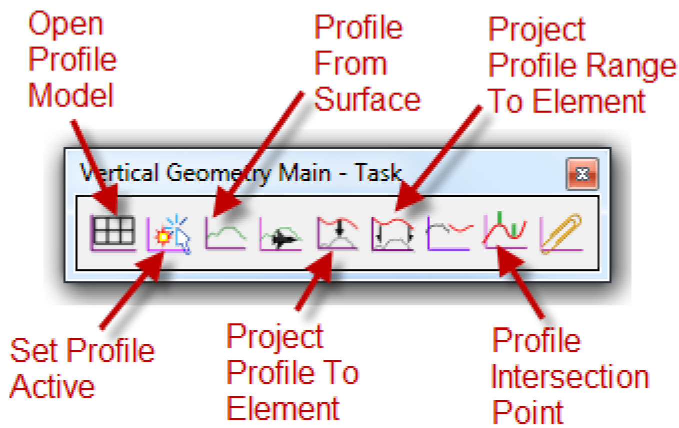
Contents

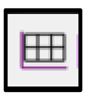
1. Vertical Geometry Commands 3
  A. Vertical Geometry Main 3
    i. Open Profile Model 3
    ii. Set Profile Active 4
    iii. Profile From Surface 5
    iv. Project Profile To Element 5
    v. Project Profile Range To Element 6
    vi. Profile Intersection Point 6
  Exercise 1: Draping Utilities For Cross Sections 7
  B. Vertical Geometry Line 12
    i. Profile Line Between Points 12
    ii. Profile Line To/From Element 12
    iii. Profile Line Between Elements 13
  Exercise 2: Offset Bridge Profile 14
  C. Vertical Geometry Curves 20
    i. Profile Curve Between Points 20
    ii. Profile Curve To/From Element 21
    iii. Profile Curve Between Elements 21
  D. Vertical Geometry Complex 23
    i. Profile Complex By Element 23
    ii. Profile Complex By VPI 24
    iii. Profile Insert Curve 24
    iv. Append Profile Element 25
    v. Profile Offset Transition 25
  Exercise 3: Creating a Complex Vertical Alignment 26
  E. Define Element Profiles 33
    i. Quick Profile Transition 33
    ii. Profile By Constant Elevation 33
    iii. Profile By Slope From Element 34
    iv. Profile By Variable Slope From Element 35
    v. Profile By Vertical Offset From Element 36

Exercise 4: Approach Radii (Quick Profile Transitions) 37
Exercise 5: Offset Profiles 50
2. Vertical Geometry Reports 56

1. Vertical Geometry Commands

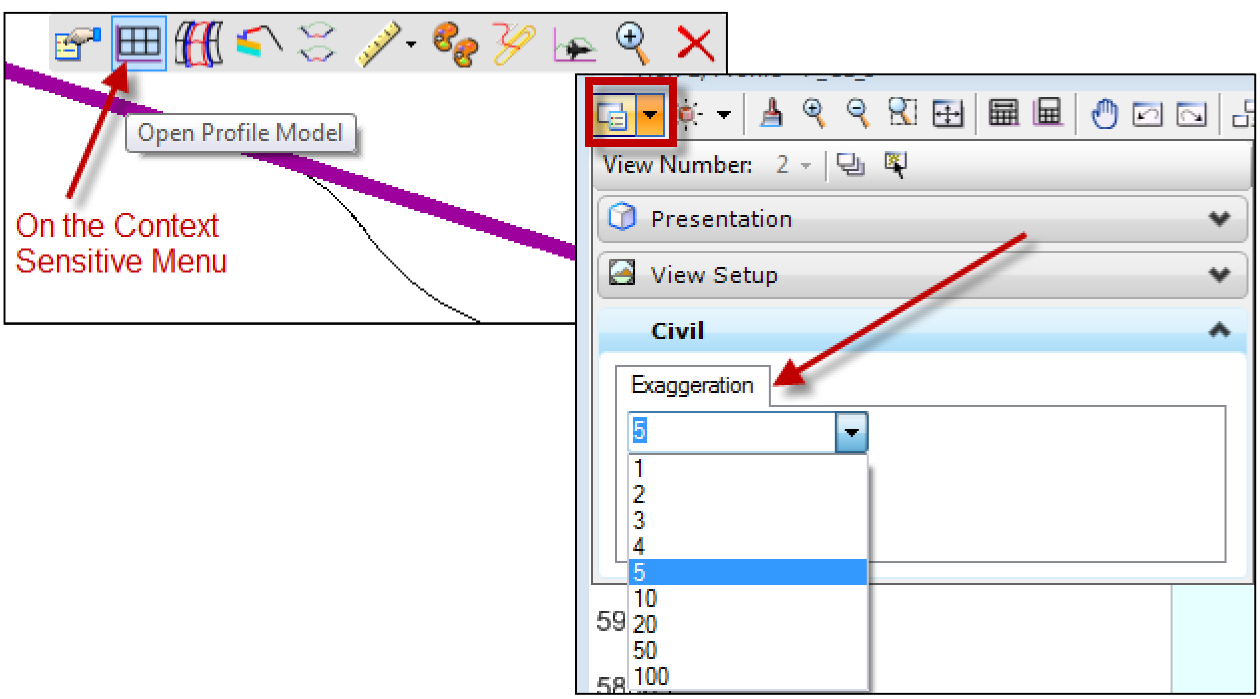
A. Vertical Geometry Main

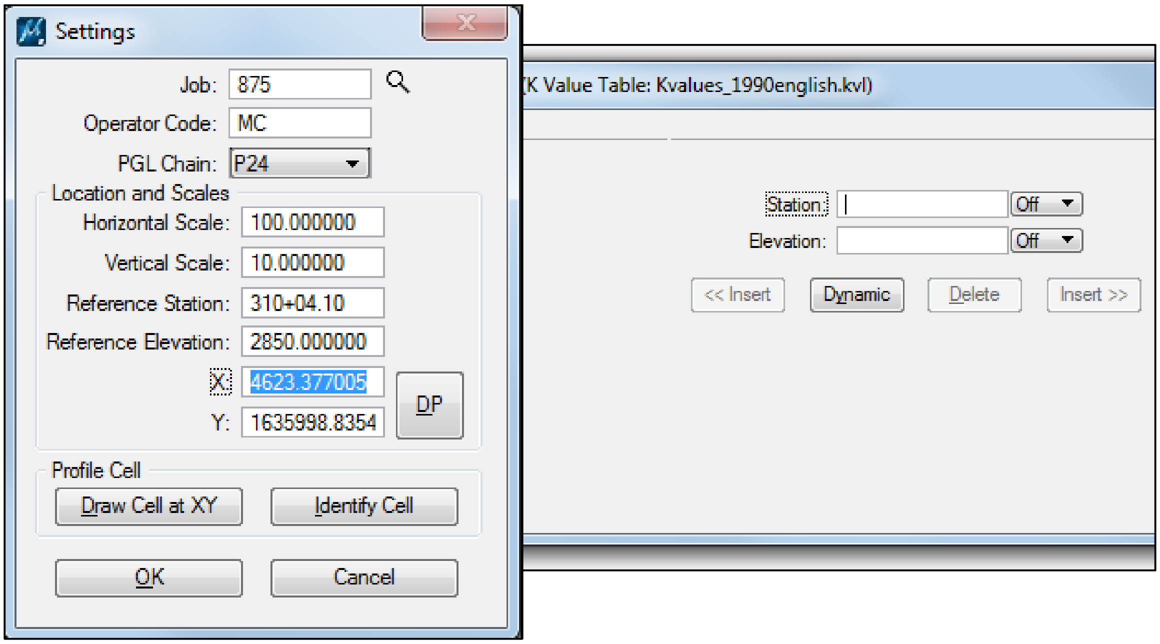




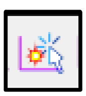
i. Open Profile Model

- Opens a dynamic view of the selected element in profile.
- Enables the use of the Vertical Geometry Tools on the selected feature
- Vertical exaggeration can be set
- In order to see the existing ground, the existing ground terrain model must be set active



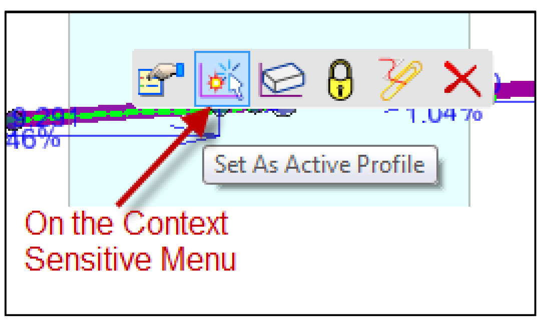


Criteria Profile Generator



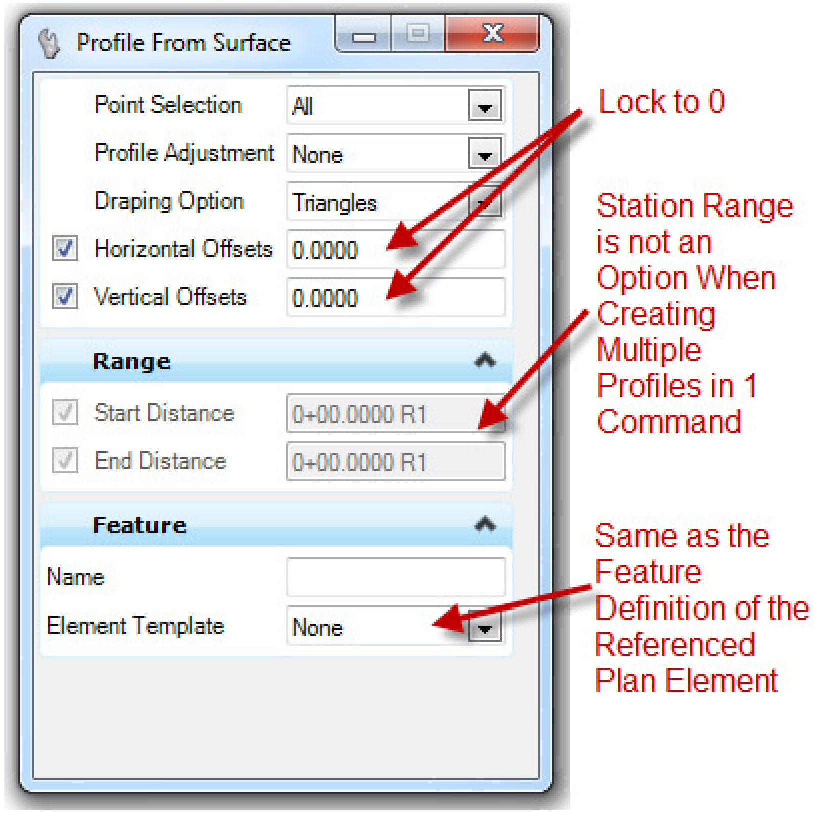
ii. <u>Set Profile Active</u>

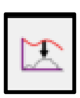
- Designates which profile element is used in the creation of the 3D element



iii. <u>Profile From Surface</u>

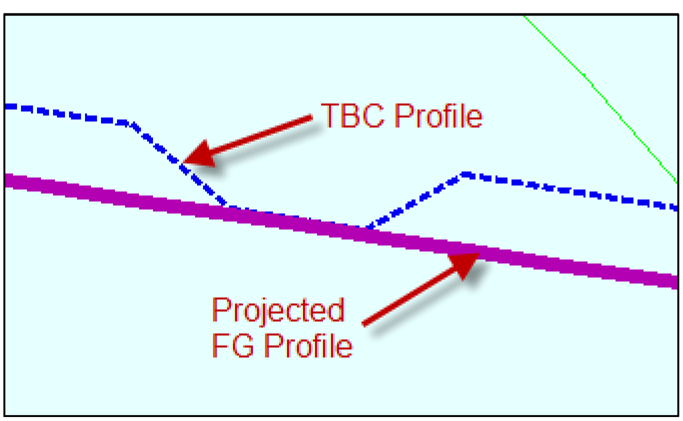
- Generates a profile by draping the horizontal alignment onto a surface (terrain model, mesh, or mesh solid)
- Can be used on multiple elements at a time

