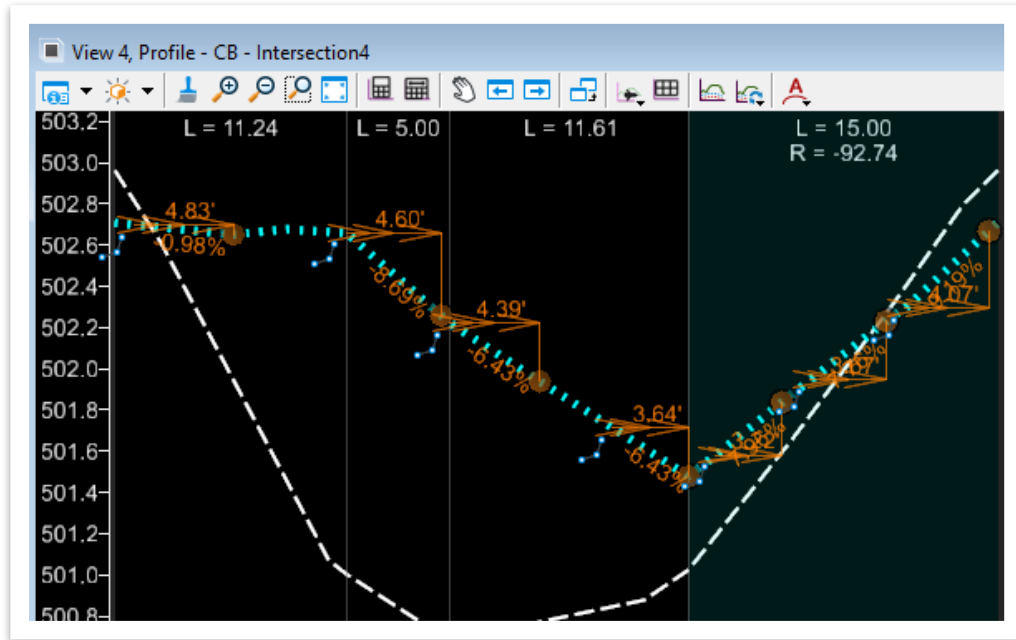


- b. Then use the **Quick Profile From Surface** tool (**OpenRoads Modeling >> Geometry >> Vertical >> Profile Creation**) and select the intersection terrain in the **3D** view to profile the perimeter element. **Right** click to accept that command. Select the surface projection profile and adjust its **Properties** under **Profile From Surface Rule** to have a **Horizontal Offset** of **0.01 ft**. Set the profile **active**.

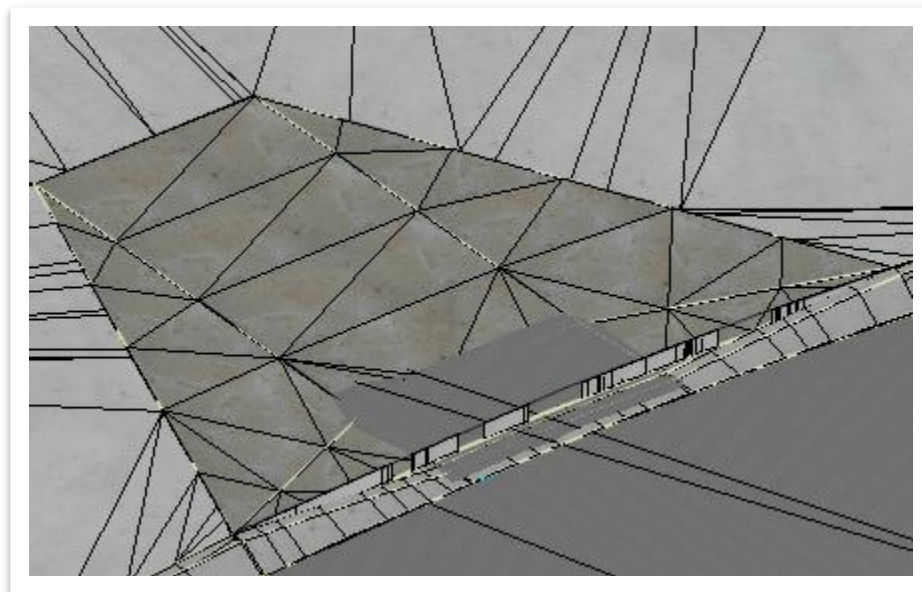


Profile From Surface Rule	
Vertical Offset	0.00'
Horizontal Offset	0.01'
Start Distance	0+00.00
End Distance	0+42.86
Profile Adjustment	None
Drape Option	Triangles
Point Selection	All
Distance of interval	

