Z. Vymazal – 10/26/2017
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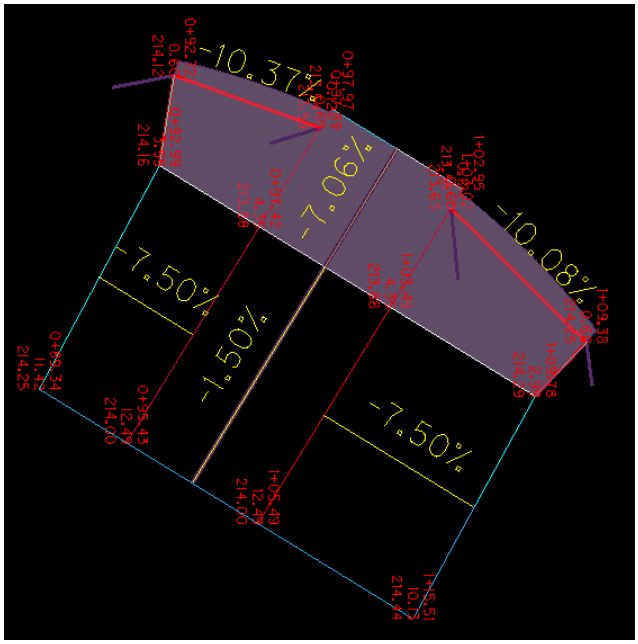
ADA Combination Ramp Modeling Workflow

Objective

To provide methods to create an ADA ramp surface (DTM) according to RD755, with features that contain detail information required by DET1720.

Summary

The ADA combination ramp modeling workflow is an iterative process. The reason the process is iterative is that there are a few factors that can be modified to achieve results that meet the minimum or desirable design criteria. If there is insufficient space between ramps, for example, you may move an entire ramp alignment and create new surfaces until they are separated enough. You will create several temporary surfaces before you create the surface and features for the final ramps. The InRoads Roadway Designer will perform most of the tasks and create the surfaces quickly. There are a couple of features that the Modeler cannot create for you, but you will be instructed in how to add the features for the ramp flares. In addition, the workflow explains InRoads commands that can be used to verify the design and annotate a 2D plan according to DET1720.



Workflow Outline

1. Create the horizontal and vertical alignment for the corner at the proposed gutter line. Use the existing DTM to match vertical at ends. Cut profile and locate ramp positions. (This step is not covered in this workflow.)
2. Create a corridor for an intermediate (temporary) sidewalk surface around the corner. Use a **TempSW_R** or **TempSW_L** template, an interval between 0.5 and 1 (smaller for small radii); active surface is the existing DTM.
3. Create a Temp_SW surface around the corner. Set Modeler Options to use Hz & Vt Cardinal Points.
4. Create the horizontal and vertical alignments for the ramps.

5. Create corridors for intermediate (temporary) surfaces for the ramps. Use **ADAcombSWramp** template. Set Surface options to generate transverse features; Interval set at 0.05 or 0.1.
6. Create Temp_Ramp surfaces for ramps. Verify distance between catches exceeds 5', or create alternate ramp alignment.
7. Create corridors and surfaces for Final_Ramp surfaces; interval larger than length of ramp; transverse features.
8. Modify final surfaces for ramps for checking and annotation. Delete CL feature, delete or modify exterior feature at base of ramp, place 2 L-shaped features for flares using intersection of transverse feature with back of curb feature; triangulate.
9. View Two Point Slope to verify design slopes.
10. Annotate gutter line CL using **ODOT-PlansDetail**; station gutter line CL using **ODOT-PlansDetailInch5**.
11. Use Annotate Features (points only) to quickly display station, offset, and elevation of design points for visual checking.
12. Generate clearance report on longitudinal features in final ramp surfaces for tabular point information to include in a sidewalk ramp detail – use FeatureStationElevationOffset.xsl for just the information that is required.

Set Up

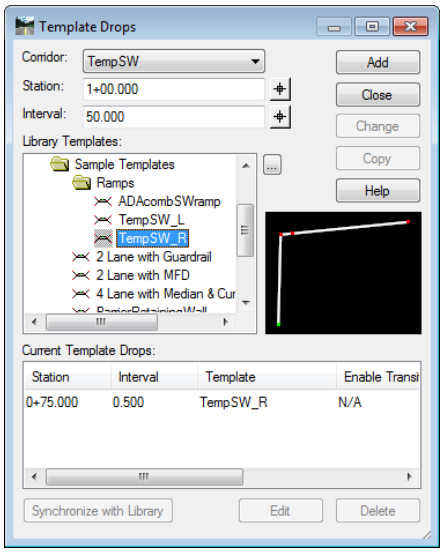
Running InRoads V8i SS2 (or InRoads SS2 Lite). Work in 3D models in a DGN for all design work. Annotations for plans should be drawn in a new 2D model. Load ALG and existing ground DTM. If working with the example dataset, load the civil_ADA.xin and Example_Templates.itl.

The ODOT preference for several commands has been adjusted for this workflow in the civil_ADA.xin and you will find the templates for this workflow in the Sample Templates>Ramps folder in Example_Templates.itl.

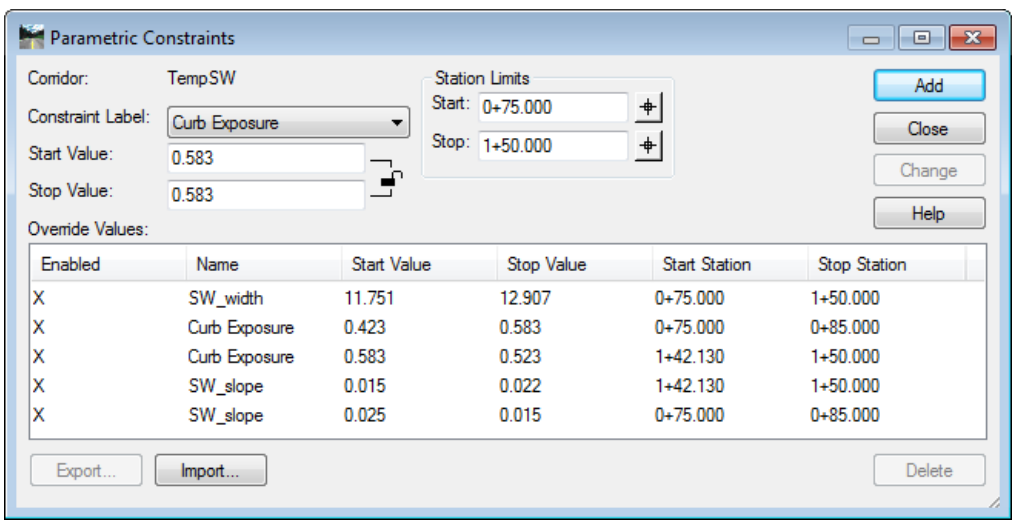
The Temporary Sidewalk Surface (TempSW)

See Example_ADARamps.dgn, TempSW model for example. This temporary sidewalk surface will be used as the active surface (target) for your ramps.

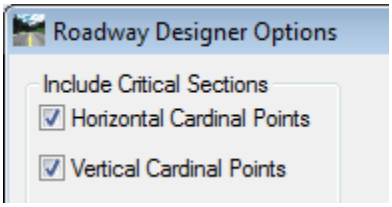
1. Create a corridor named TempSW using the corner alignment. Assign one template drop and identify either TempSW_R or TempSW_L as the template. Set the interval to about 0.5. Active Surface (target) is the existing ground, Example_OG.



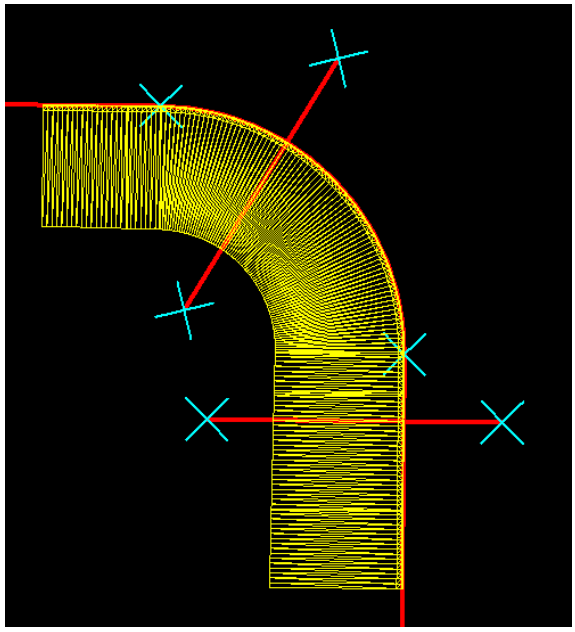
2. Adjust the **Tools>Parametric Constraints…** to set or taper the sidewalk width. The sidewalk slope and curb exposure may also be tapered.