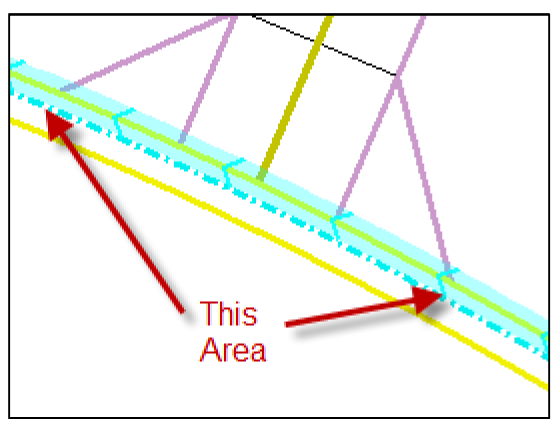


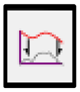


iv. <u>Project Profile To Element</u>

- Shows an element's profile in the Profile View of another element

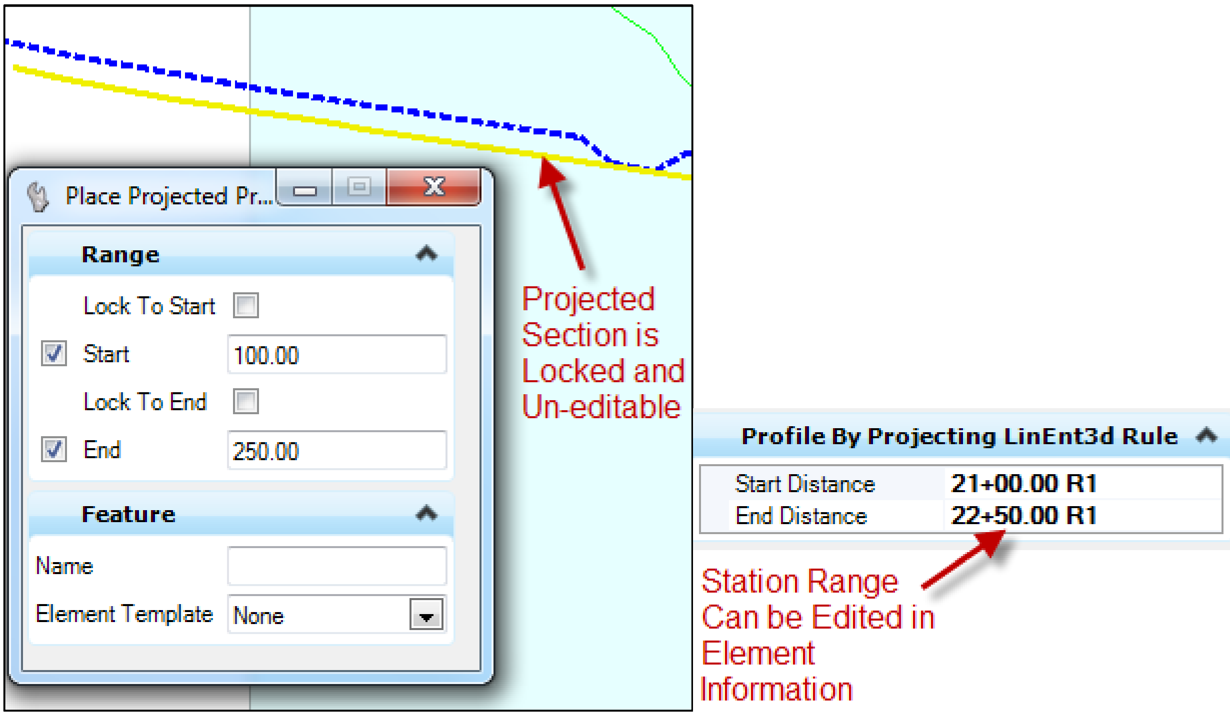


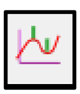




v. Project Profile Range To Element

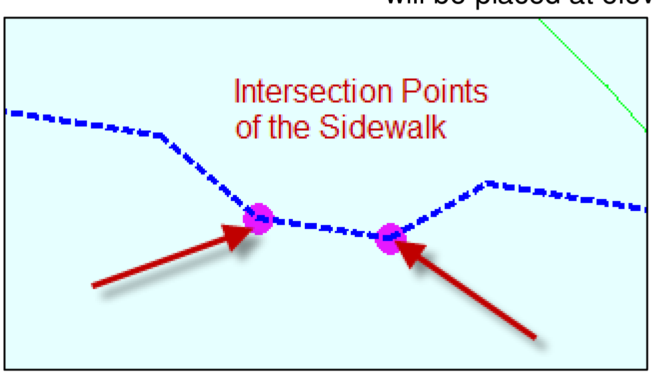
- Shows part of an element's profile in the Profile View of another element





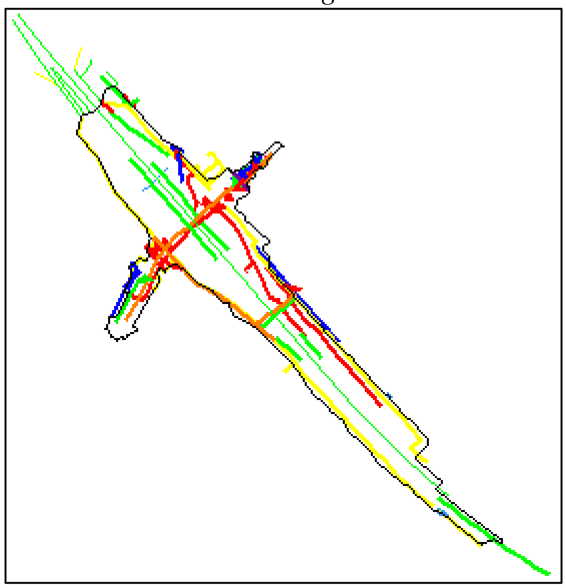
vi. Profile Intersection Point

- Constructs a graphic point in an element's profile view at the station and elevation of a crossing element
- If the crossing element does not have an active profile, the point will be placed at elevation 0

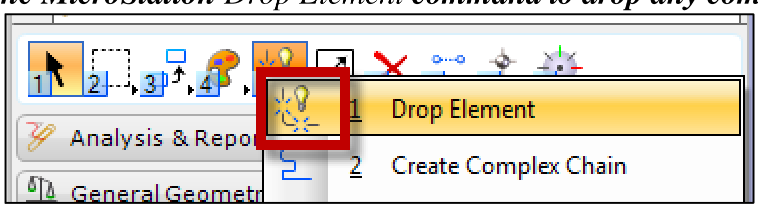


Exercise 1: Draping Utilities For Cross Section Annotation

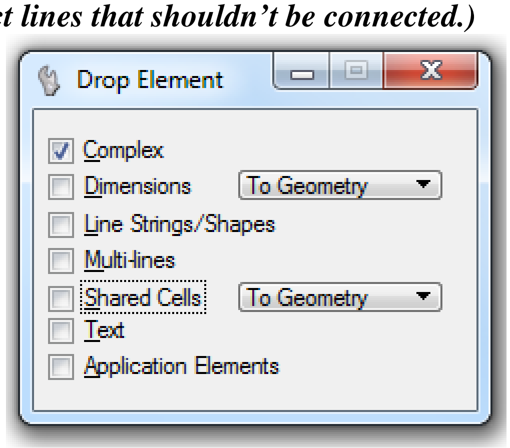
1. ***Start OpenRoads using the Enhanced Workspace***
2. ***Open file** 4855001RDEFF001.dgn*



3. ***Select all elements***
4. ***Select the MicroStation** Drop Element **command to drop any complex chains.***

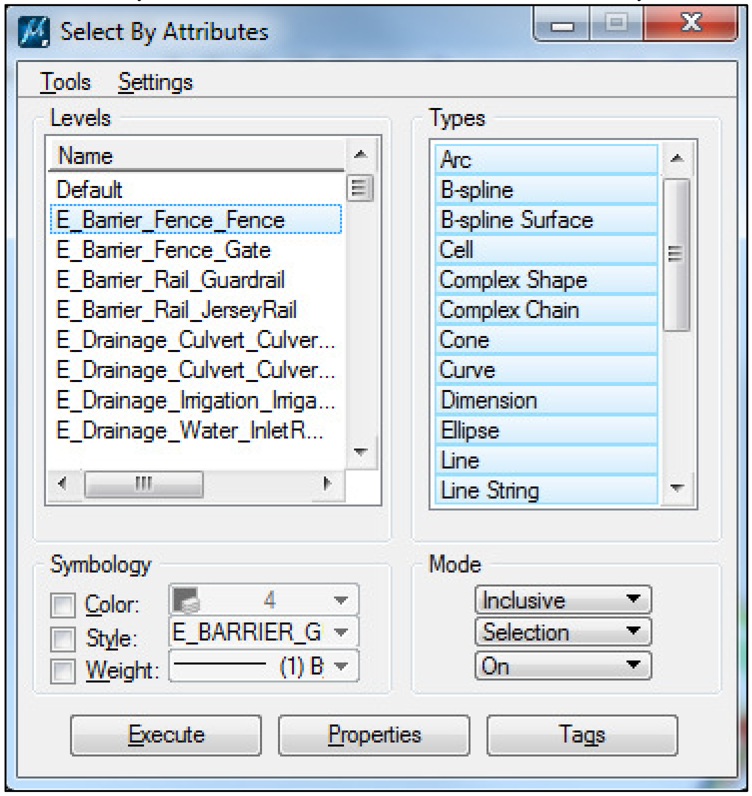


5. ***Check the** Complex **box. (When complex survey chains are featurized, they connect lines that shouldn't be connected.)***

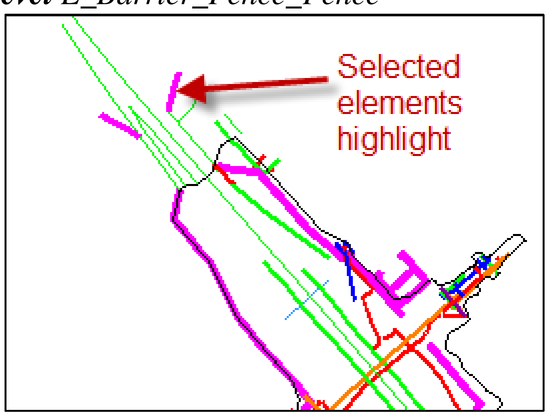


6. ***Data point to accept***

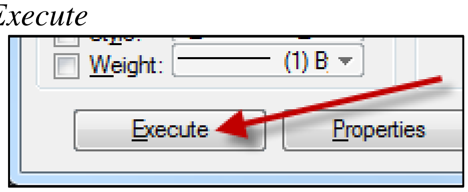
7. ***Open the*** *Select By Attributes* ***command:*** *Edit > Select By Attributes*



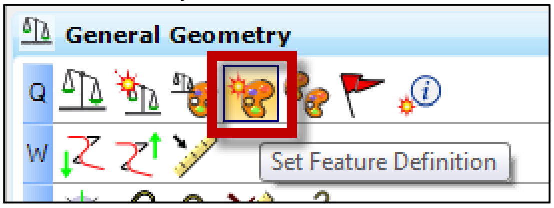
8. ***Select level*** *E_Barrier_Fence_Fence*



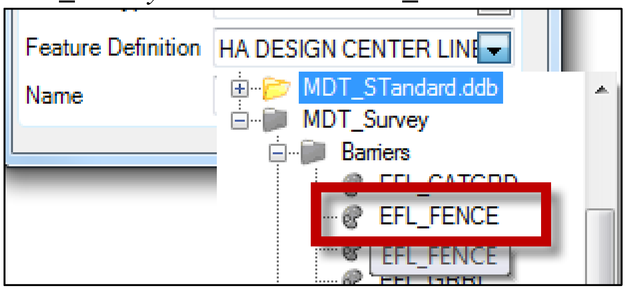
9. ***Click*** *Execute*



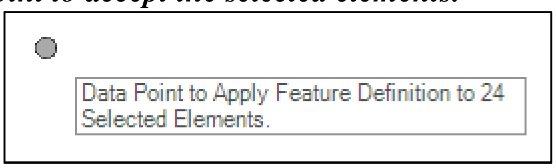
10. Select *Set Feature Definition*



11. Select *MDT_Survey > Barriers > EFL_Fence*



12. Data point to accept the selected elements.

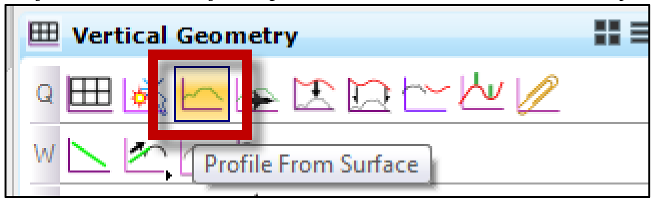


13. Repeat for the remaining levels using the following feature definitions:

LEVEL	FEATURE DEFINITION
E_Barrier_Fence_Gate	EFL_GATE
E_Barrier_Rail_Guardrail	EFL_GRRL
E_Barrier_Rail_JerseyRail	EFL_JRRL
E_Drainage_Culvert_CulvertInvert	EFL_CULVI
E_Utility_Communication_CableTVOverhead	EFL_TVX
E_Utility_Communication_FiberOpticCableUnderground	EFL_FIBERU
E_Utility_Communication_TelephoneOverhead	EFL_TELX
E_Utility_Communication_TelephoneUnderground	EFL_TELU
E_Utility_Drainage_SanitarySewer	EFL_SANSEW
E_Utility_Drainage_StormDrain	EFL_STRMDR
E_Gas_GasUndeground	EFL_GAS
E_Utility_Power_PowerOverhead	EFL_PWRX
E_Utility_Power_PowerUnderground	EFL_PWRU
E_Utility_Water_WaterUnderground	EFL_WATER