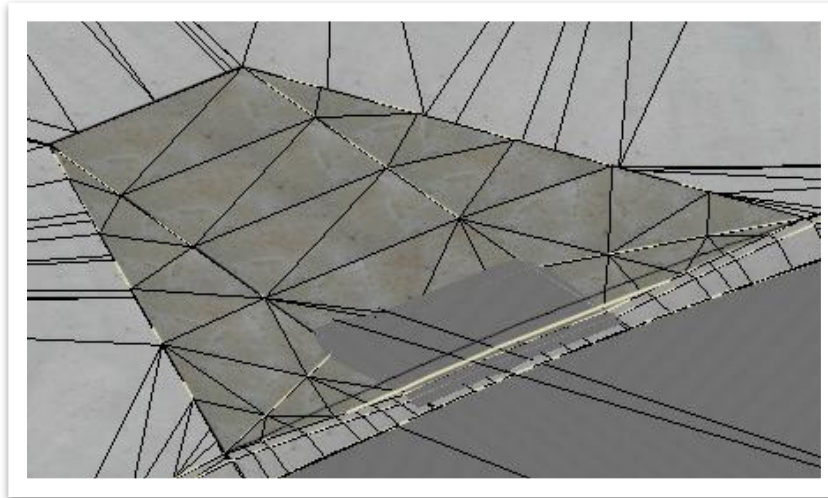
- c. Use the **Simplify Geometry** tool (**OpenRoads Modeling >> Geometry >> Common Tools**) to convert the profile to PIs and remove its dependency on the island surface. This will allow the element to be used as a void in the terrain model.



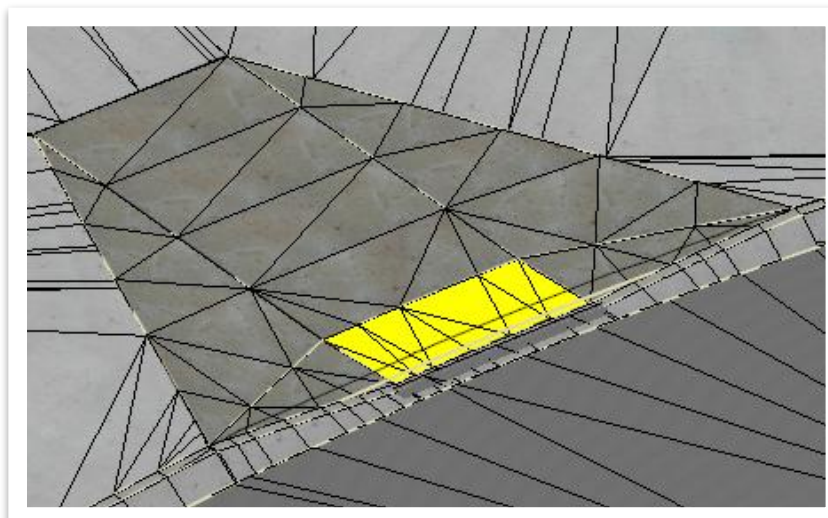
- d. Open the terrain tab and select the **Add Features** tool (**OpenRoads Modeling >> Terrain >> Edit**). Set the feature type to **Break Void**. Select the island surface terrain in the **3D** view and then select the closed shape in the **2D** view.
- e. Review the model in **3D** to ensure the surface terrain was clipped appropriately.



- f. If vertical meshes appear at the edge of the terrain void, simply adjust the vertices of the clipping element from **Step 7a** to cover the area.

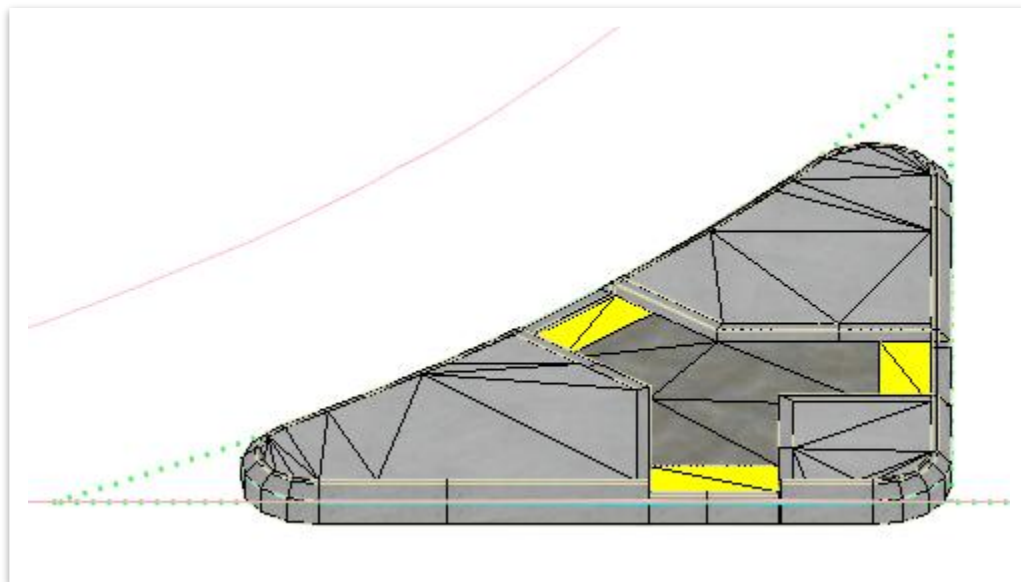


- g. If the intersection surface is covering the lower portion of the ramp, the perimeter shape can be used as a **Drape Void** on the intersection terrain model. Open the terrain tab and select the **Add Features** tool (**OpenRoads Modeling >> Terrain >> Edit**). Set the feature type to **Drape Void**. Select the intersection surface terrain in the **3D** view and then select the closed shape in the **2D** view. **Note:** *The user may create a new shape with MicroStation or Geometry tools for the intersection void area, if desired, but the shape must not include the area directly beneath the **ISLAND CTRL** element, which is needed for the island and ramp civil cells to function properly. Also, it is possible that the island surface void will revert to covering the ramp at this point. If this happens, remove the perimeter feature from both terrain models and then add it again, but in reverse order, adding it as a **Drape Void** on the intersection surface terrain and then as a **Break Void** on the island surface terrain.*