3. Set **Tools>Options**… to include Horizontal and Vertical Cardinal Points.

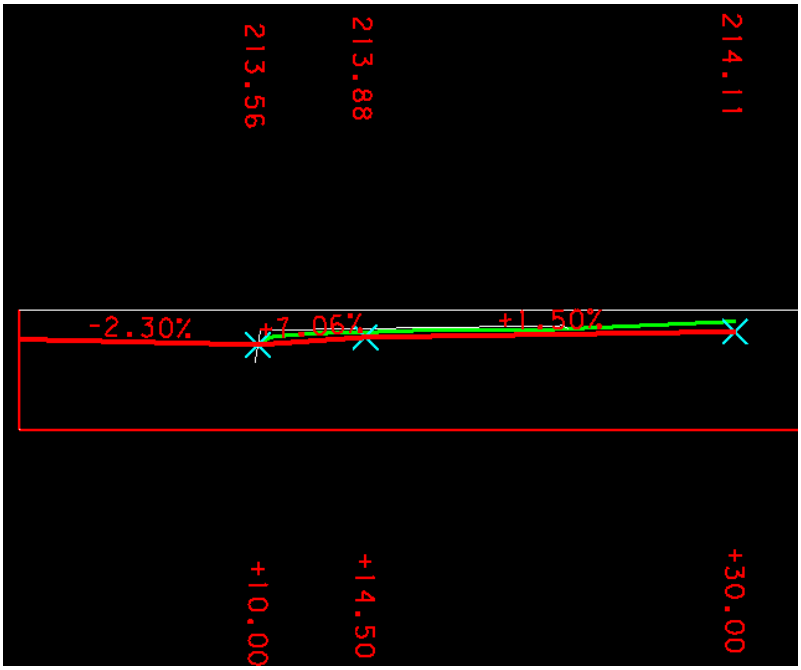


4. **Create Surface**. Do not add transverse features. View the triangles in the TempSW model.



The Ramp Alignments (ramp#)

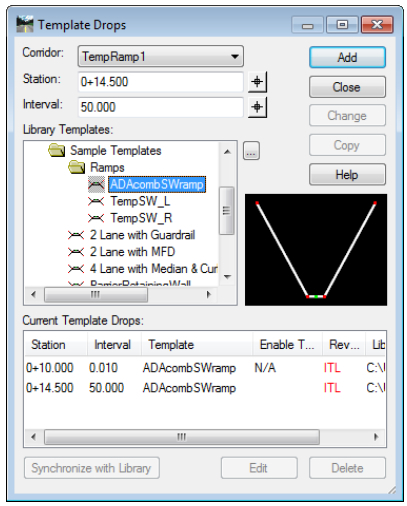
1. Create a horizontal alignment at each desired ramp CL location. The horizontal alignment should begin out in the street so that you can establish the slope of the roadway. Ensure that the horizontal extends past the back of the sidewalk.
2. Cut the profile and create the vertical alignment with longitudinal slopes that match the intended slopes of the ramp. Elevation at gutter line station should match existing. You should have a VPI at the back of ramp, where the slope changes from 7.5% (or less) to 1.5%.



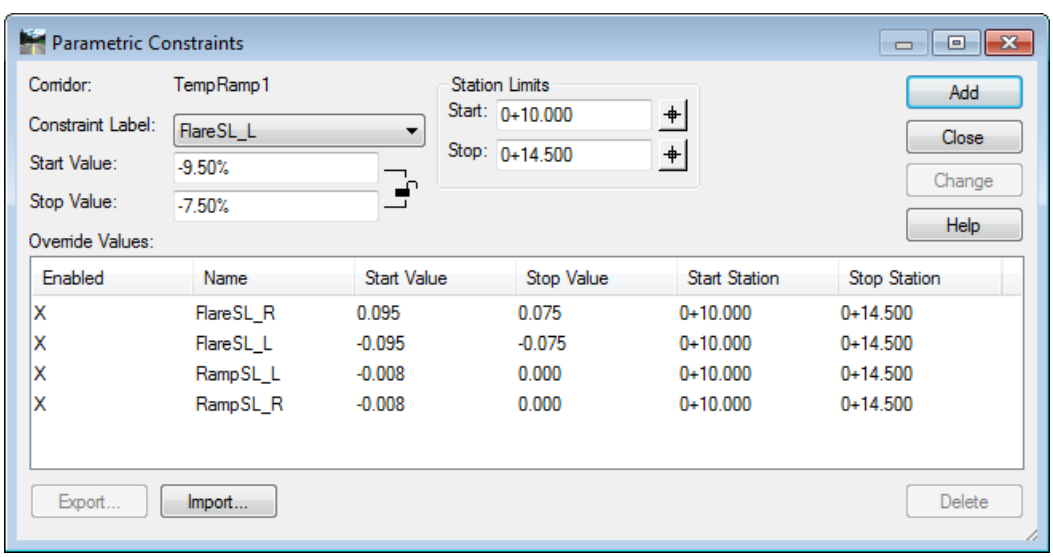
The Temporary Ramp Surfaces (TempRamp#)

See Example_ADARamps.dgn, TempRamp1 model for example. These temporary ramp surfaces are used to determine where the ramp slopes will catch against the temporary sidewalk surface. You can determine if you meet the design requirements with your alignments and other factors, such as ramp width. Work through these steps for each ramp on the corner before finalizing.

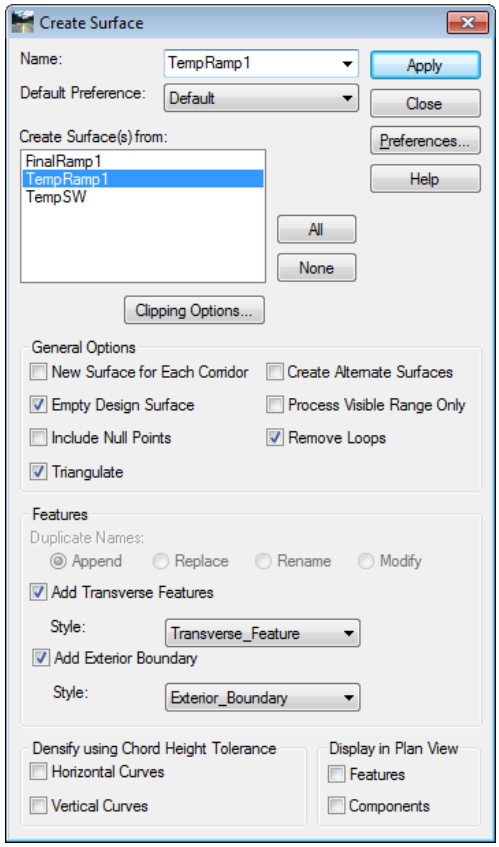
1. Create a corridor named TempRamp1 using the ramp1 alignment. The corridor should begin at the station of the gutter line. Assign two template drops using ADAcombSWramp as the template. Set the interval to about 0.01 for the ramp area, and increase the interval to something large at the back of the ramp station. Active Surface (target) is the temporary sidewalk, TempSW.