14. Using the *Element Selection* ***dialog, select all levels in the file***

15. ***Select*** *Profile From Surface* ***from the Vertical Geometry tools***



16. ***Data point to accept the 128 objects***

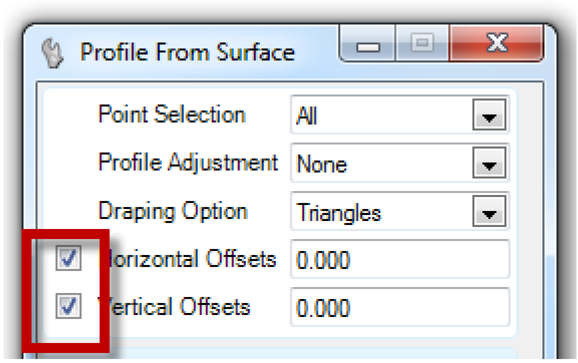
17. ***Select terrain 4855001RDDTME01***

18. ***Set Point Selection to*** *All*

19. ***Leave Profile Adjustment set to*** *None*

20. ***Set Draping Option to*** *Triangles*

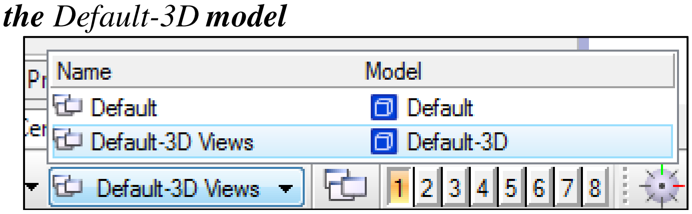
21. ***Lock Horizontal and Vertical Offsets to*** *0*



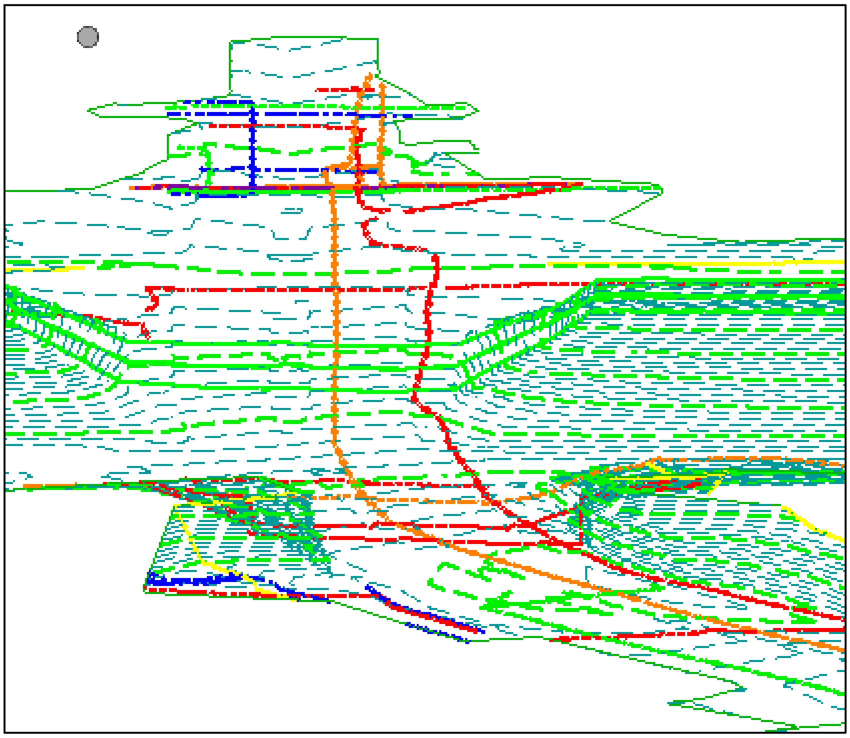
22. ***Element Template will default to*** *None* ***and*** *Name* ***will be blank***

23. ***Data point through the prompts. Once the Vertical Offset value is accepted, the profiles will be created***

24. ***Open the*** *Default-3D* ***model***

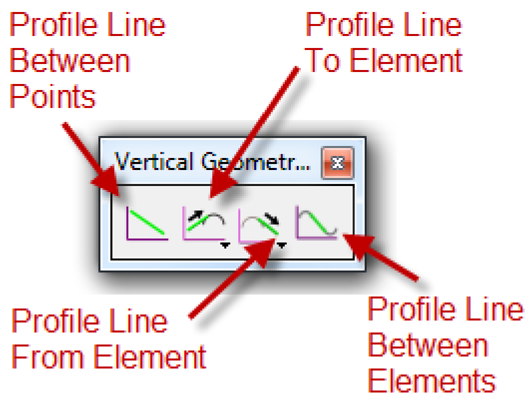


25. Profiles were created anywhere the linestrings were within the terrain boundaries.

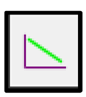


These featurized, 3D linestrings will create cross section annotation cells automatically when OpenRoads cross sections are run.

B. Vertical Geometry Line



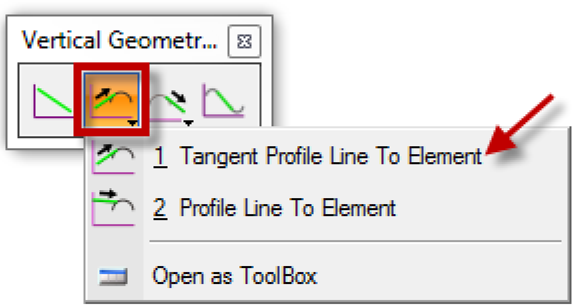
* Vertical Geometry Line tools are similar to the Horizontal Geometry Line tools and fundamentally work the same.

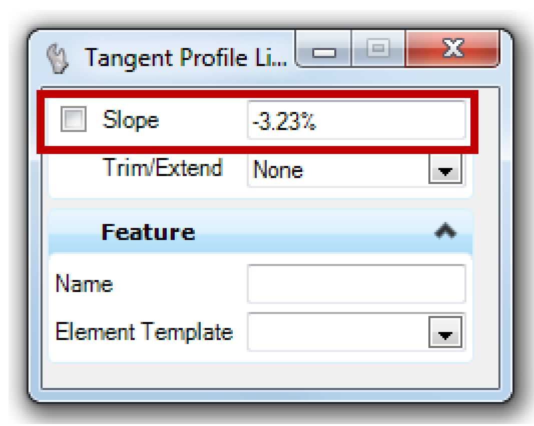


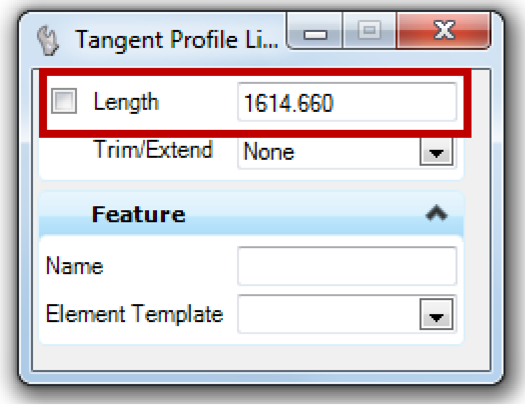
i. Profile Line Between Points

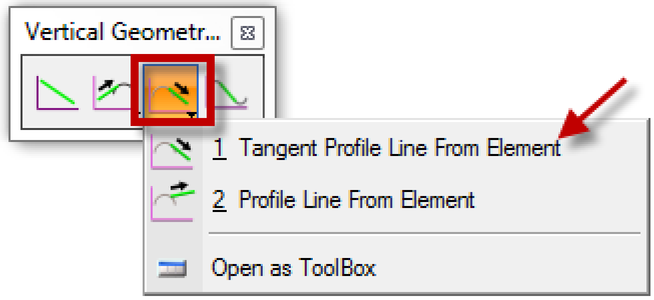
Constructs a line between user-defined points

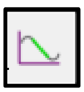
ii. Profile Line To/From Element





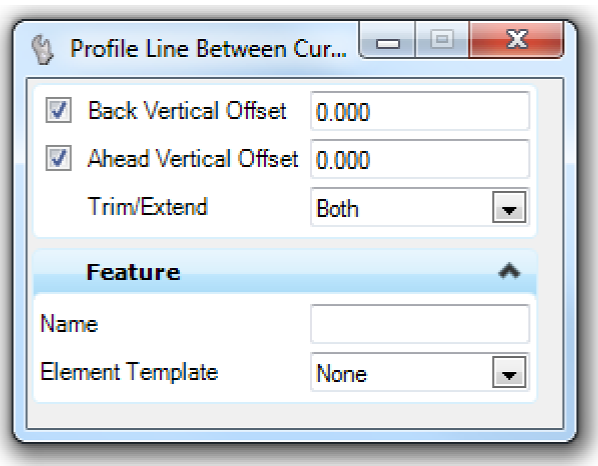






iii. <u>Profile Line Between Elements</u>

Constructs a line between two previously created <u>curves</u>

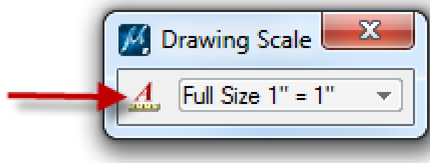


<u>Exercise 2: Offset Bridge Profile</u>

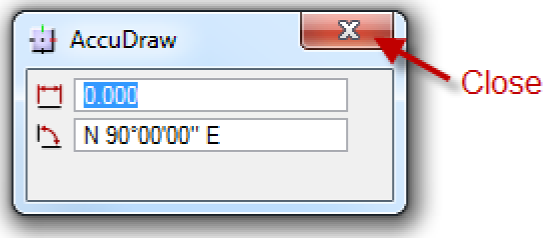
1. ***Start OpenRoads using the Enhanced Workspace***

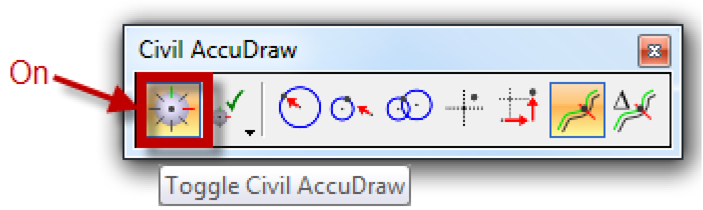
2. ***Open file*** *8875000RDALN001.dgn*

3. ***Turn off*** *Drawing Scale* ***(Annotation + Modeling = Bad)***

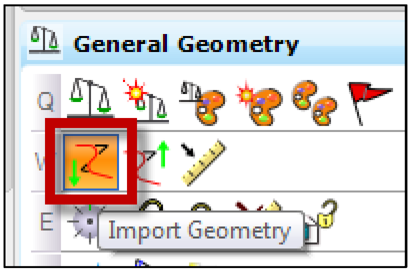


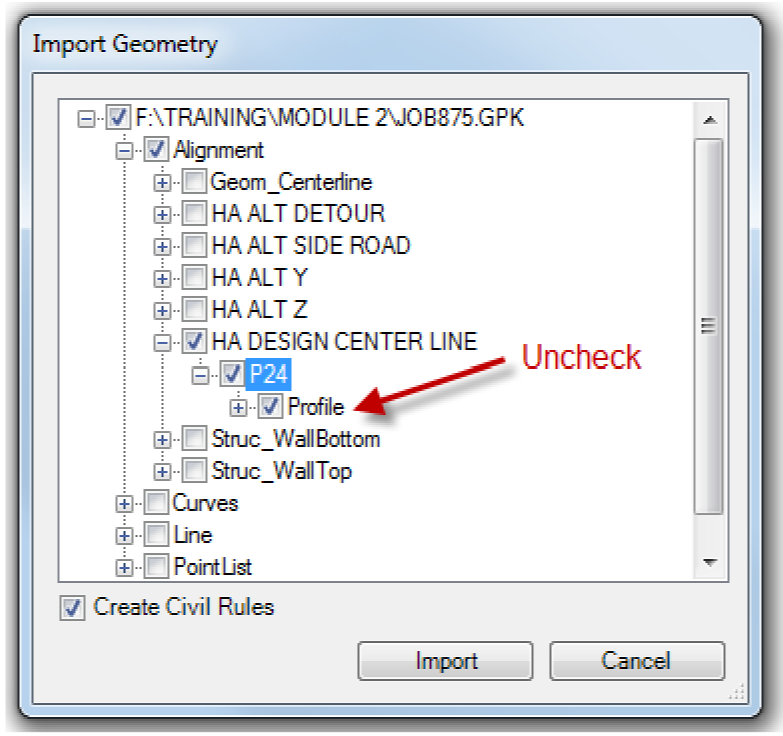
4. ***Turn off <u>MicroStation</u> AccuDraw & Toggle on <u>Civil</u> AccuDraw (MicroStation AccuDraw + Civil AccuDraw = Bad)***



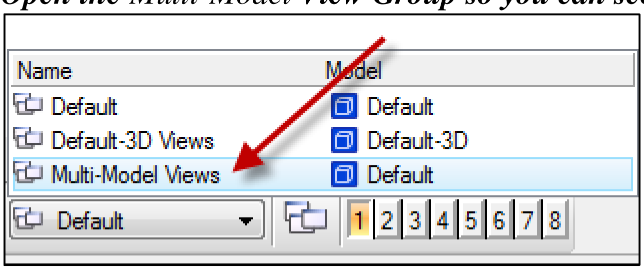


5. ***Import Alignment** P24 **from** JOB875.GPK **without the profile***

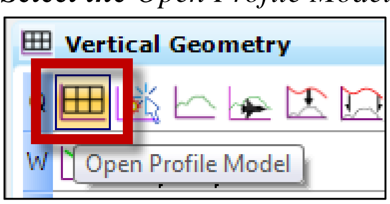




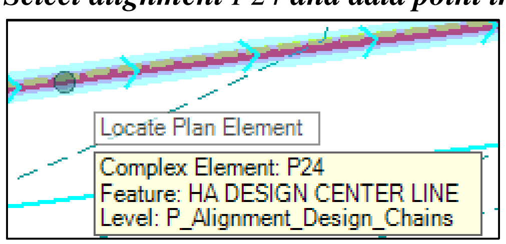
6. ***Open the** Multi-Model **View Group so you can see plan and profile side-by-side***