## CR-51 RIGHT TURN ISLAND WITH CUT-THRU

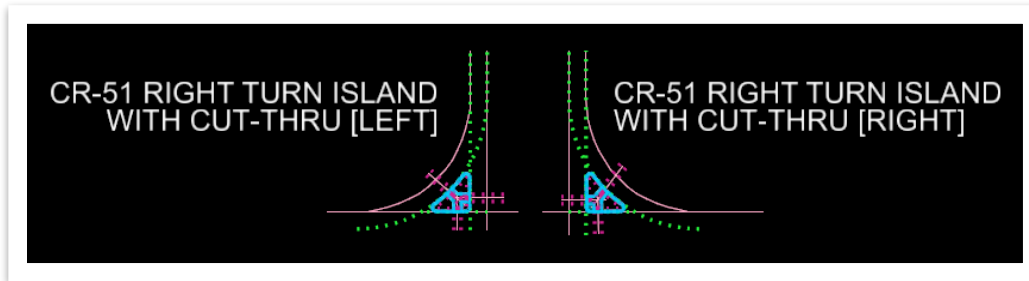
### PEDESTRIAN REFUGE



The following guidance applies to both the **[LEFT]** and **[RIGHT]** versions of the **CR-51 RIGHT TURN ISLAND WITH CUT-THRU** civil cell, even though the screenshots show the **[LEFT]** only. The **CR-51 RIGHT TURN ISLAND WITH CUT-THRU** civil cells require six reference lines to place: **MAINLINE EOP**, **SIDEROAD CL**, **INTERSECTION EOP**, **MAINLINE CROSSWALK CL - NO PROFILE**, **SIDEROAD CROSSWALK CL - NO PROFILE**, and **TURN LANE CROSSWALK CL NO PROFILE**.

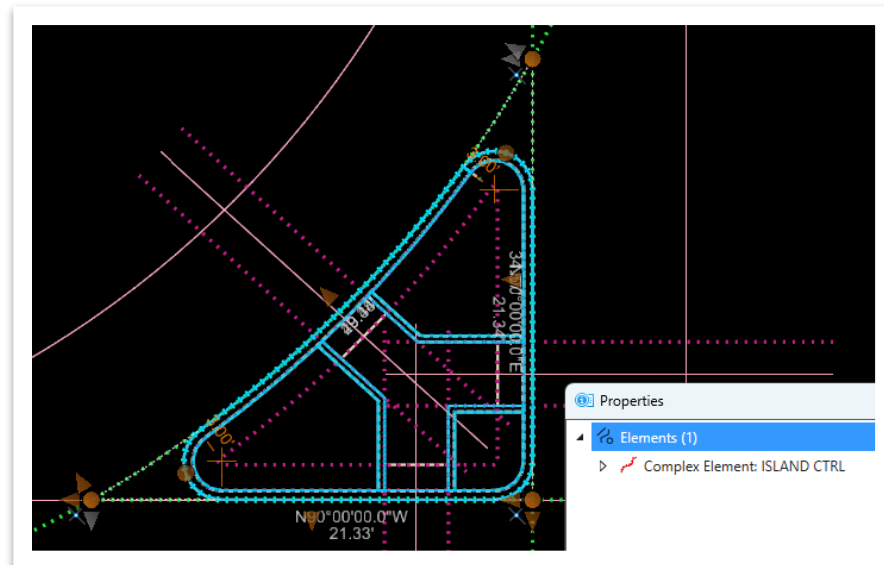
1. The ADA Ramp centerlines must be laid out manually before placing this civil cell. The ramp centerlines should not have a profile. The centerlines do not have to be perfect before placing the ramp, but it is helpful for the civil cell if the user has already planned out the intersection in 2D using MicroStation tools. **Note:** The three ramp centerline elements must extend past each other for the civil cell to place correctly.
  - a. It is recommended to start with the mainline ADA ramp centerline and align that with the theoretical cross walk location across the mainline.
  - b. Then, define the centerline of the sideroad ADA ramp that crosses the sideroad thru-lanes.
  - c. Finally, place the ADA ramp centerline that crosses the right-hand turn lane.

2. Open the **Place Civil Cell** tool (**OpenRoads Modeling >> Model Detailing >> Civil Cells**). In the **Pick Civil Cell** window, select the appropriate civil cell from the dgnlib. Choose the **[LEFT]** or **[RIGHT]** option based on the diagram below, sideroad alignment running from bottom to top of the screen.