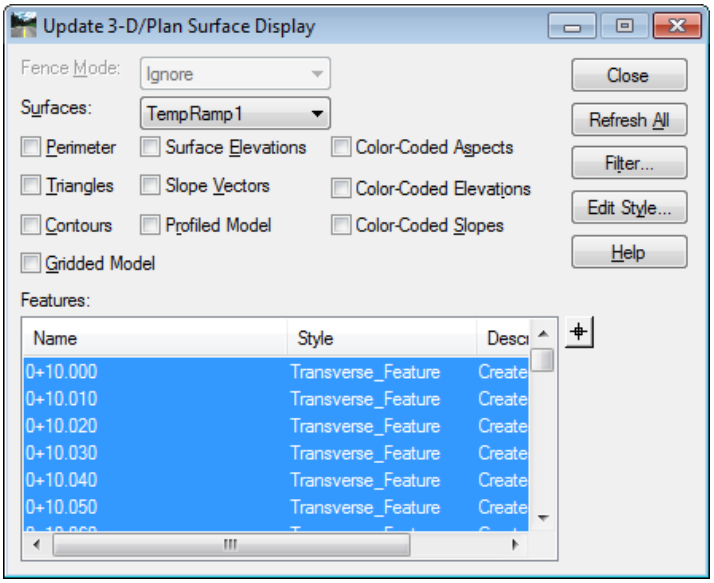
2. Adjust the **Tools>Parametric Constraints…** to taper the ramp slope from the existing slope (you'll see this in the corner profile) to 0% at the back of ramp station. Taper the flare slope from about 9.5% at the gutter line station to 7.5% at the back of ramp station.



3. Ensure that the Active Surface is TempSW. Run **Create Surface** and toggle on "Add Transverse Features".



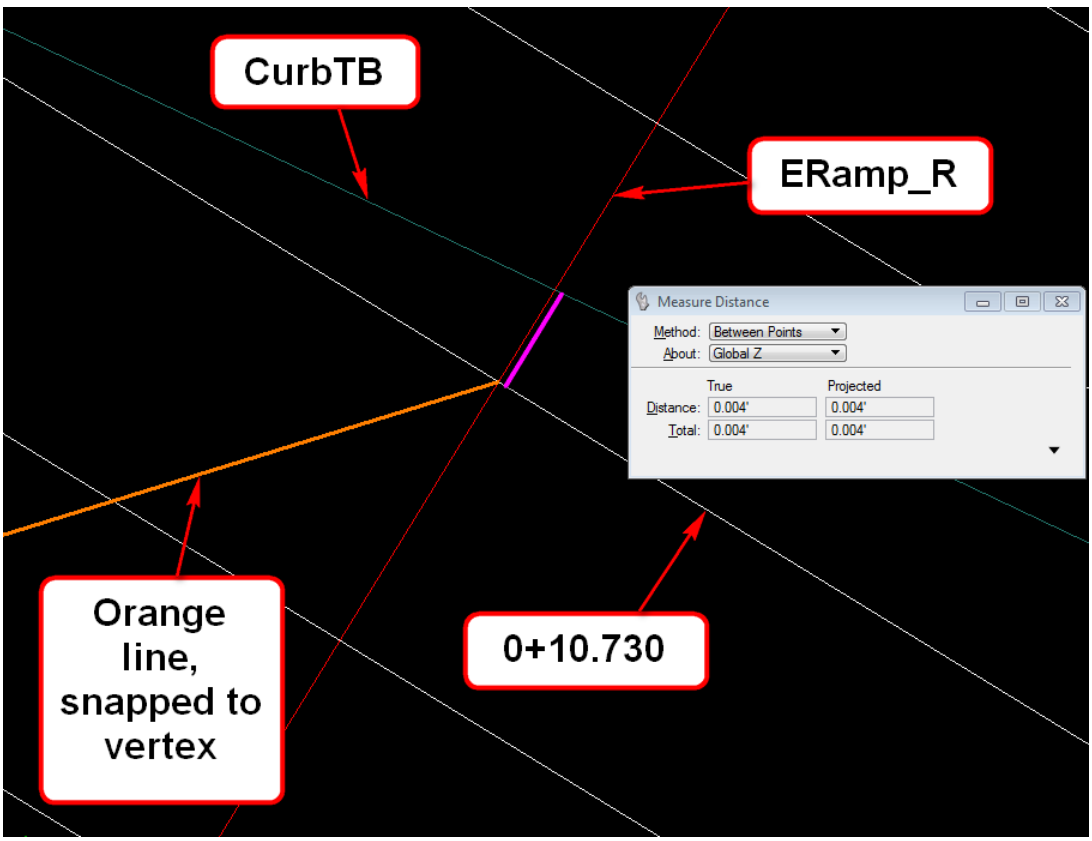
4. Use **Surface>Update 3-D Plan/Surface Display…** in a 3D model for the temporary ramps. Set the Surface to the temporary ramp, right-click in the Features window and choose **Select All**.

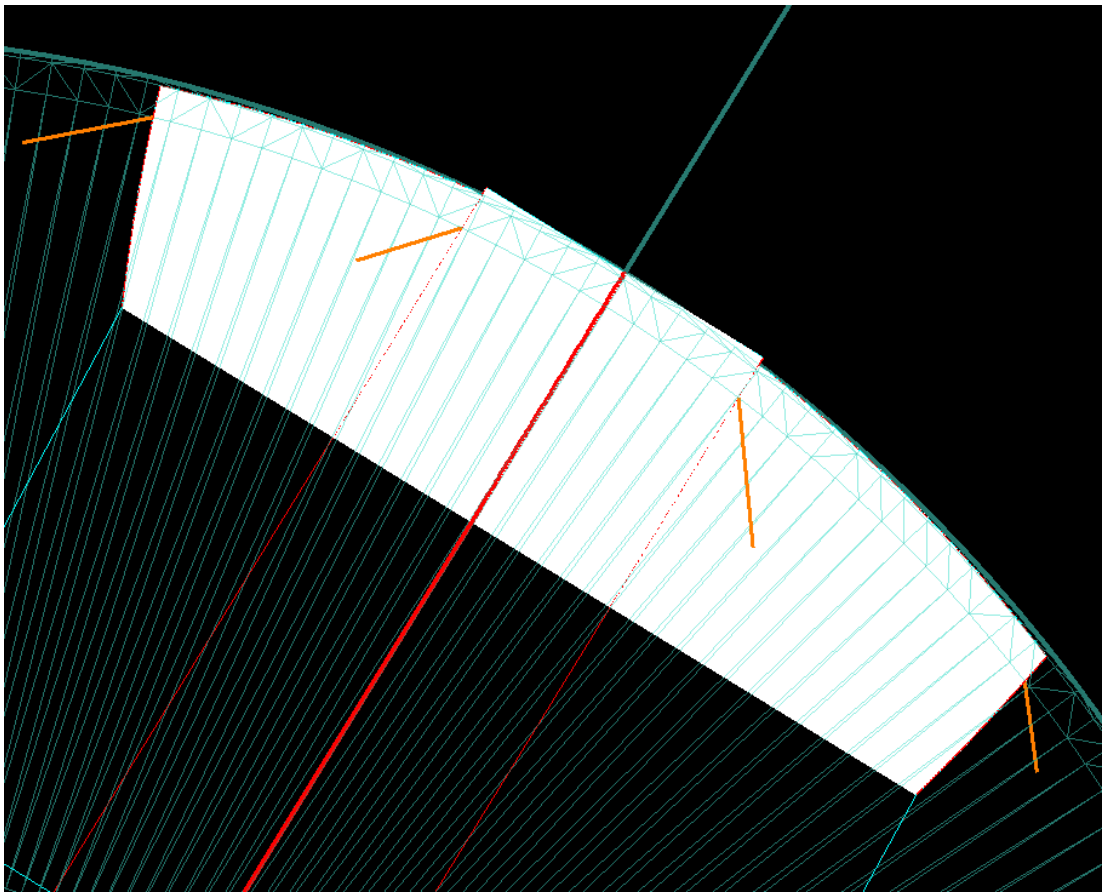


5. After running both ramps, verify that there is sufficient distance between the catch lines to meet design requirements. If not, begin this section again after altering the geometry.

   The reason the transverse features are included, is to aid you in locating four critical points for your design: Edge of the Flare slope at the top back of curb (both sides) and the Edge of the Ramp at the top back of curb (both sides). If the location of the ramps is acceptable, continue.

6. Attach the TempSW model as a reference. At each side of the ramp, zoom in and locate the intersection of the exterior boundary (catch line) and the transverse feature that is closest to the back of curb line seen in the reference. Draw a line on an unused level, snapping one end to that intersection point. It is not necessary to use an intersection snap mode because there is a vertex at that point on both elements. Draw similar lines from the intersection of the edge of ramp and the transverse feature that is closest to the back of curb. DO NOT snap to the curb line – you do not want to pick up that elevation! We just need to be within about 0.01' from the top back of curb, horizontally.