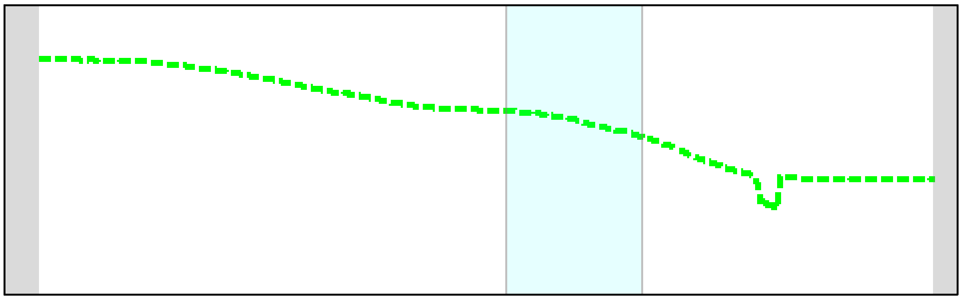
7. ***Select the** Open Profile Model **command***



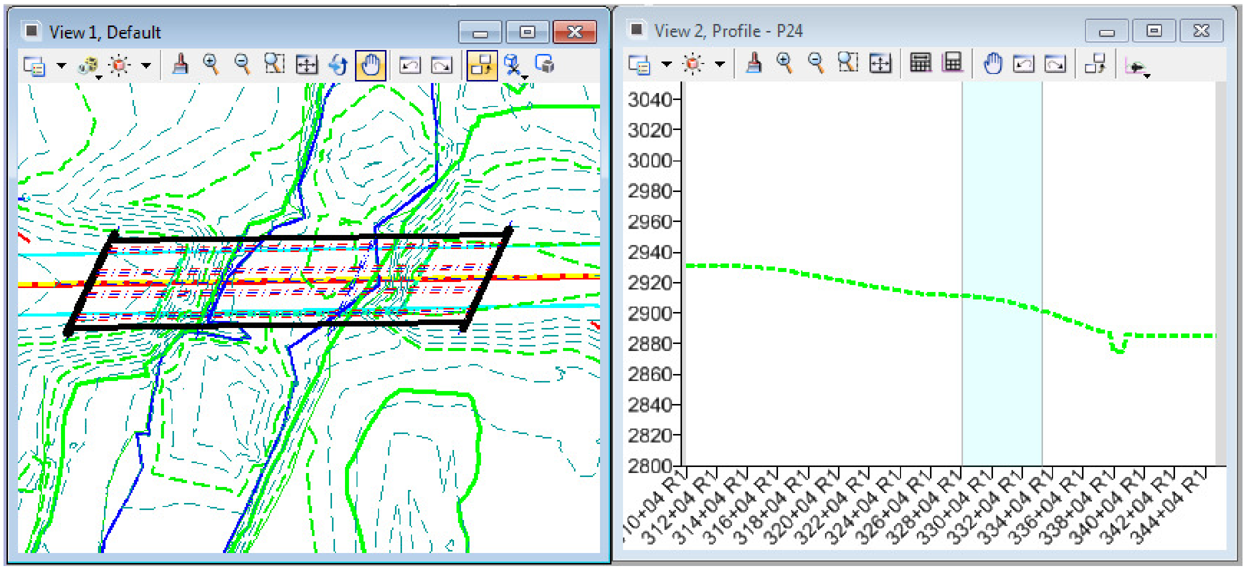
8. ***Select alignment** P24 **and data point in View 2***



9. Set terrain model** 8875000DIDTM001 **active to see the existing ground profile

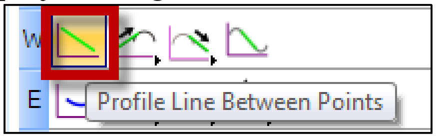


**Terrain model can be set active even though it is in reference file 8875000RDETR001.dgn*

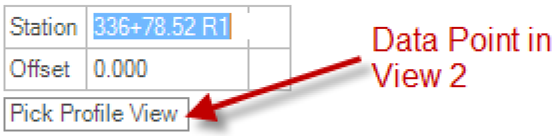


The new bridge needs to be at minimum of 1.5' higher than the existing bridge, with a downgrade between 1.0 - 2.0%.

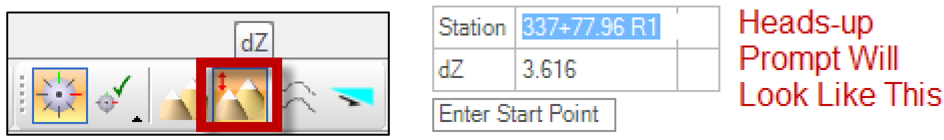
10. Select the** Profile Line Between Points **command to create the proposed bridge profile using Civil AccuDraw



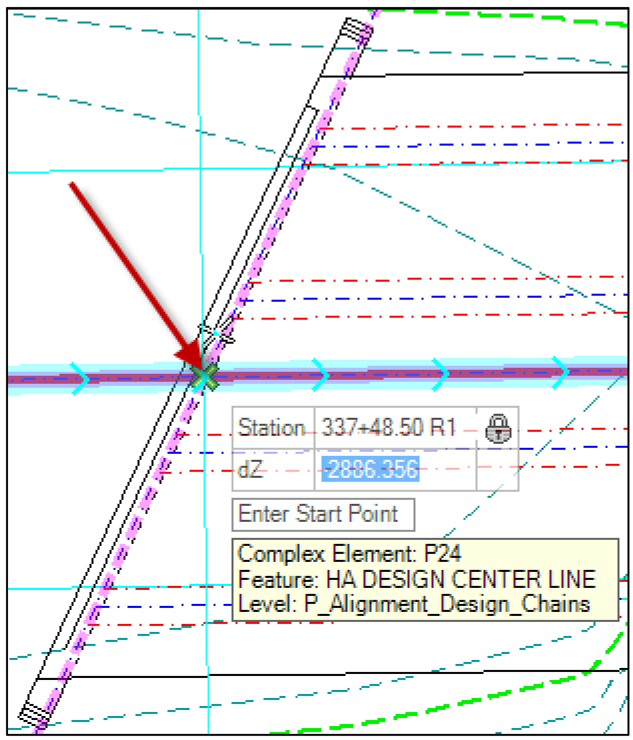
11. Activate View 2



*12. **Select*** *dZ (change in elevation)* ***from the Civil AccuDraw Toolbar***

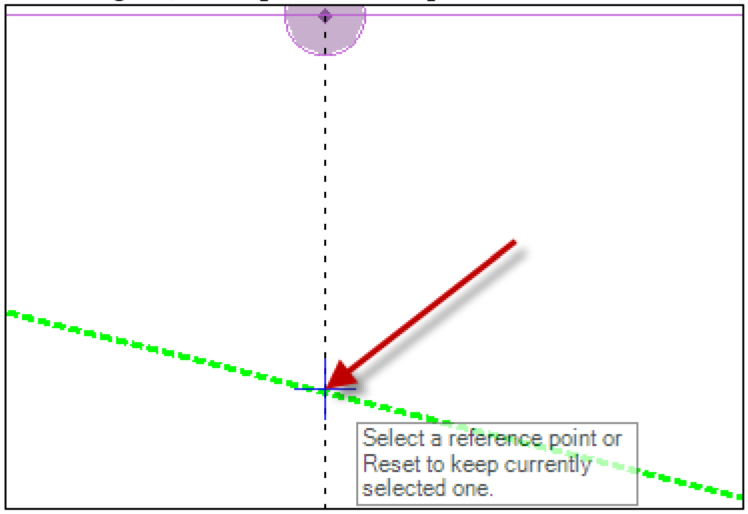


13. In the plan view, hover the mouse over the alignment intersection with the left centerline of bearing. Type *<Enter>* ***to lock*** *337+48.50* ***in the Station input. Do <u>not</u> data point.***



14. Turn off snaps (This will avoid the nuisance of having the profile line creating snaps where the user doesn't want them.)

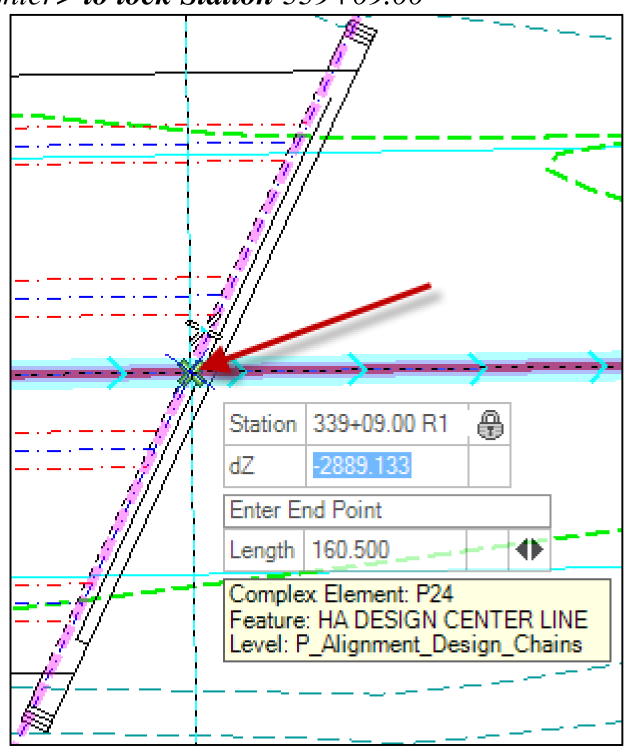
15. In the profile view type ‘o’. (dZ input box must be active.) Then place crosshairs at the intersection with existing ground. (Snaps don’t work, but you can get close by zooming in.) Data point to accept.



16. Type 1.5 in the dZ input and hit <Enter> to lock the value. Data point.

17. Turn snaps back on.

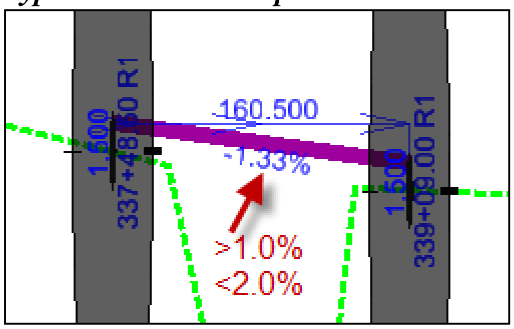
18. In plan view, hover the mouse over the right centerline of bearing intersection. Hit <Enter> to lock Station 339+09.00



19. ***Turn off snaps.*** *(Again, this will avoid the nuisance of having the profile line creating snaps where the user doesn't want them.)*

20. ***In the profile view type*** *'O'*. ***(****dZ* ***input box must be active.) Then place crosshairs at the intersection with existing ground. (Snaps do not work, but you can get close by zooming in.) Data point to accept.***

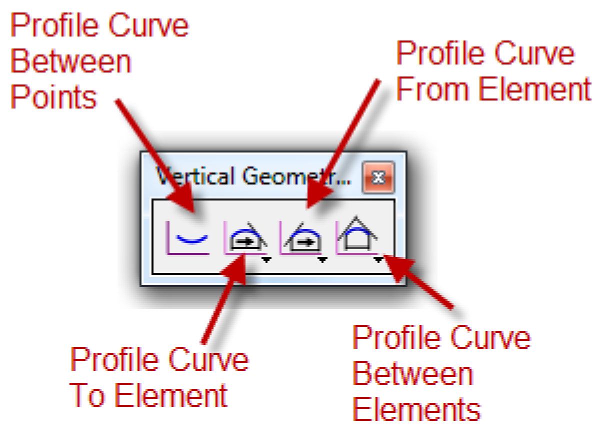
21. ***Type*** *1.5* ***in the dZ input and hit*** *<Enter>* ***to lock the value. Data point.***



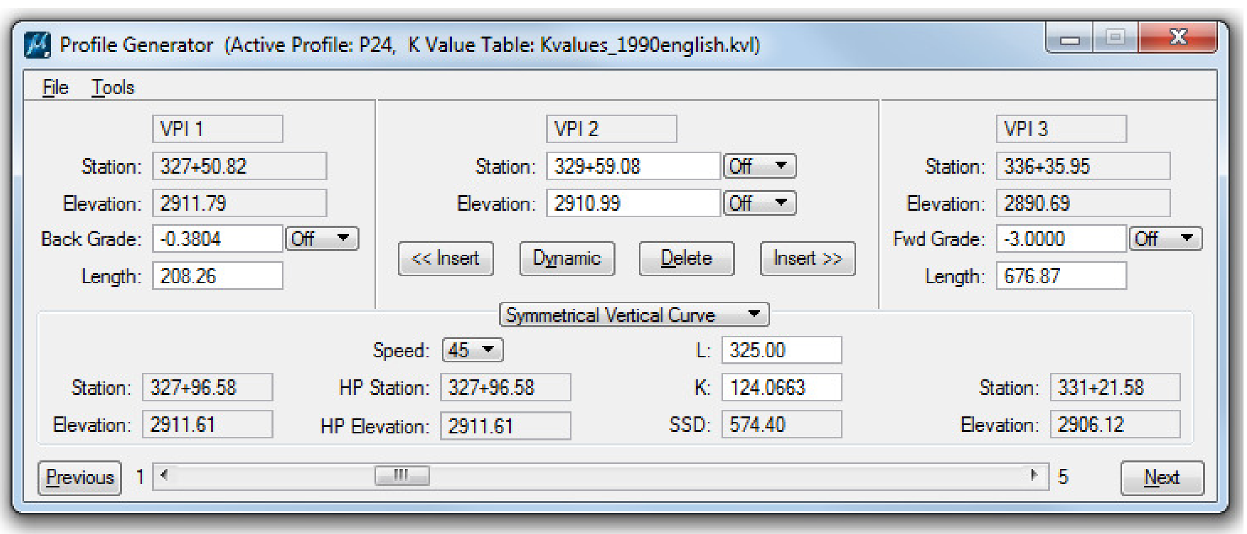
If the line moves: rules are removed.