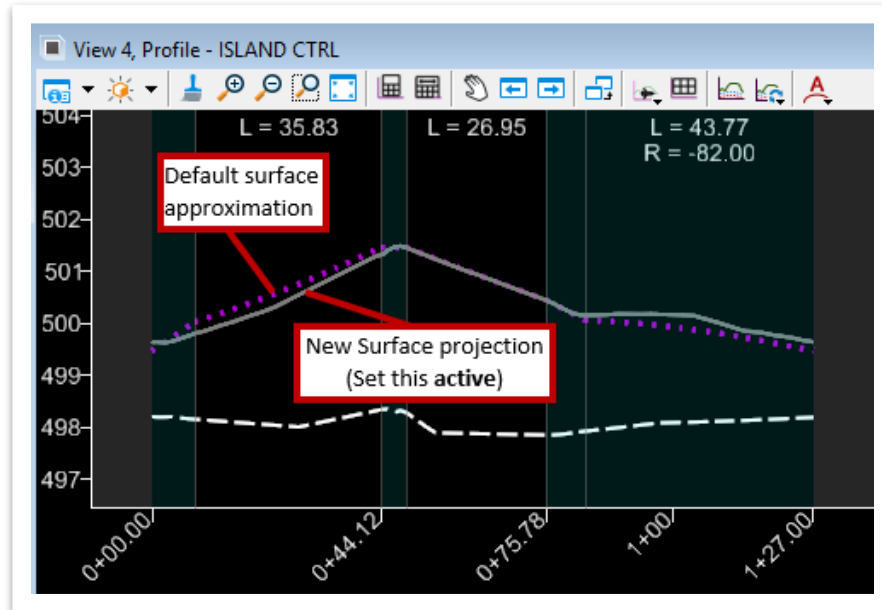


3. Select the following reference lines in order: **MAINLINE EOP**, **SIDEROAD CL**, **INTERSECTION EOP**, **MAINLINE CROSSWALK CL - NO PROFILE**, **SIDEROAD CROSSWALK CL - NO PROFILE**, and **TURN LANE CROSSWALK CL - NO PROFILE**, along with the corridor to be clipped, if applicable. **Note:** *The user may need to reverse the direction of one or more reference lines during placement.*
  - a. The mainline edge of pavement should be going from left to right.
  - b. The sideroad centerline should be going from bottom to top (i.e., away from the mainline)
  - c. The intersection Edge of pavement should be going from bottom to top (i.e., away from the centerline)
  - d. All ramp centerlines should be facing each other, into the island.

4. Review the placement in 2D and 3D to ensure that it placed correctly. If the cell does not look correct, the reference lines may need to be adjusted. If this is the case, the user may need to delete the civil cell and then place the civil cell again on the revised reference lines.
  - a. This cell will break if the ADA ramp centerlines on the mainline and the sideroad are closer than 7 ft from the mainline edge of pavement for the sideroad ADA centerline and 7 ft from the sideroad through lane for the mainline ADA centerline.
5. Adjust the civil cell to match the proposed design.
  - a. By default, the cell approximates the surface of the intersection cell. The first thing to do is to make sure it follows the proposed intersection surface exactly.
    - i. Do this by opening the profile model of the **ISLAND CTRL** element. Then use the **Quick Profile From Surface** tool (**OpenRoads Modeling >> Geometry >> Vertical >> Profile Creation**) and select the intersection terrain in the **3D** view to quickly pull that profile. **Right** click to accept that command.



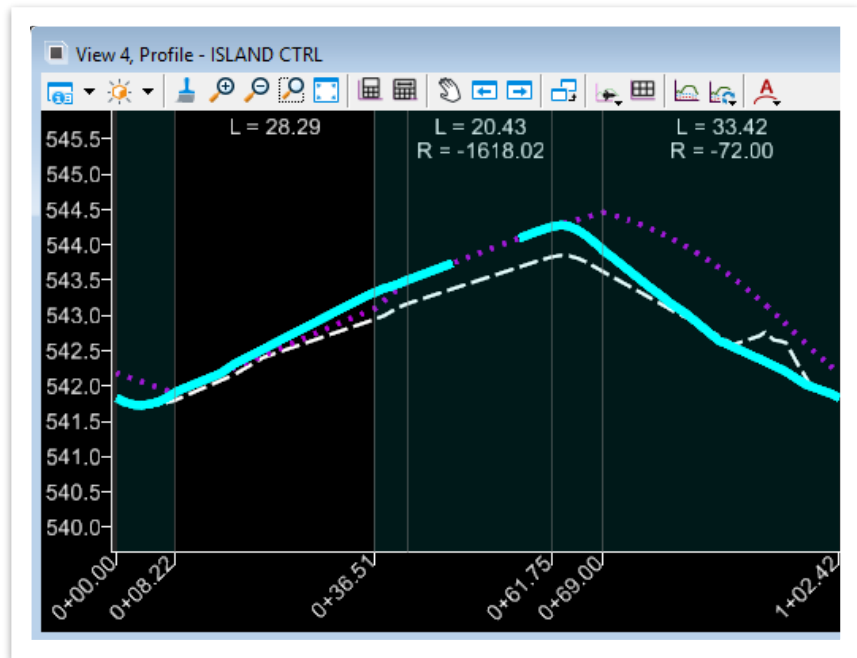
- ii. The surface profile will now show in the profile view. Set the surface profile to the **active** profile.