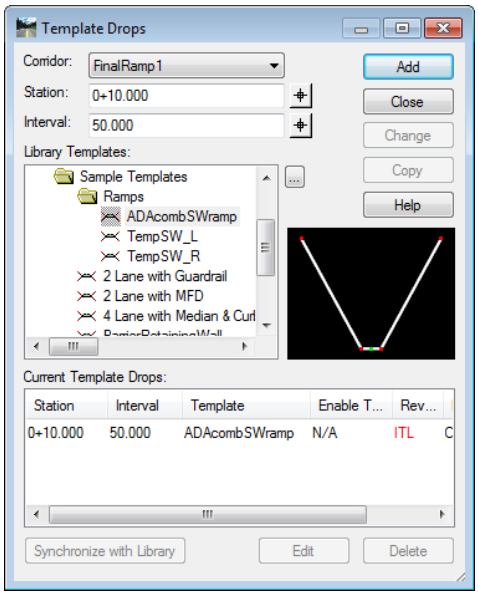




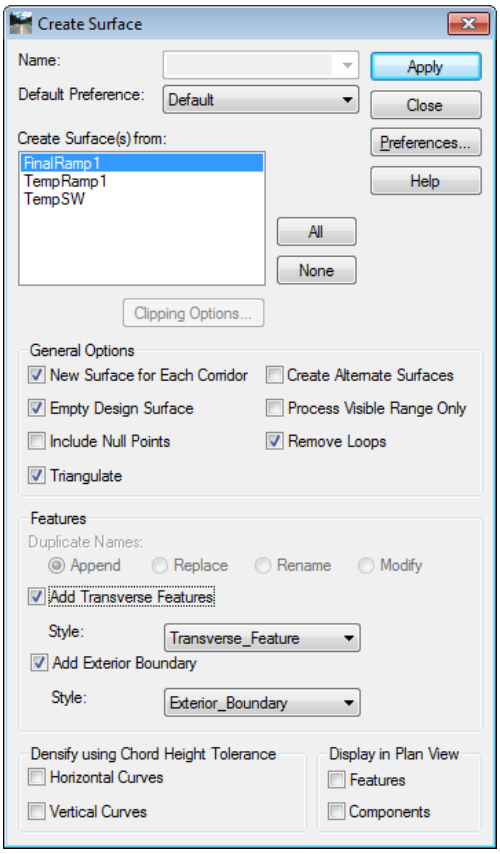
The Final Ramp Surfaces (FinalRamp#)

See Example_ADARamps.dgn, FinalRamp1 model for example. The ramp surfaces are finalized by removing all of those transverse features that we don't need any more. We'll do this by copying the temporary ramp corridor and use just one template drop with an interval that is larger than the length of the ramp. The other modifications are: manually add two features for the ramp flare at the back of curb, and manually edit the exterior boundary at the bottom of the ramp. After the final ramp surfaces are retriangulated, they can be used for annotation and reporting so that you can get the information into the plan details. Work through these steps for each ramp on the corner to produce the final ramp surface that is ready for annotating.

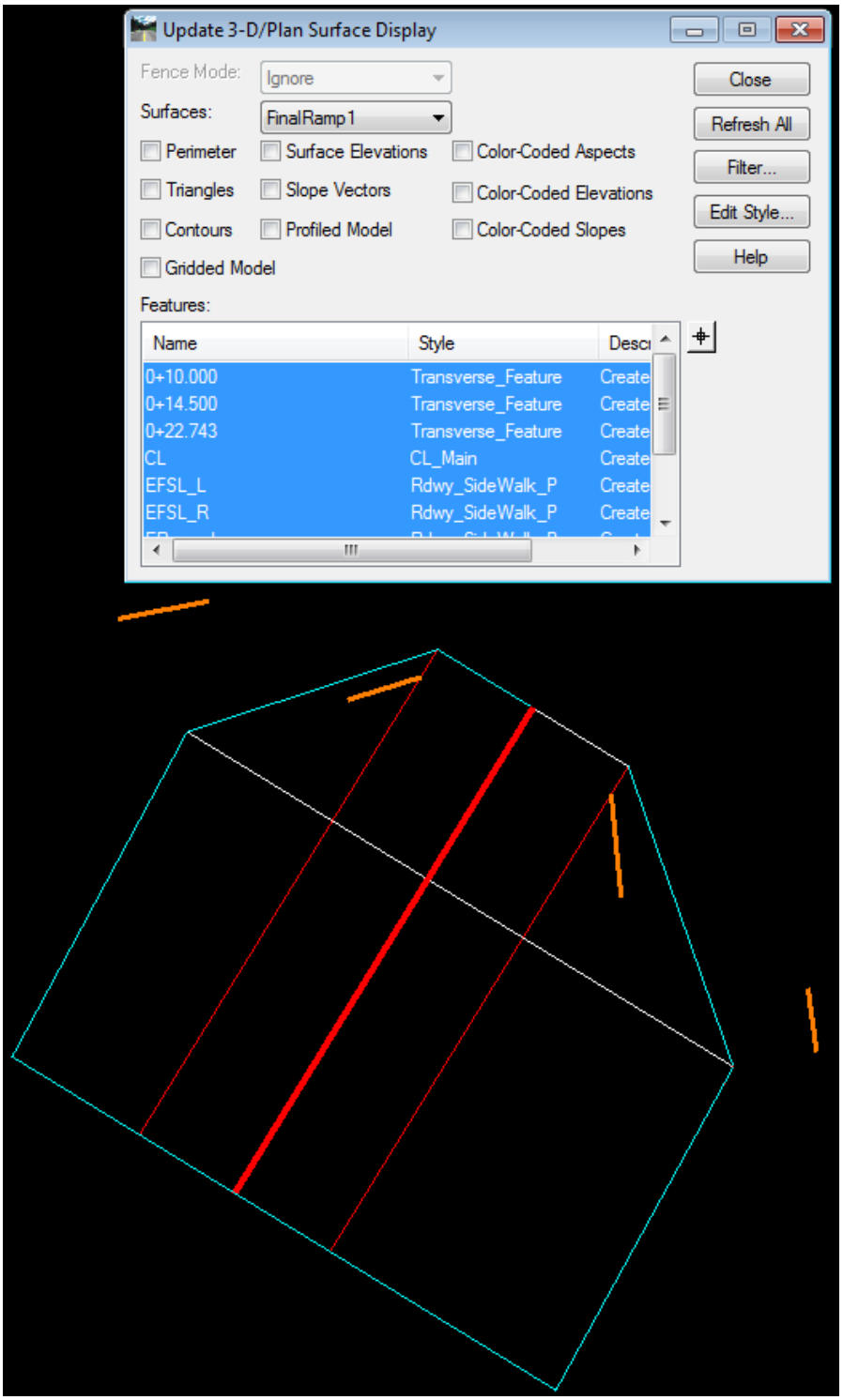
1. Copy the temporary ramp1 corridor and name it FinalRamp1. Modify the template drops such that the result is one template (ADAcombSWramp) drop at the gutter line station with an interval that is larger than the distance to the back of walk.



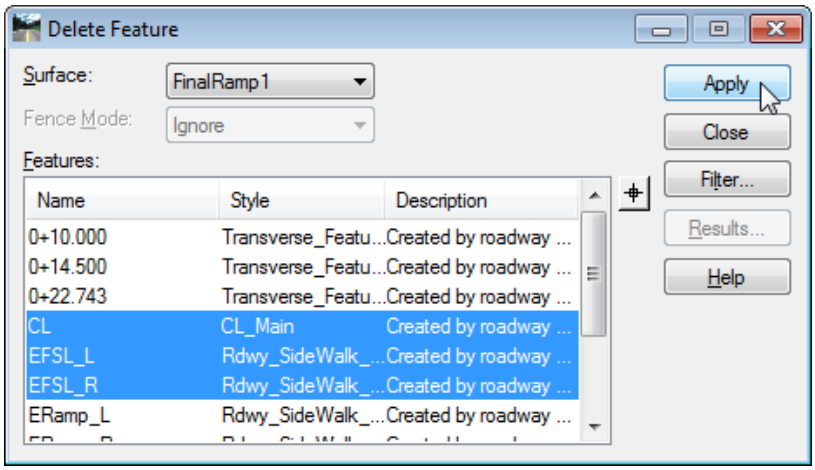
2. The parametric constraints should still contain the slope tapers, which will provide the stations for the transverse features, so the horizontal and vertical cardinal points can be toggled off in the options. Ensure that the Active Surface (target) is still the temporary sidewalk, TempSW, and run **Create Surface** – for the final surface, and ADD transverse features. The idea is to end up with the minimum number of features with the minimum number of vertices to define the ramp.