22. ***Close the file***

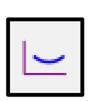
C. Vertical Geometry Curves



* Vertical Geometry Curve tools are similar to the Horizontal Geometry Curve tools and fundamentally work the same.



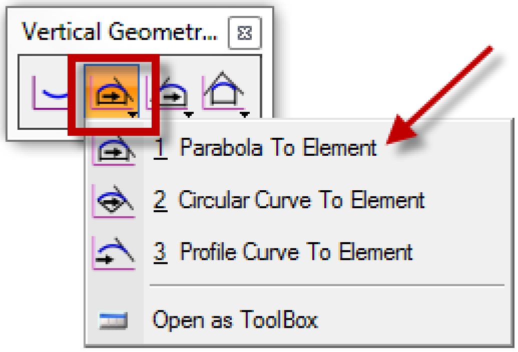
Criteria Vertical Curve Design

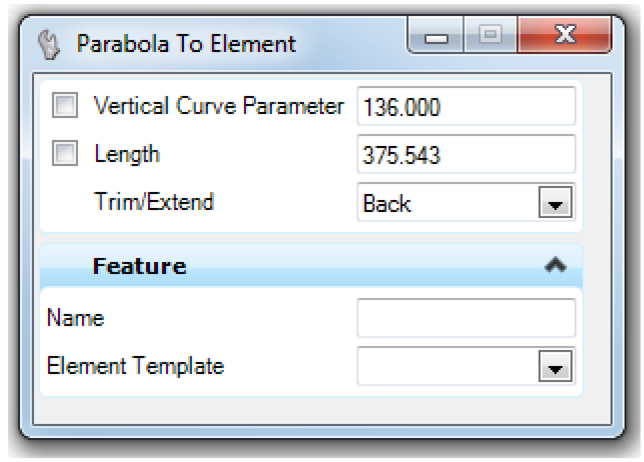


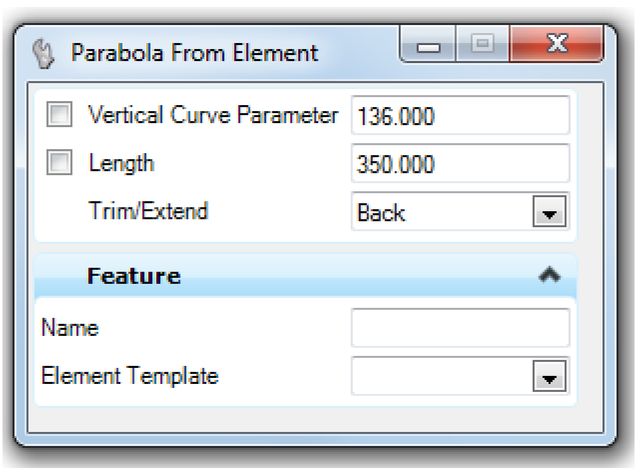
i. Profile Curve Between Points

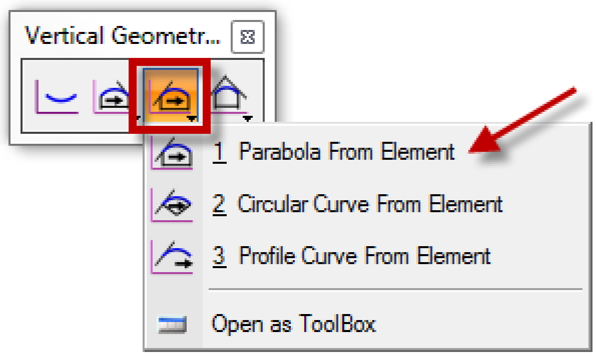
Constructs a curve between user-defined points

ii. Profile Curve To/From Element



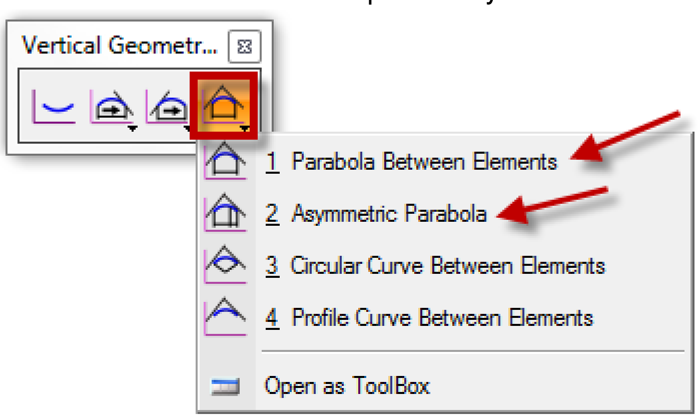


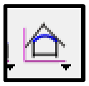




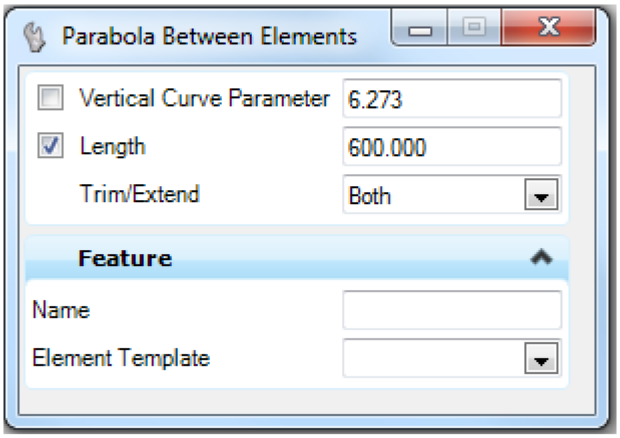
iii. Profile Curve Between Elements

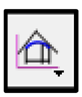
Constructs a curve between two previously created elements



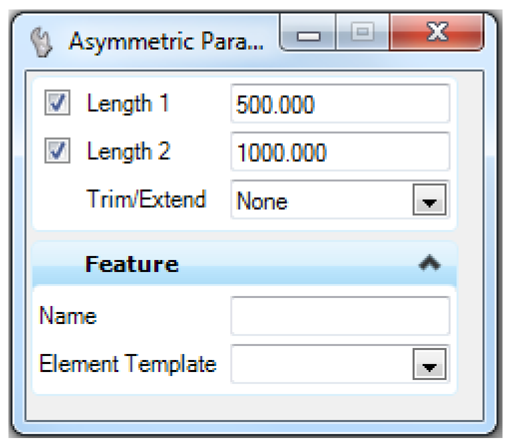


1. **Parabola Between Elements** – Constructs a parabola between two elements

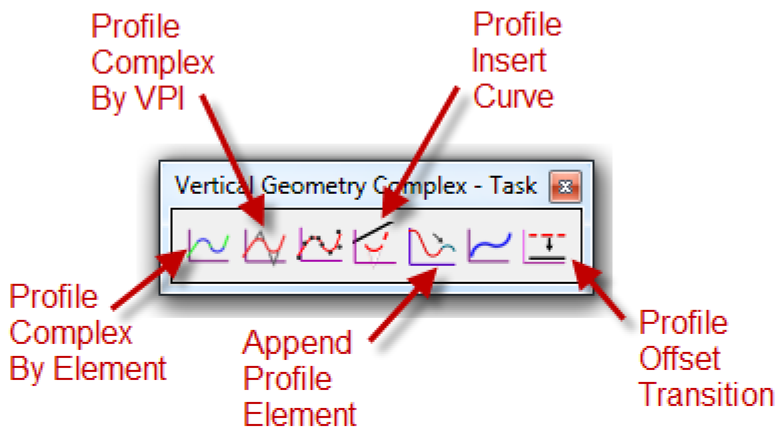


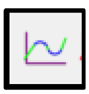


2. **Asymmetric Parabola** – Constructs an asymmetric parabola between two elements



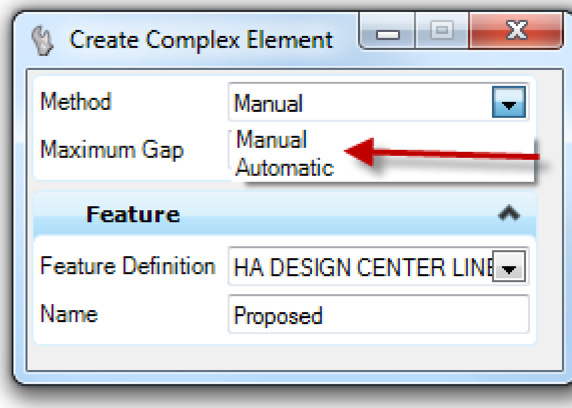
D. Vertical Geometry Complex





i. Profile Complex By Element

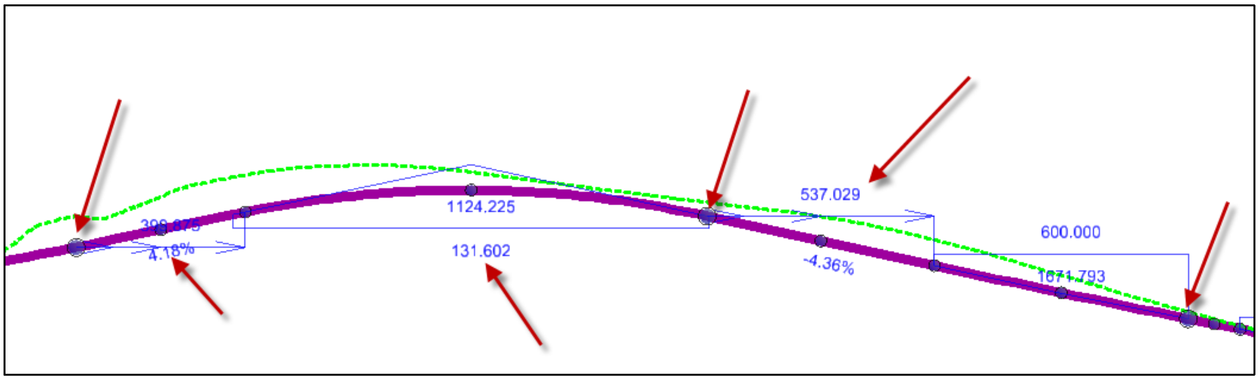
Constructs a complex vertical alignment from previously placed elements

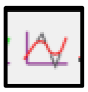


3. Manual
    a. Select elements in order one at a time
    b. Note directional arrow when selecting
    c. Once all elements are selected data point in a blank area to accept
4. Automatic
    a. Select the first element with the directional arrow in the desired direction
    b. Complex will be highlighted. Data point in a blank area to accept

*This tool is similar to the Horizontal Geometry Complex By Element tool and fundamentally works the same.

When elements become part of a complex element, they retain their individual rule data and element manipulators



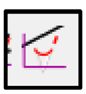


ii. Profile Complex By VPI

Constructs a complex vertical alignment defined by vertical points of intersection (VPI)

- Curves can include transitions
- Zero radius curves can be used to create angle points

*This tool is similar to the Horizontal Geometry Complex By PI tool and fundamentally works the same.

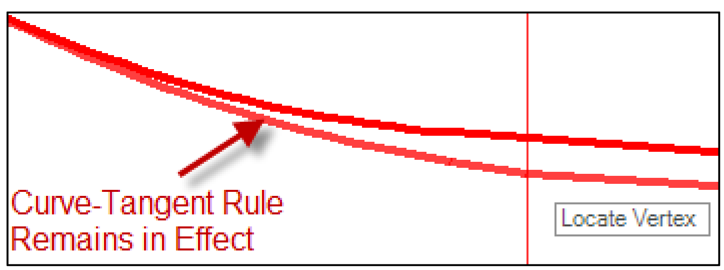


iii. Profile Insert Curve

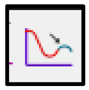
Inserts a vertical curve into a vertical alignment

- Works similar to the MicroStation Modify > Insert Vertex tool

- Rules
  - c. Length
  - d. Vertical Curve Parameter
  - e. Slope In
  - f. Slope Out



*This tool is similar to the Horizontal Geometry Horizontal Insert Fillet tool and fundamentally works the same.