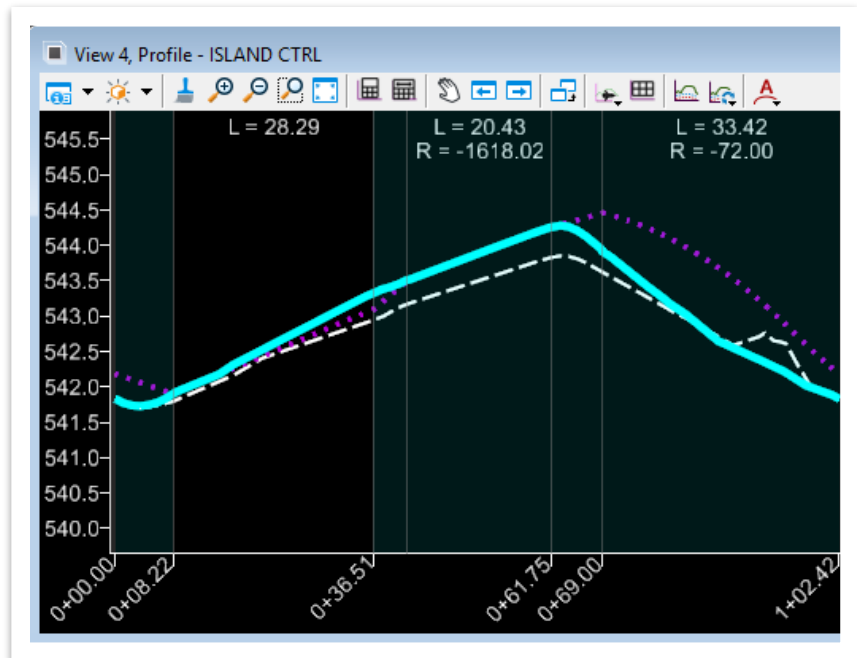
- iii. It is possible that the surface projection profile will have gaps, depending on the curvature of the mainline alignment, because the 3D line that defines the intersection surface boundary approximates a curve, but is in fact a line string. If gaps are present, select the surface projection profile and adjust its **Properties** under **Profile From Surface Rule** to have a **Horizontal Offset** of **0.01 ft**. *Note: if there are still gaps after adding this offset, try a negative offset value or increasing the magnitude of the offset to resolve the issue.*

Profile From Surface Rule	
Vertical Offset	0.00'
Horizontal Offset	0.01'
Start Distance	0+00.00
End Distance	1+02.42
Profile Adjustment	None
Drape Option	Triangles
Point Selection	All
Distance of interval	

- Before adding offset (different example shown):

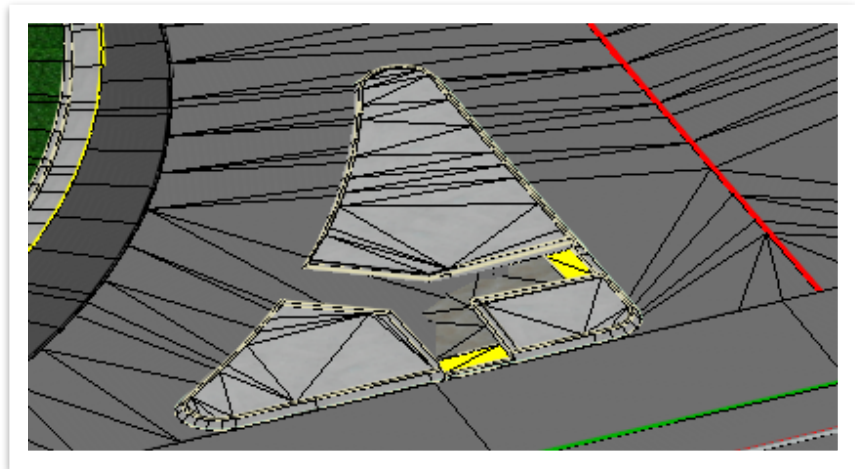


- After adding offset (different example shown):