3. Use **Surface>Update 3-D Plan/Surface Display…** in a 3D model for the final ramp editing. Set the Surface to the final ramp, right-click in the Features window and choose **Select All**. Attach the temporary ramp model as a reference – turn off all levels except the intersection lines (we'll use those for snapping).



4. Use **Surface>Edit Surface>Delete Feature…** and delete the CL feature and the EFSL features.


Delete Feature
Surface:
FinalRamp1
Fence Mode:
Ignore
Features:
Name
Style
Description
0+10.000
Transverse_Featu...
Created by roadway ...
0+14.500
Transverse_Featu...
Created by roadway ...
0+22.743
Transverse_Featu...
Created by roadway ...
CL
CL_Main
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EFSL_L
Rdwy_SideWalk_...
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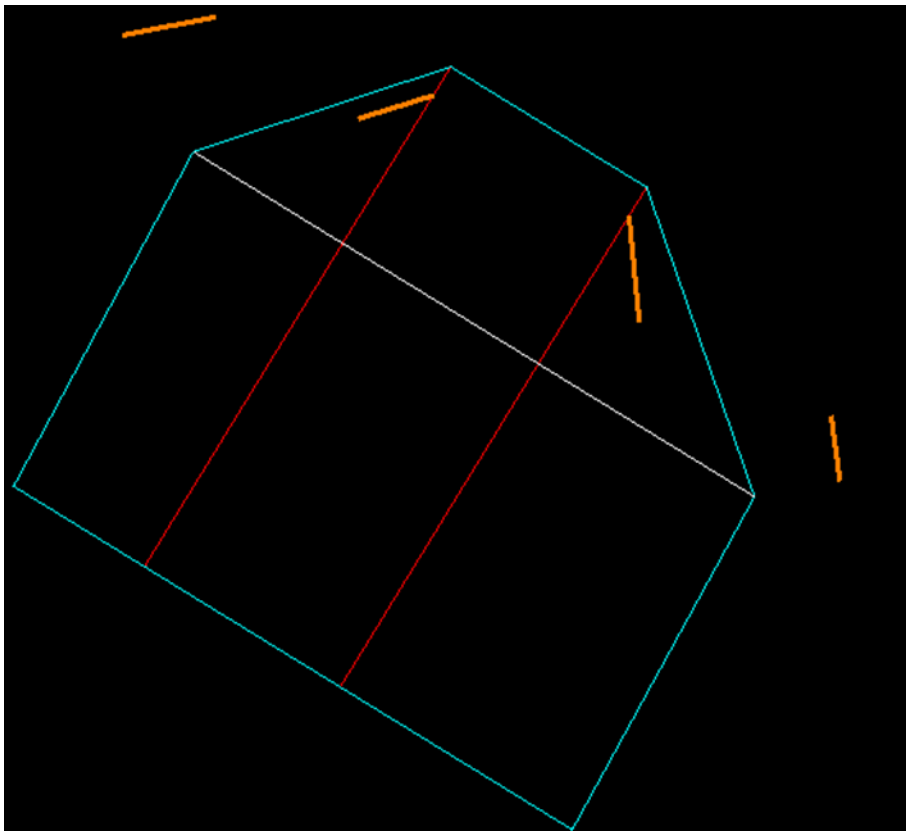
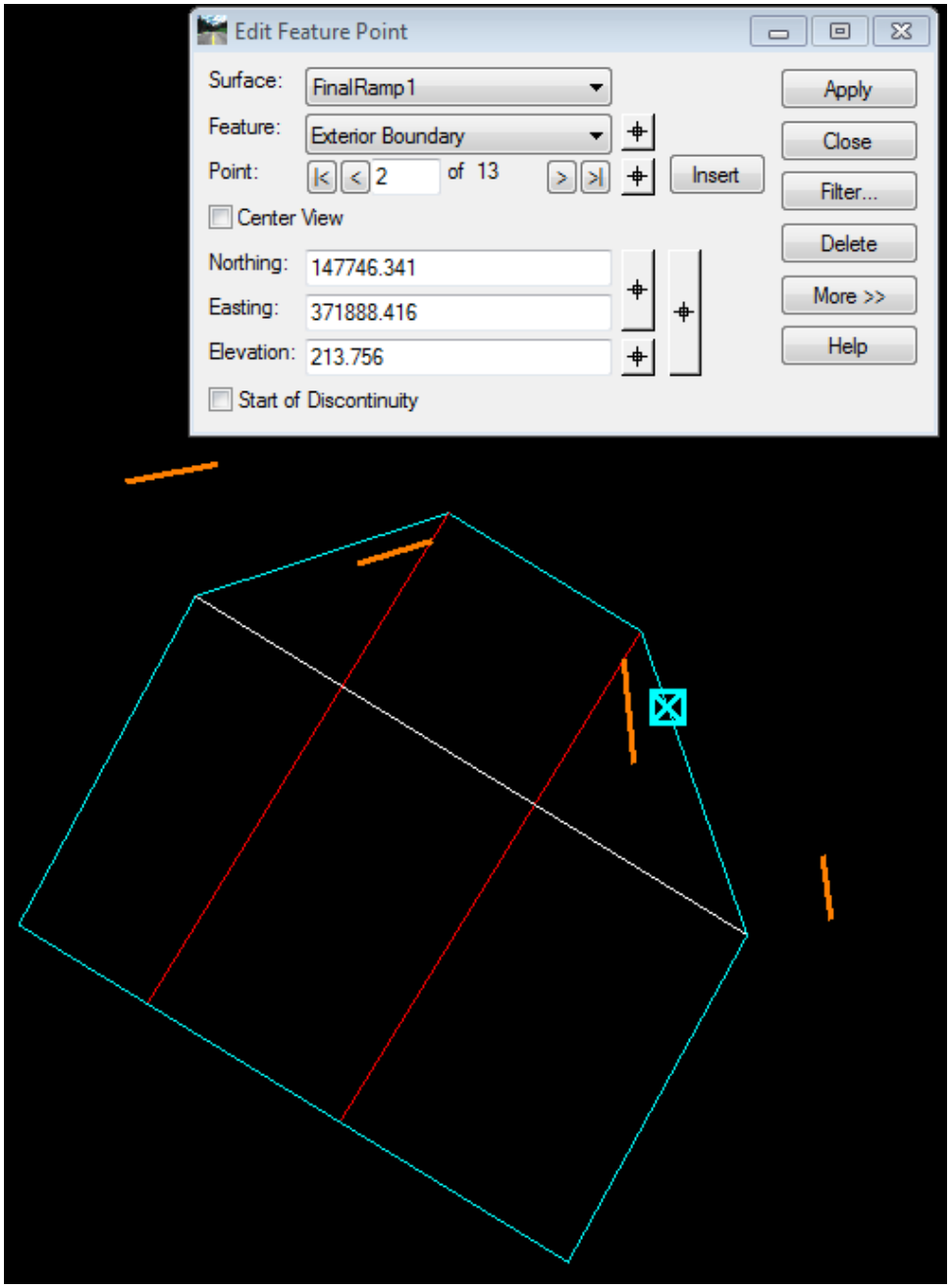
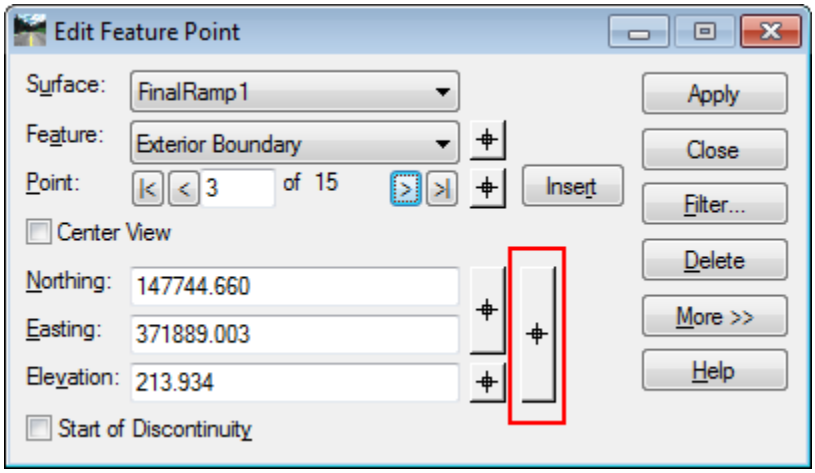
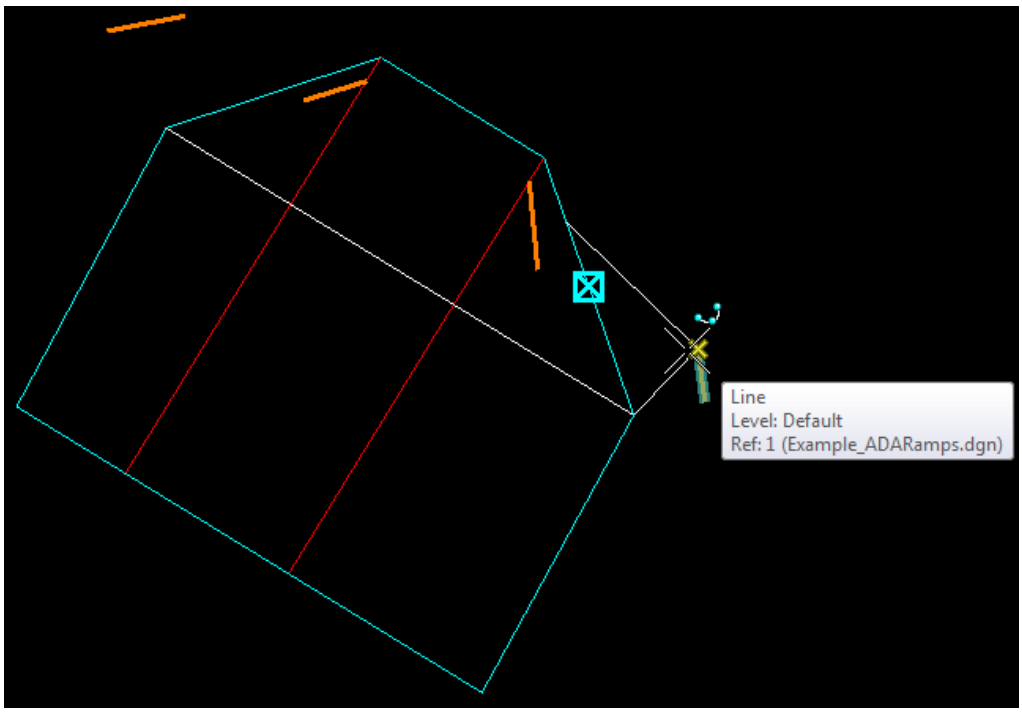