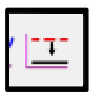


iv. Append Profile Element

Adds elements to the end of an existing complex element

- In order for the tool to work properly, additional elements must be added **at the end** of the established complex element

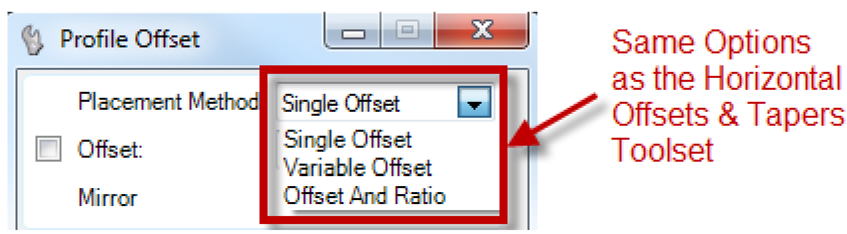
*This tool is similar to the Horizontal Geometry Append Element tool and fundamentally works the same.

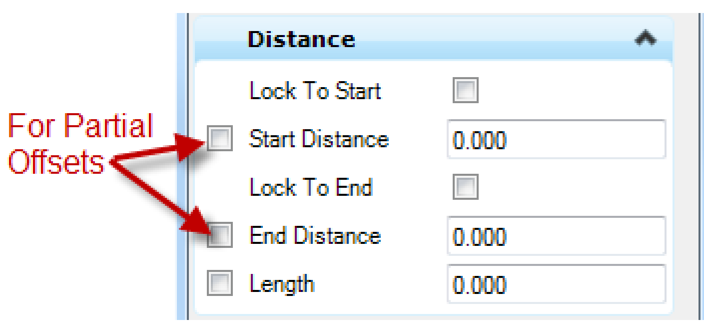


v. Profile Offset Transition

Constructs a profile element at an offset from a base profile element

- Base element may be a line, vertical curve, or complex element





*This tool is similar to the Horizontal Geometry Offsets & Tapers toolset and fundamentally works the same.

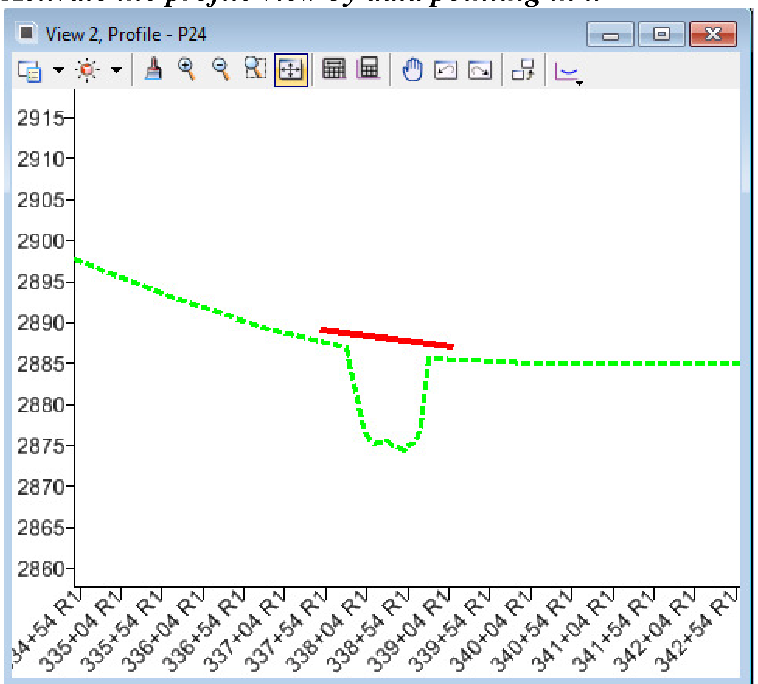
Exercise 3: Creating a Complex Vertical Alignment

1. ***Start OpenRoads using the Enhanced Workspace***

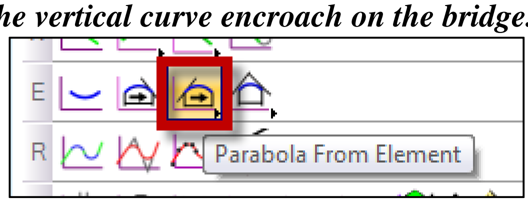
2. ***Open file** 8875000RDALN002.dgn*

3. ***Make sure Snaps are toggled on***

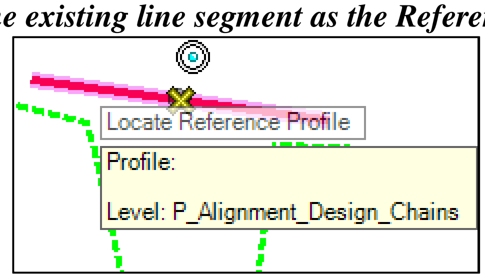
4. ***Activate the profile view by data pointing in it***



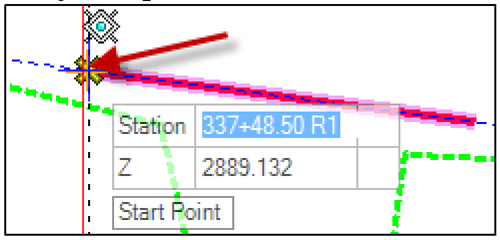
5. ***Select the** Parabola From Element **command to create a vertical curve from the already-drawn bridge profile. (Using 'From Element' is a good way to avoid having the vertical curve encroach on the bridge.)***



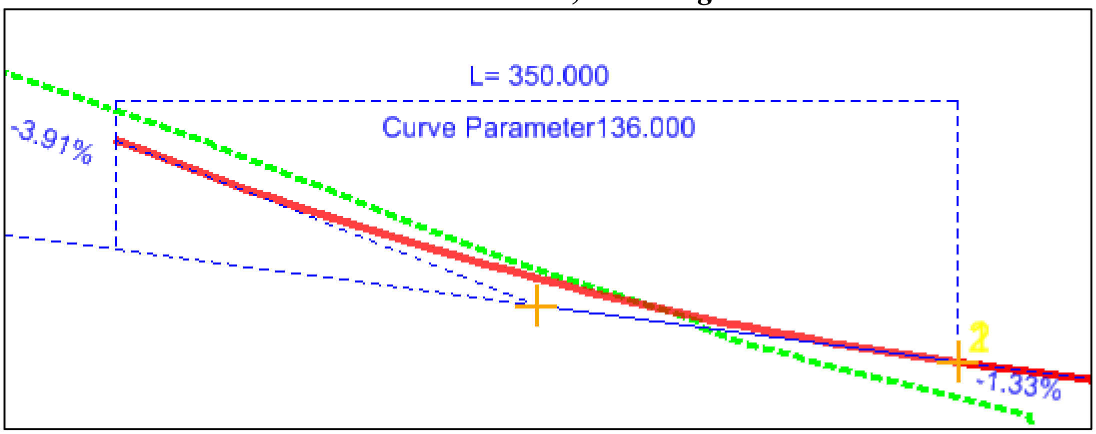
6. ***Select the existing line segment as the Reference Profile***



7. ***Snap to the left end point as the** Start Point.*



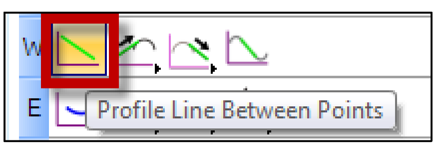
8. ***Set Vertical Curve Parameter to** 136, **and Length to** 350.*



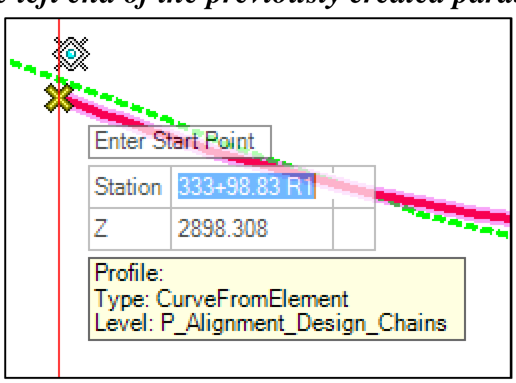
9. ***Set Trim/Extend to** Back **(This would trim the 'from' element if the start point weren't starting the end point of the line segment)***

10. ***Data point to accept***

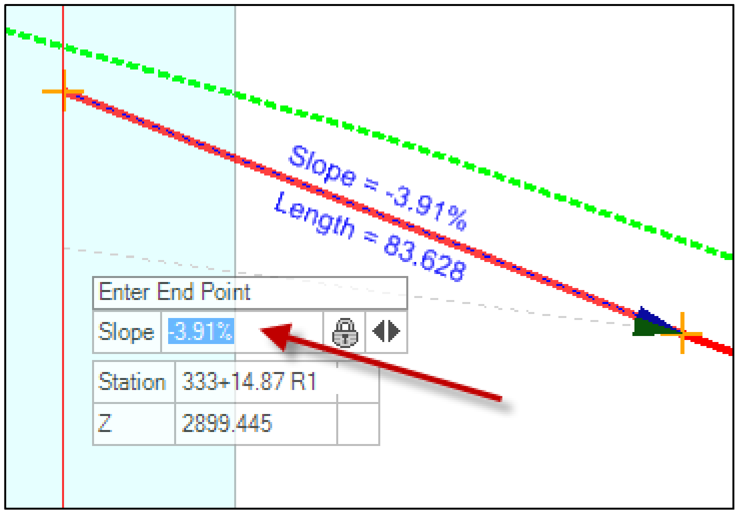
11. ***Select the** Profile Line Between Points **command to create a tangent back from the new vertical curve***



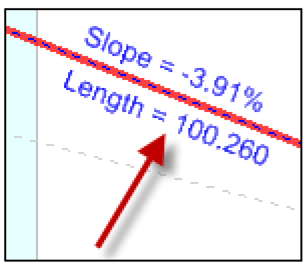
12. ***Select the left end of the previously created parabola as a start point***



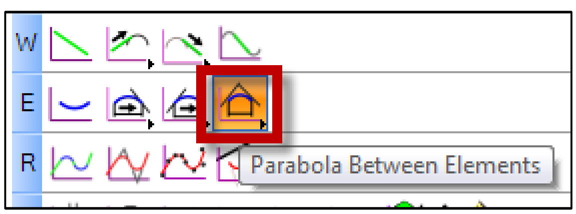
13. Use the <Right> arrow key to change the input prompt to Slope*. Type* -3.91 *(from Step 7) and lock*



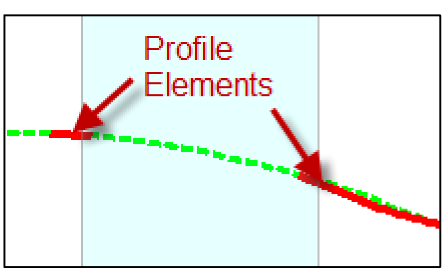
14. Using the length dynamic label, data point to end the line with an approximate length of 100'

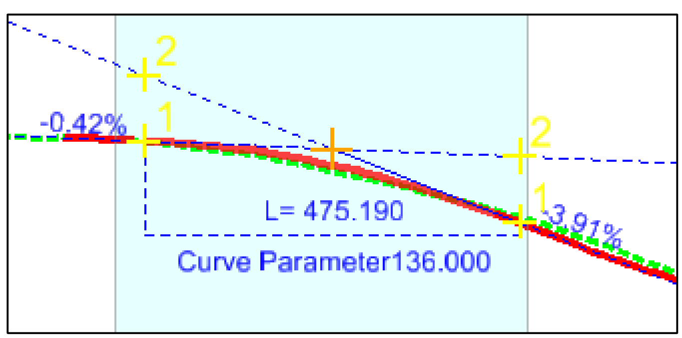


15. Select the Parabola Between Elements *command*



16. Select the first tangent and the tangent just created. Set Vertical Curve Parameter to 136

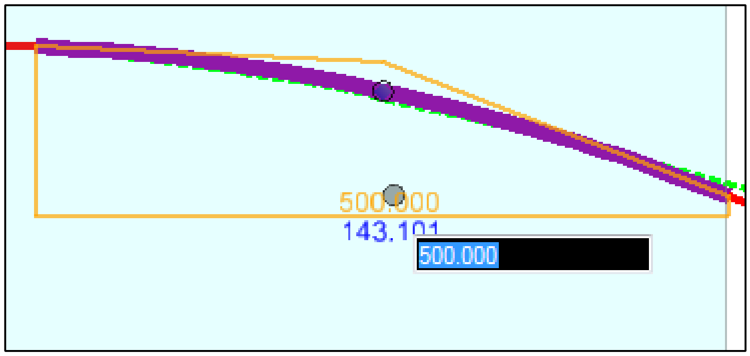




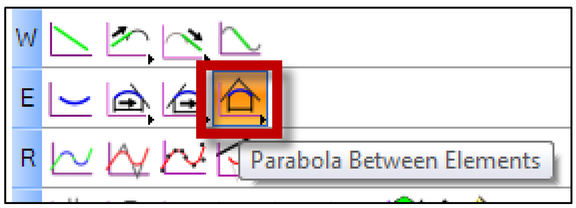
*17. **Data point to accept the lower quadrant solution***