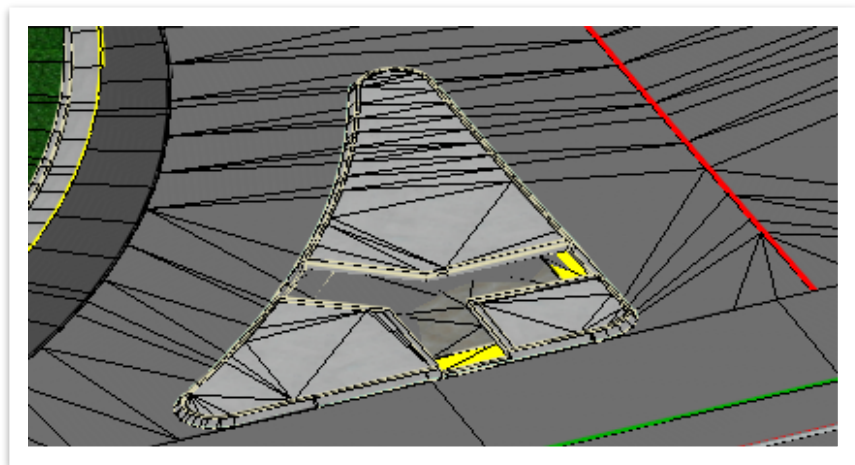


iv. Review the island in **3D** and notice that it aligns with the intersection terrain from the intersection civil cell.

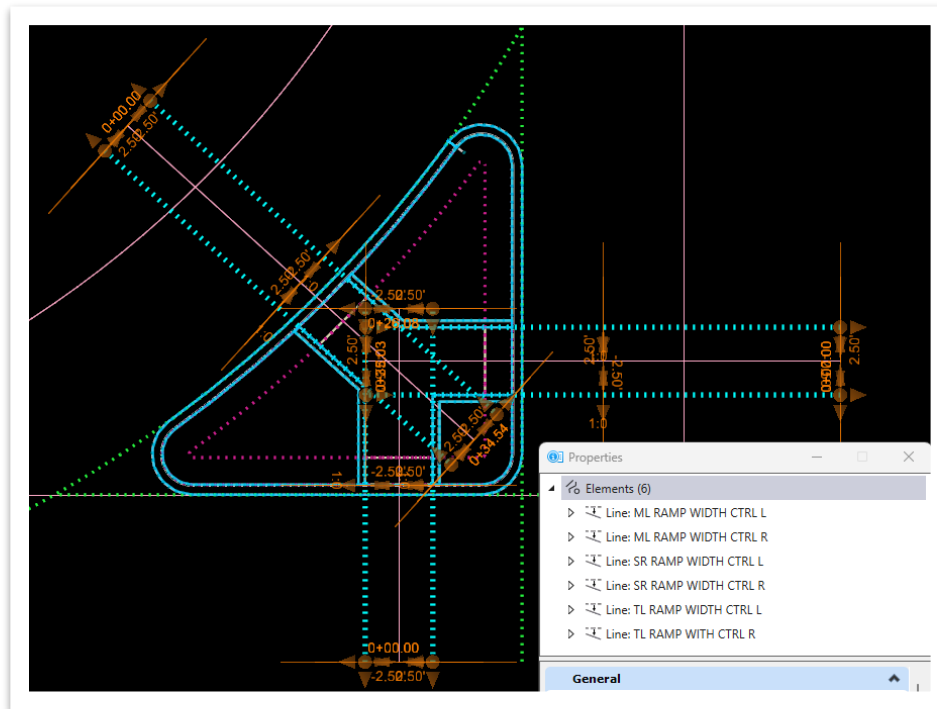
- Before modifying profile:



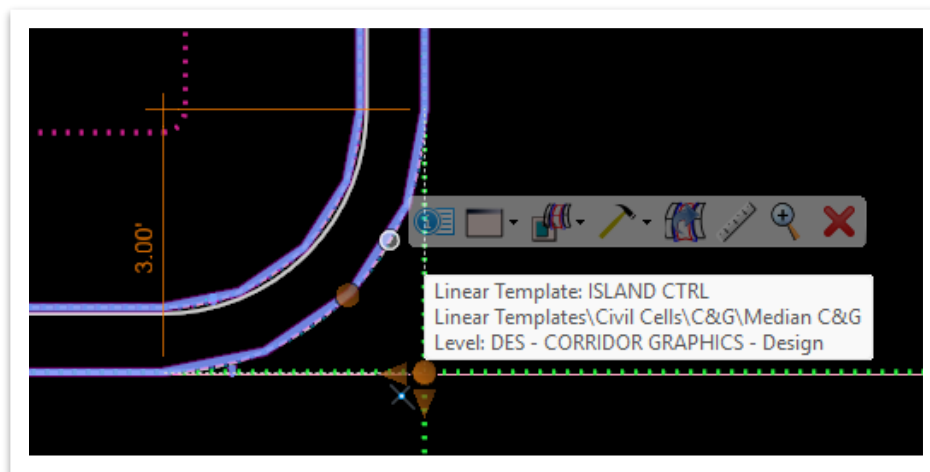
- After modifying profile:



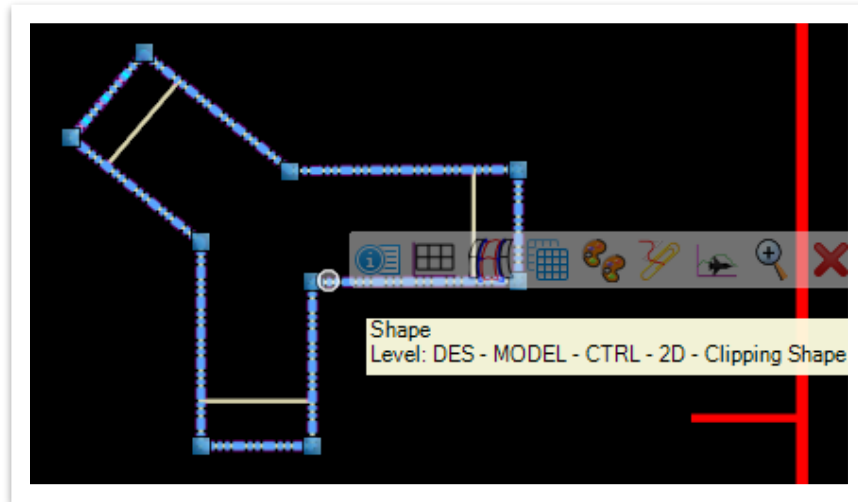
- b. Modify curb ramp widths using the **RAMP WIDTH CTRL** elements. By default, ramp widths are set to **4 ft**. **Note:** Users may turn off all levels except **DES - TRAN - Sidewalk** to better see the controlling elements.



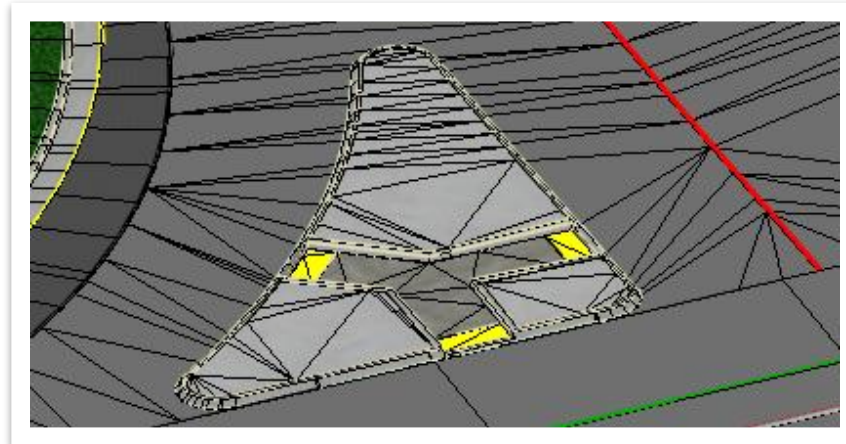
- c. To change the island corner radii, locate the **ISLAND CTRL** element. Each radius is set to **3 ft** by default. **Note:** For this step, turn back on the **DES - TRAN - Curb and Gutter** level if it was previously turned off.



- d. If necessary, clip a void in the intersection terrain model for where the ADA ramps are.
  - i. Create a closed shape by tracing the perimeter of the desired void using MicroStation tools. **Note:** *In the screenshot below, all levels are turned off except **DES MODEL - Lines - Sidewalk** and **DES - MODEL - CTRL - 2D - Clipping Shape**.*