5. Use **Surface>Edit Surface>Edit Feature Point…** to insert two points in the Exterior Boundary feature, on either side of the ramp throat. Modify the location of the inserted points and snap to the orange lines (drawn to the temporary ramp) that intersected near the top back of curb.
    a. Points are inserted midway between the current point and the previous point. After inserting 2 points with current Point position set to 2, there will be four points on the line segment that was originally defined from point 1 to point 2. Advance around to the other side and add two points there. Click [**Apply**] after adding a total of four points.

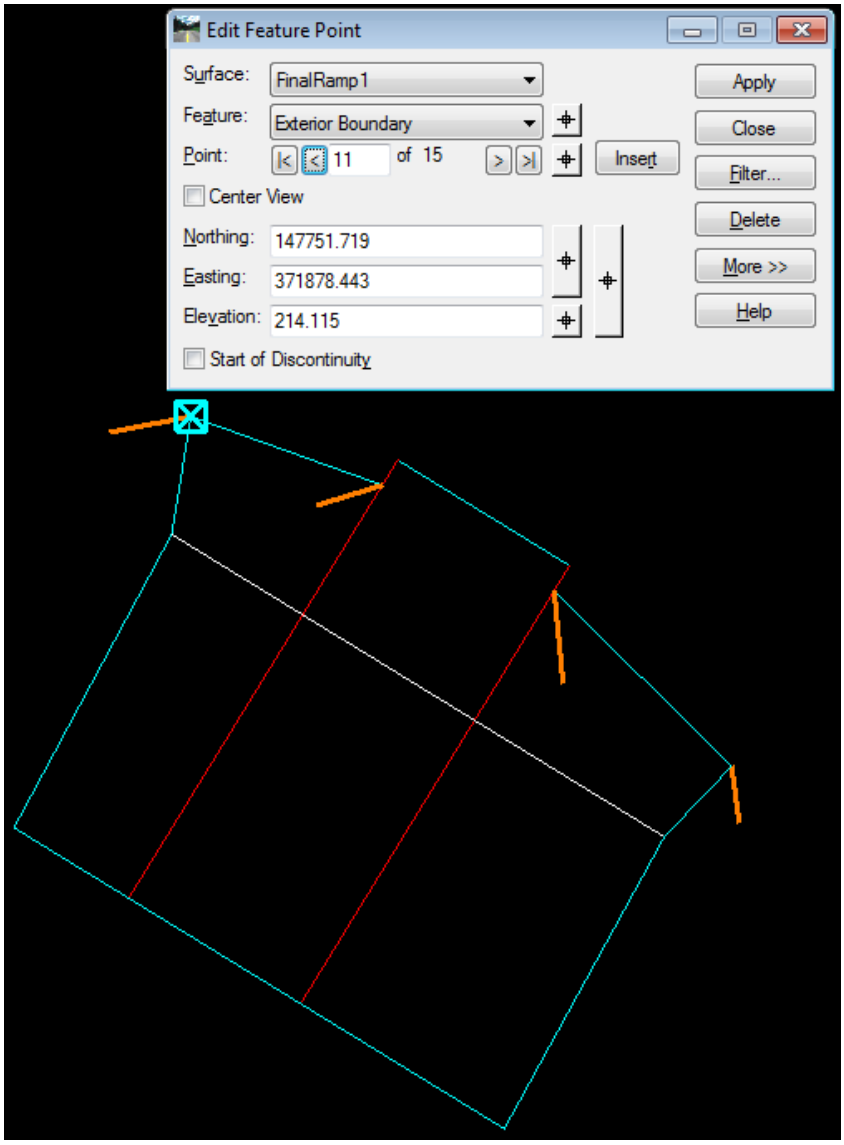


b. Now, use the tallest targeting button on the **Edit Feature Point** dialog to modify the location (N, E, & Elev) of the new points and snap them to the end of the orange lines. ***Important! You will need to use a Tentative Snap or the AccuSnap toggle of <Ctrl>+<Shift>***. Click [**Apply**] after each point is modified.