*18. **Data point to accept** Trim/Extend:Both*

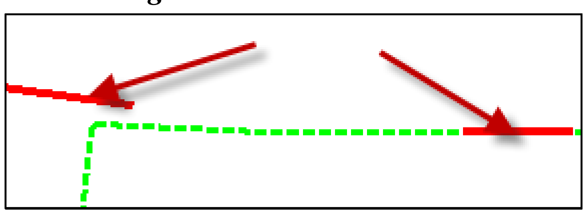
*19. **Click on the parabola and change the length to** 500*

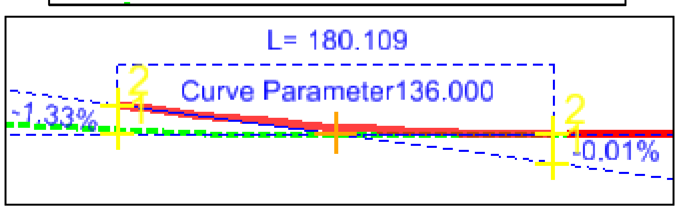


*20. **Select the** Parabola Between Elements **command to create a vertical curve between the bridge profile and the last tangent***



*21. **Select the last two tangent sections. Set Vertical Curve Parameter to** 136*

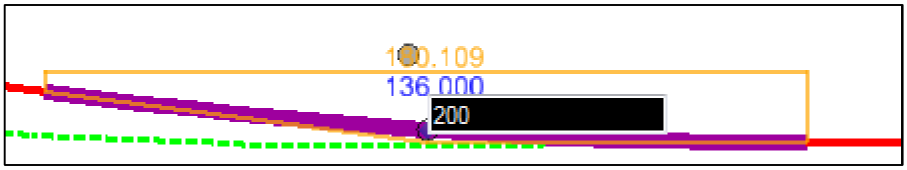




*22. **Data point to accept the upper quadrant solution***

*23. **Data point to accept** Trim/Extend:Both*

*24. **Click on the parabola and change the length to*** *200* ***(round to an even increment)***

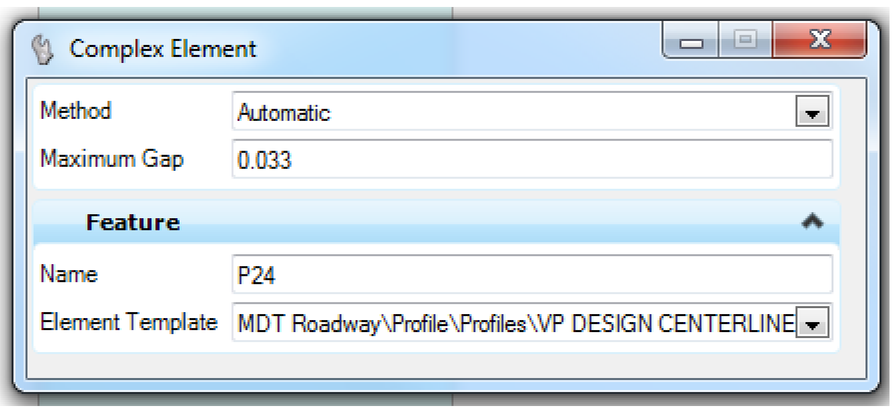


25. Select the *Profile Complex By Element* ***command***

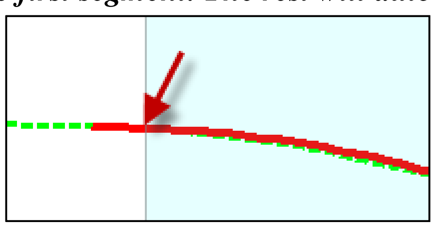
26. Set Method to *Automatic*

27. Name the profile *P24*

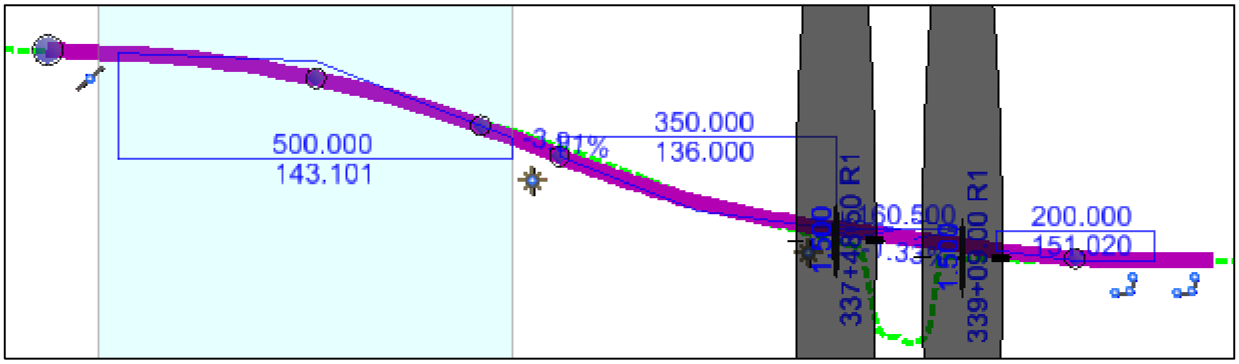
28. Set Element Template to *MDT Roadway\Profile\Profiles\VP DESIGN CENTERLINE*



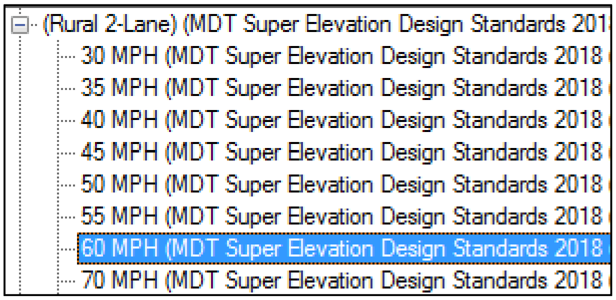
29. Select the first segment. The rest will auto-select

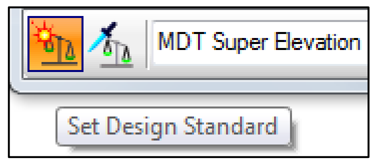


30. Data point to accept the complex element

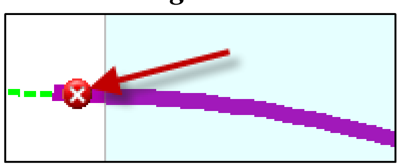


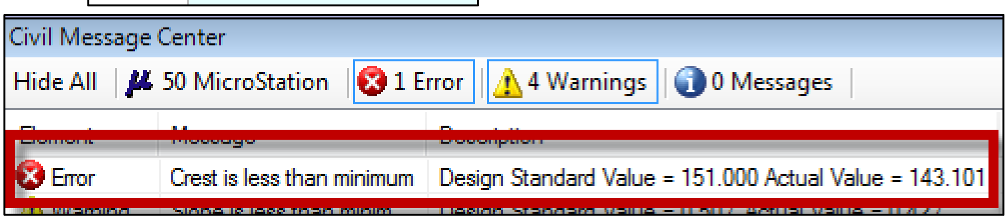
31. Apply the Rural 2-Lane, 60 MPH *design standard to the profile*



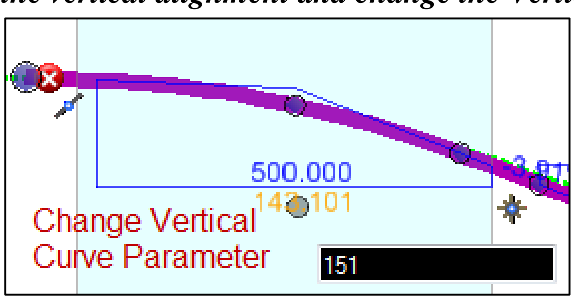


32. Open the Civil Message Center to check for errors

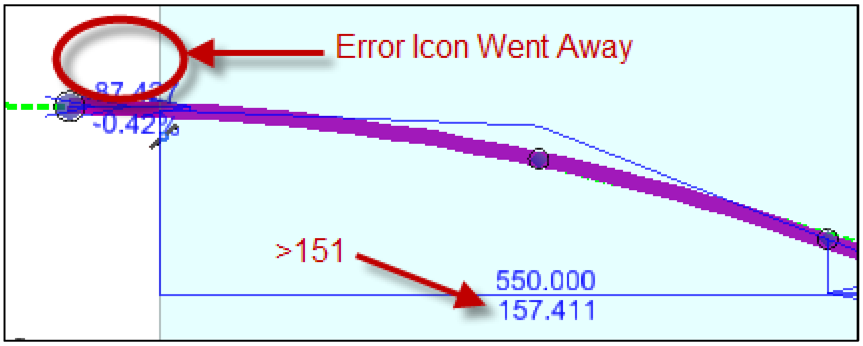




33. Click on the vertical alignment and change the Vertical Curve Parameter to 151

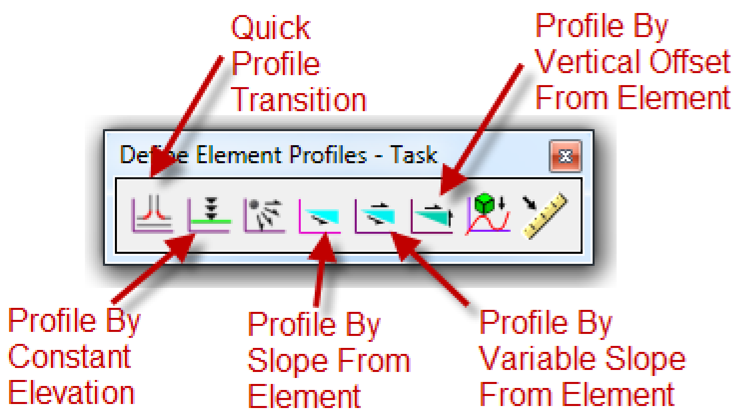


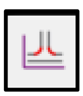
34. Round the curve length from 527 up to** 550 **(Round to an even increment)



35. Close the file

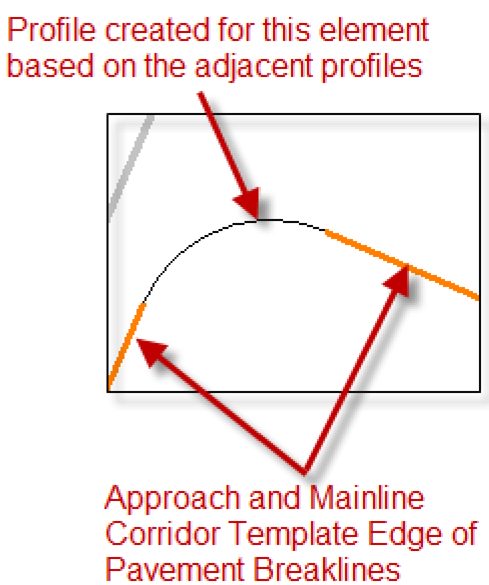
E. Define Element Profiles

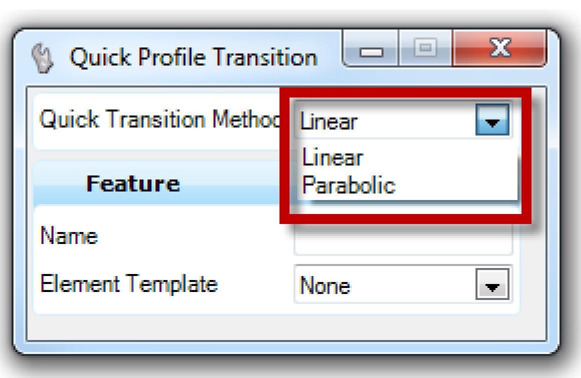


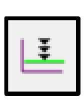


i. Quick Profile Transition – Defines an element's profile by matching the slope and elevation of adjoining elements

- Adjoining elements must have an active profile
- Transition can be a linear or parabolic curve



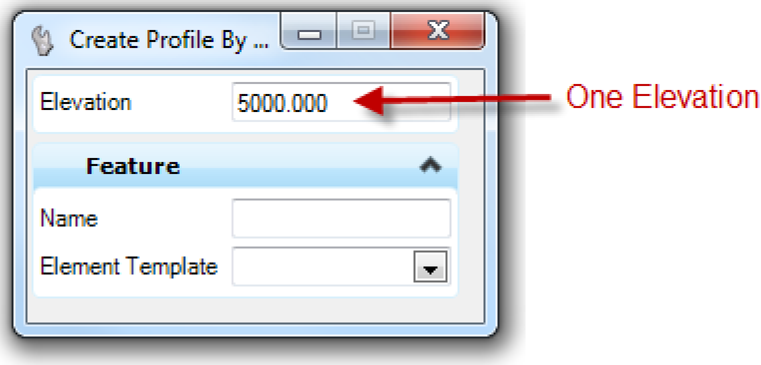


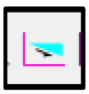


ii. Profile By Constant Elevation – Defines a flat profile at a given elevation

- Creates civil rules that can be edited in the Profile View
- Profiles for multiple elements can be created with one command
- Cannot apply different elevations in one command