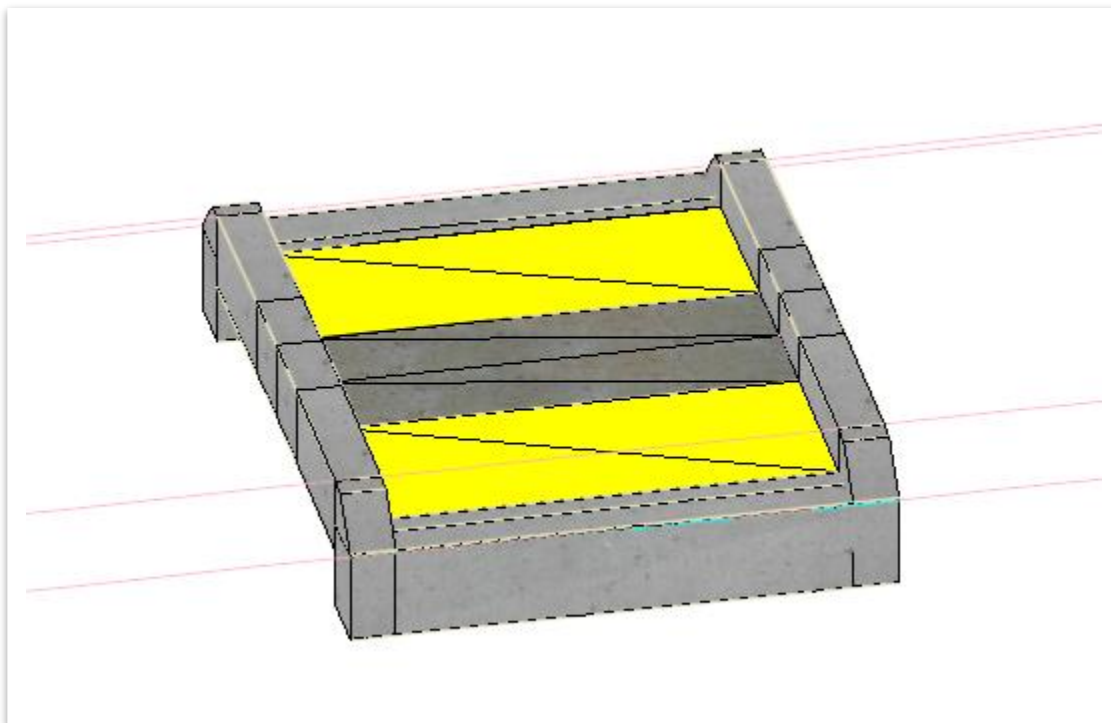


- ii. Open the terrain tab and select the **Add Features** tool (**OpenRoads Modeling >> Terrain >> Edit**). Set the feature type to **Drape Void**. Select the intersection terrain in the **3D** view and then select the closed shape in the **2D** view. This will take time to process.
    - iii. Review the model in **3D** to ensure the surface terrain was clipped appropriately



## CR-51 MEDIAN REFUGE

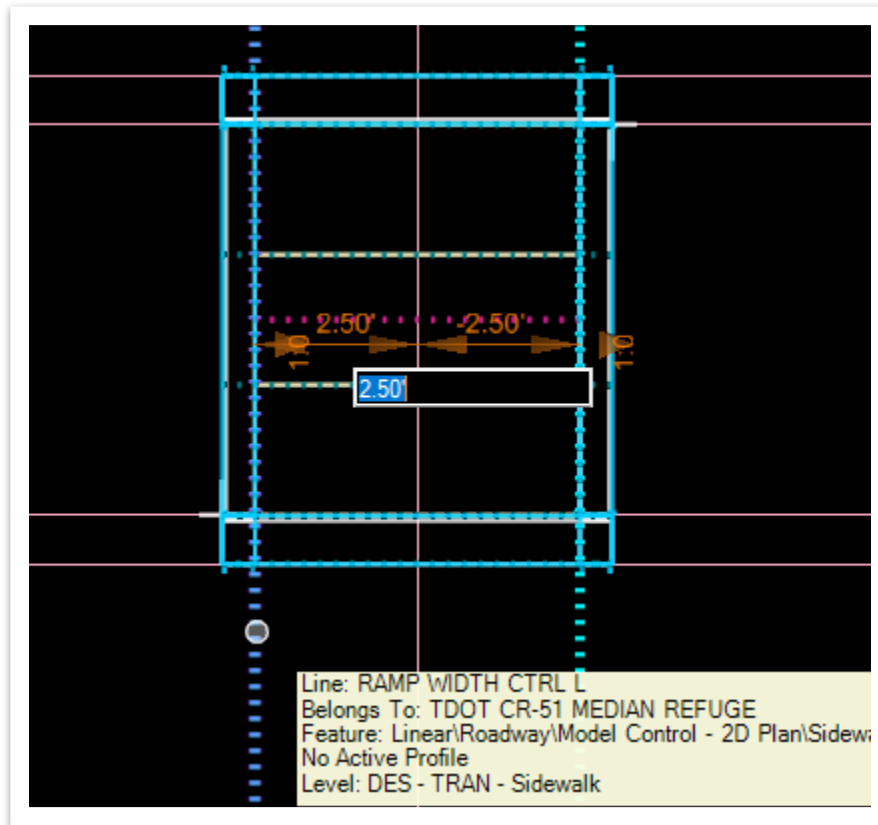
### PEDESTRIAN REFUGE



The **TDOT CR-51 MEDIAN REFUGE** civil cell requires the median to be modeled before this crossing refuge can be placed. The median is usually modeled within the roadway template itself, allowing for conventional corridor clipping after civil cell placement.

1. Before placing the civil cell, using the **Ramp CL - CTRL** feature definition (**Linear >> Roadway >> Model Control 2D Plan >> Sidewalk**) draw a ramp centerline passing through the **CR FLOWLINE** and **CR BACK TOP** elements on both sides of the median crossing. **Note:** *The profile of the ramp centerline does not need to be correct, and the direction does not matter. Also, for this civil cell to work, the ramp centerline must be approximately perpendicular to the roadway and cross all four reference elements listed in **Step 2**.*
2. Open the **Place Civil Cell** tool (**OpenRoads Modeling >> Model Detailing >> Civil Cells**). In the **Pick Civil Cell** window, select the appropriate civil cell from the **dgnlib** and click **OK**. Then, select the following reference lines in order: **CR FLOWLINE [TOP]**, **CR BACK TOP [TOP]**, **CR FLOWLINE [BOTTOM]**, **CR BACK TOP [BOTTOM]**, and **RAMP CL - NO PROFILE**, along with the corridor to be clipped, if applicable. **Note:** *Top and Bottom in the reference names above assume that the screen is oriented with the mainline stationing going from left to right. If these are selected correctly, no reference line directions should need to be changed.*

3. Adjust the civil cell to match the proposed design.
  - a. Modify the ramp width using the **RAMP WIDTH CTRL R** and **RAMP WIDTH CTRL L** elements.



- b. Modify the detectable warning surface lengths using the **DTWS BOT BACK CTRL** or **DTWS TOP BACK CTRL** elements.