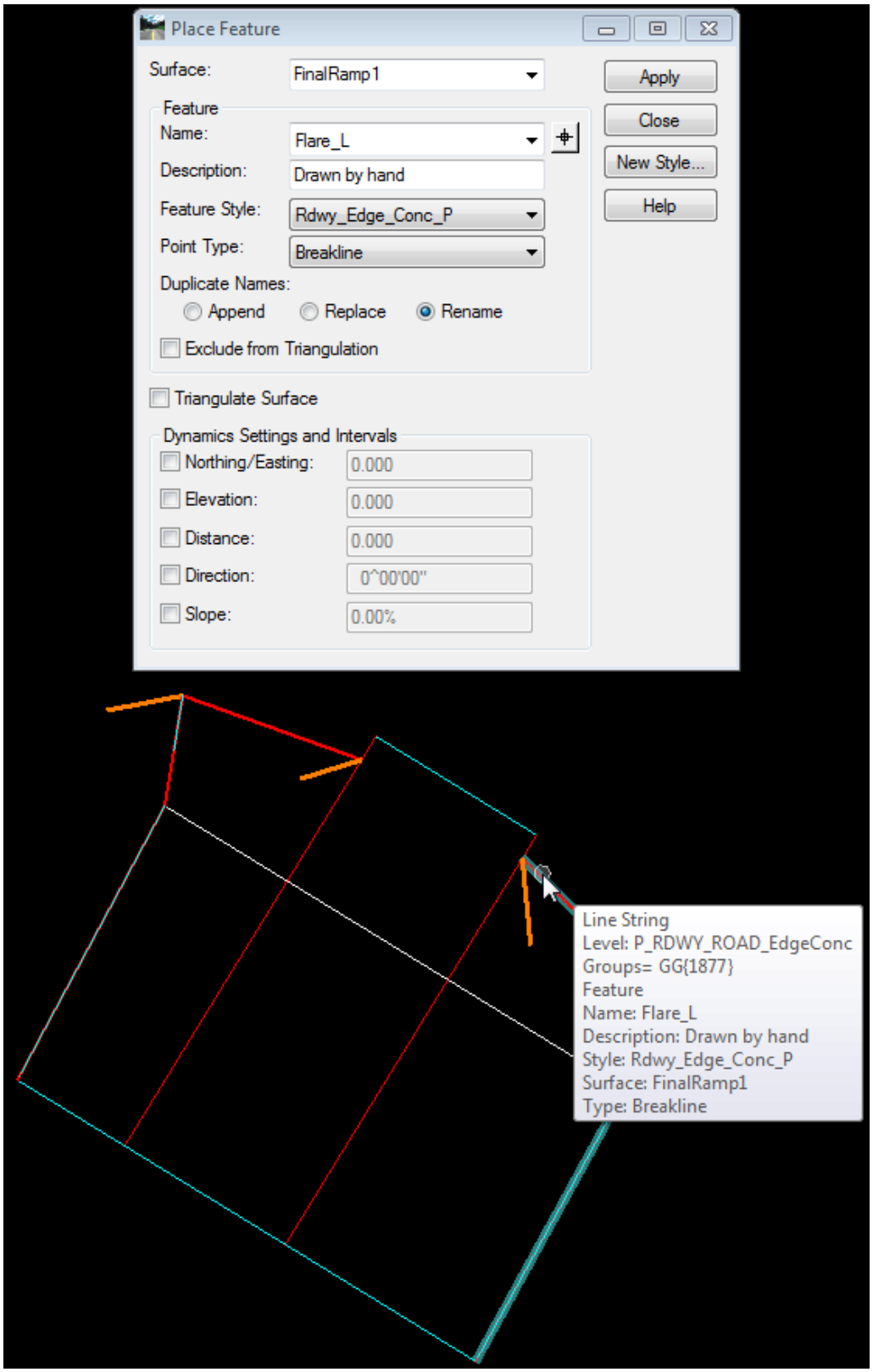




The cyan blue Exterior Boundary line now has vertices at the points on the ramp wings where the wings intersect the top back of curb.



6. Use **Surface>Design Surface>Place Feature…** to place features along the edge of each ramp wing, all the way to the back of the walk, for feature annotation and reporting. Use a feature style like, Rdwy_Edge_Conc_P and a description that indicates that the feature was manually placed.



7. **Triangulate** the final surface and save it.

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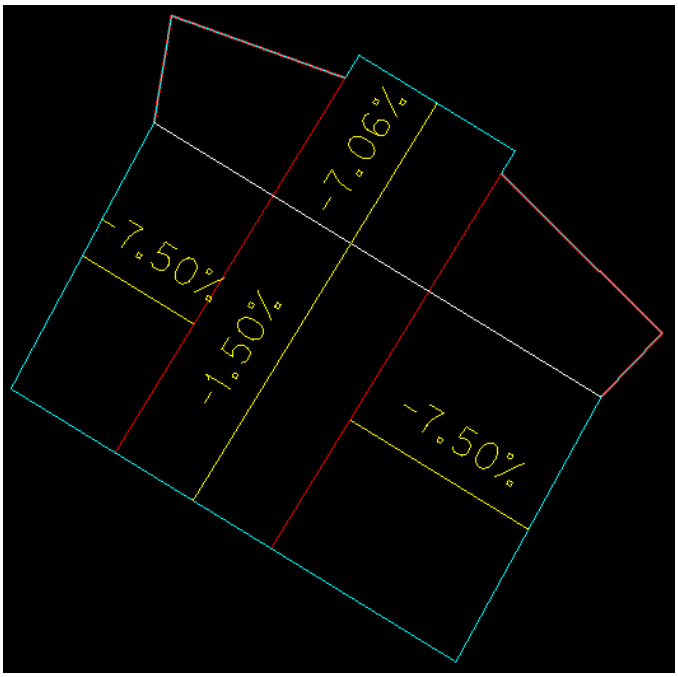
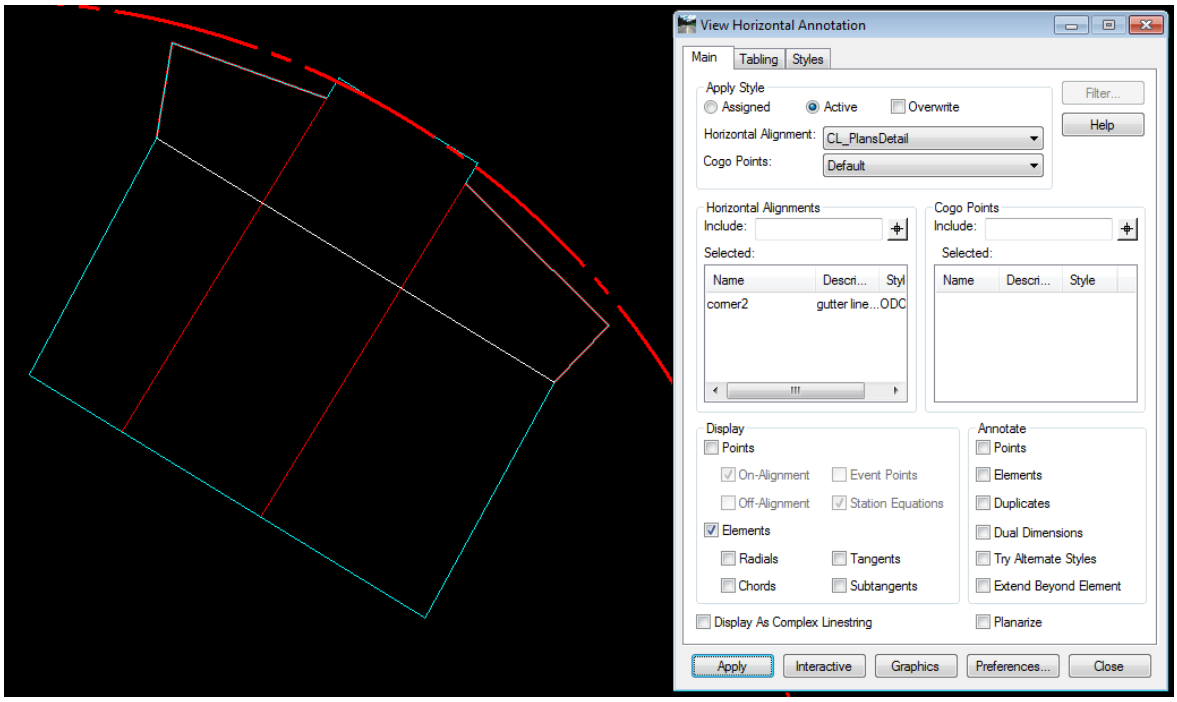
Annotating the Final Ramp Features

All of the information you need for verifying that your ramp meets design requirements and the information needed to show on contract plans is stored in InRoads data. So, use horizontal annotation and feature annotation to display that information. The Civil Report Browser can display the information in tabular reports that can be edited prior to using Axiom Office Importer to place the table into the design file.

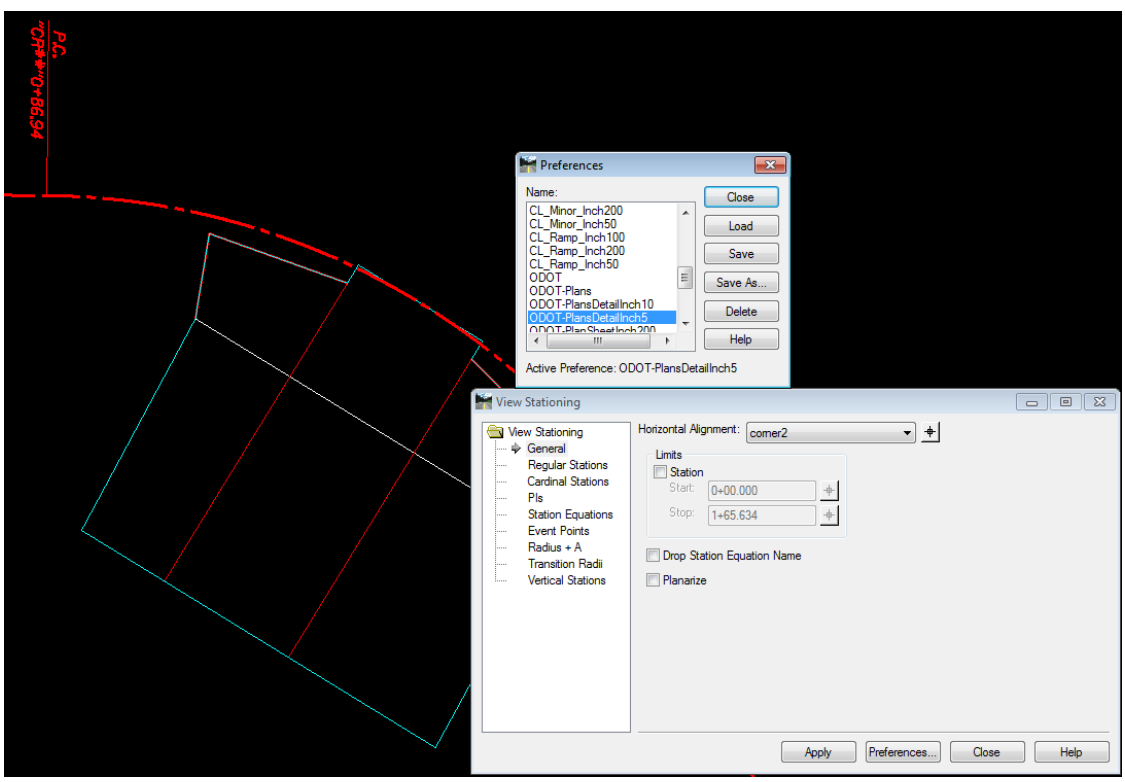
1. Create a new **2D model** with Annotation Scale set to 1”=5’ for annotating and verifying the design.
2. Use **Surface>Update 3-D Plan Surface Display…** to display the design features.
3. Verify that the slopes meet design requirements. Use **Surface>View Surface>Two Point Slope…** to display a slope line and slope value between midpoints on line segments. Use the AccuSnap toggle <Ctrl>+<Shift> to select the midpoints.



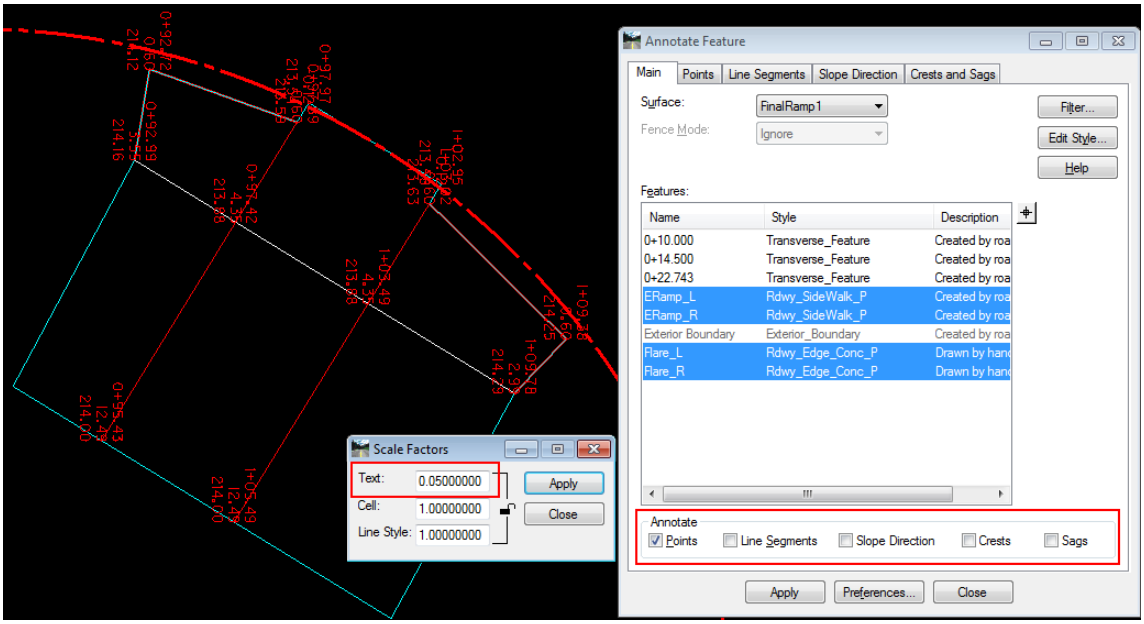
4. To annotate for plans, use **Geometry>View Geometry>Horizontal Annotation**… with the **ODOT-PlansDetail** preference and include the corner gutter line alignment.



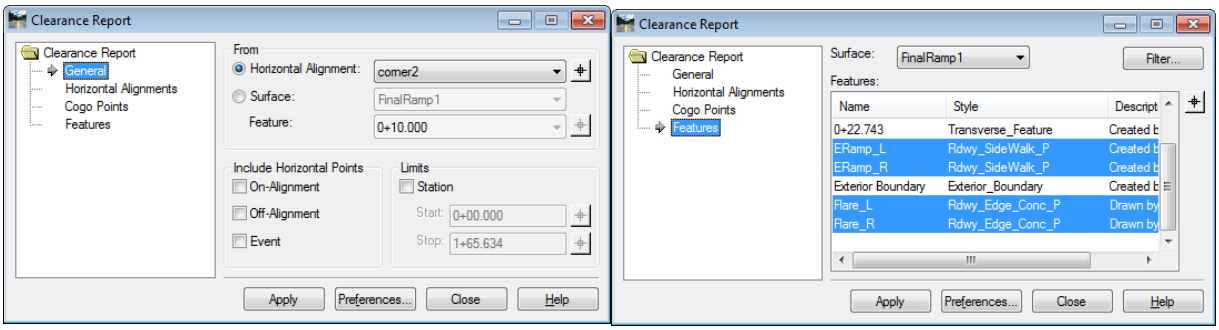
5. Use **Geometry>View Geometry>Stationing…** with the **ODOT-PlansDetailInch5** <u>preference</u> with the corner gutter line alignment active. The curve number may be entered in the Cardinal Point prefix prior to stationing. **Add Annotation** [+A], so that text is scaled up for 1”=5’ size.



6. Station, offset, and elevation may be displayed directly on the vertices of the features for a visual check. The **ODOT** preference for the **Annotate Feature** command is set up for 1”=100’ scale. Open **Tools>Global Scale Factors…** and set the ***Text*** scale factor to 0.05; click [**Apply**]. With the gutter line alignment as the active alignment, use **Surface>View Surface>Annotate Feature…** with “Line Segments” unchecked, to annotate all vertices with station, offset, and elevation.



7. Reset the **Global Scale Factor** for ***Text*** to 1.0 and click [**Apply**], the [**Close**] the dialog.
8. Generate a clearance report on all of the longitudinal features using **Tools>XML Reports>Clearance…**. Set the horizontal alignment to the gutter line alignment and select the **Features**. Then click [**Apply**] to open the **Report Browser**.



9. On the **Report Browser**, select a style sheet from the Clearance folder. ***Clearance.xsl*** is a formatted report that saves directly to Excel. ***FeatureStationElevationOffset.xsl*** is an unformatted text report that may be opened with Excel and converted.

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