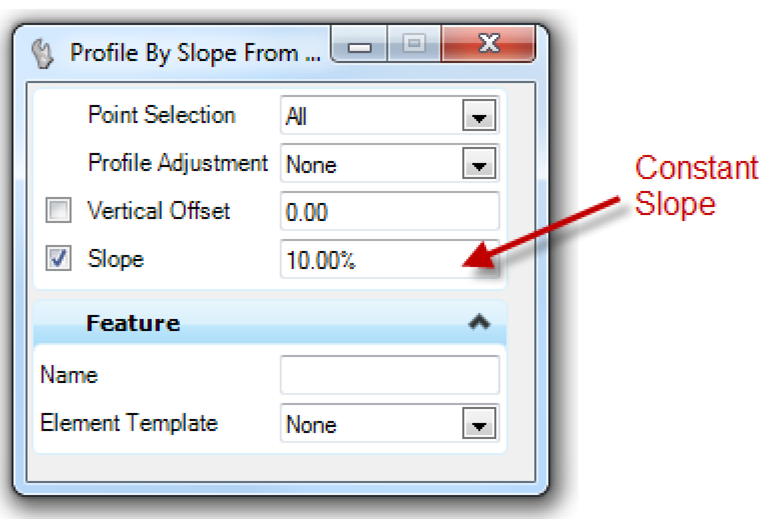
- Defines the entire element



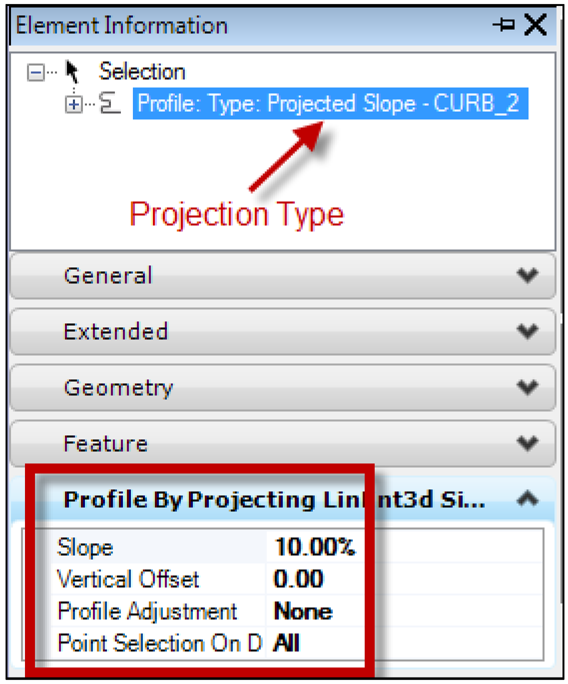


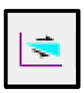
iii. Profile By Slope From Element – Defines the profile of an element by projecting a fixed slope from another element with an active profile

- Multiple element profiles can be defined at once as long as they utilize the same parameters (Ex. Front and Back of Sidewalk based on Top Back of Curb @ 1.50%)
- Defines the entire element

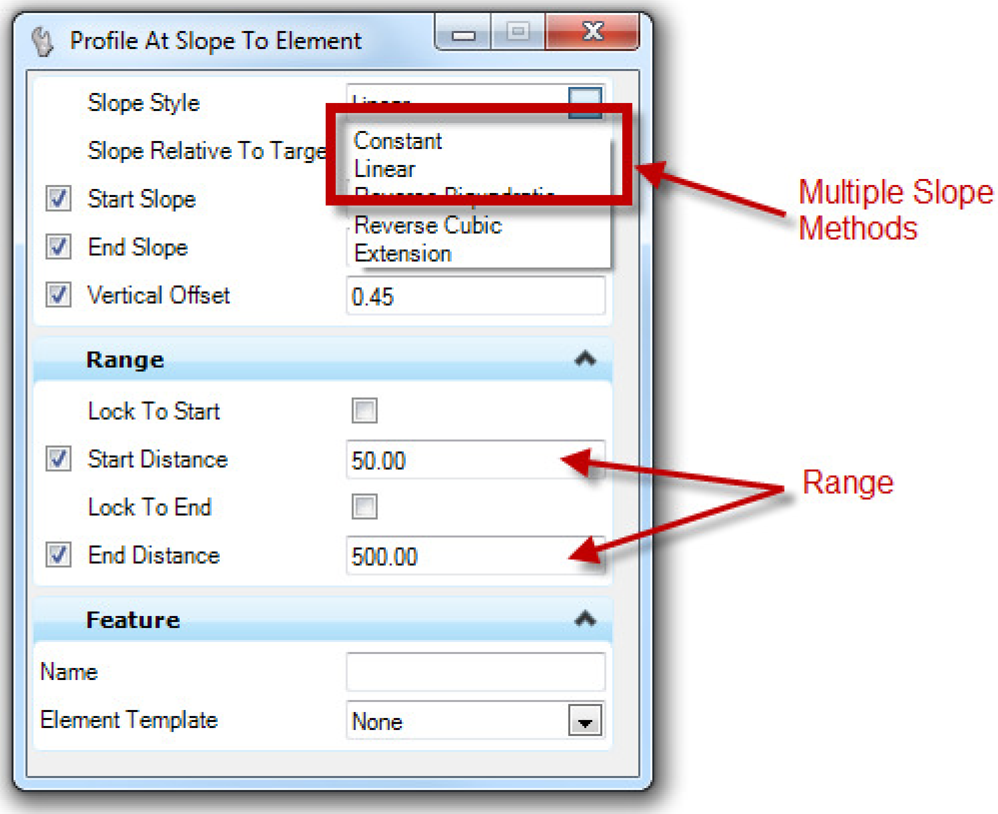


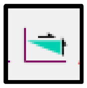
- Profile is a locked civil element with no manipulators
- Parameters can be edited in the Element Information dialog





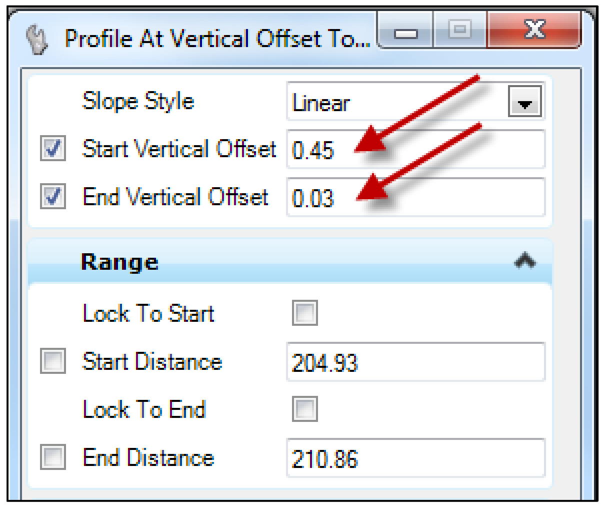
iv. <u>Profile By Variable Slope From Element</u> – Defines the profile of an element based on slope(s) and range



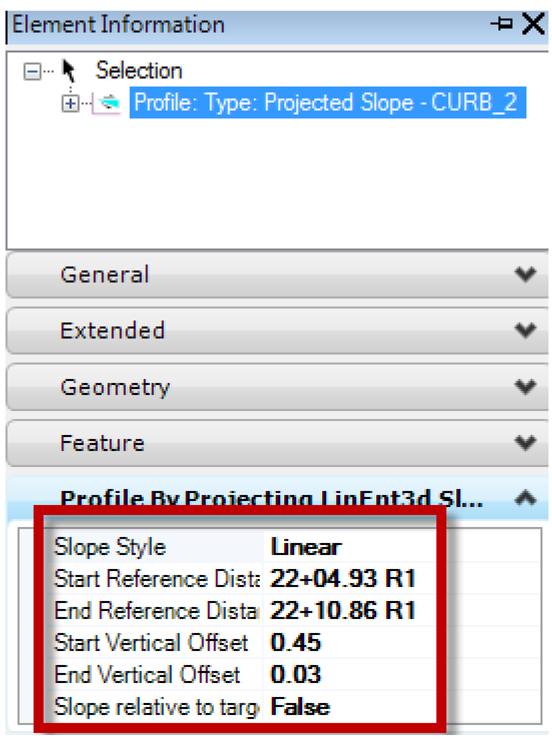


v. Profile By Vertical Offset From Element – Defines the profile of an element based on a vertical offset from another element with an active profile

- Results are similar to the Profile By Variable Slope tool, except that this tool employs offset transitions instead of slope transitions



- Profile is a locked civil element, only the offset parameter can be edited in the Profile View
- Parameters can be edited in the Element Information dialog

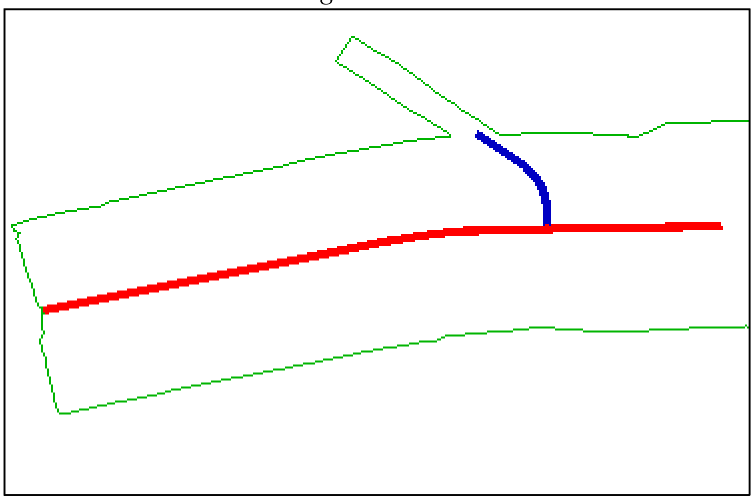


Exercise 4: Approach Radii (Quick Profile Transitions)

Create Mainline Geometry

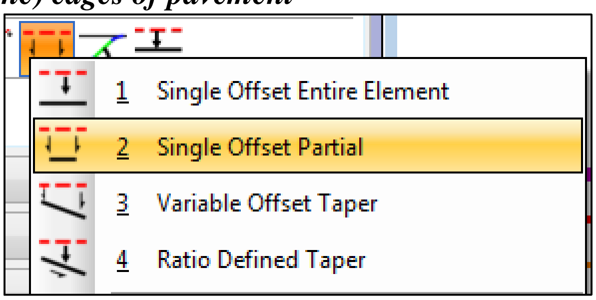
1. ***Start OpenRoads using the Enhanced Workspace***

2. ***Open file*** *8875000RDALN003.dgn*

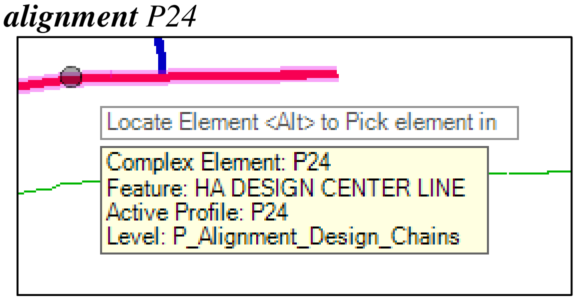


3. ***Set the Active Feature Definition to*** *Road_EdgeOfPavement* ***and toggle on*** *Use Active Feature Definition*

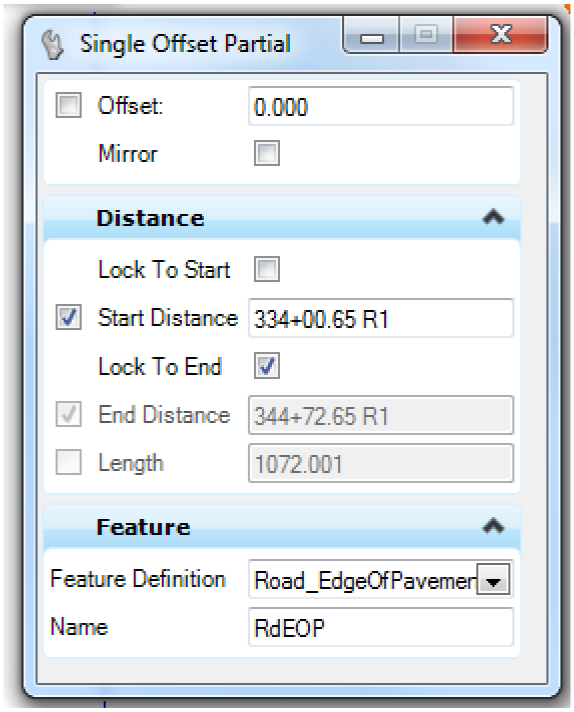
4. ***Select the horizontal*** *Single Offset Partial* ***command to create the*** *P24* ***(mainline) edges of pavement***



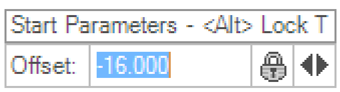
5. ***Select alignment*** *P24*



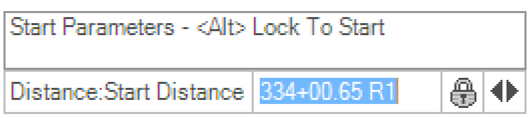
6. ***Check the*** *Lock To End* ***box***



7. ***Set*** *Offset* ***to*** *-16.0*



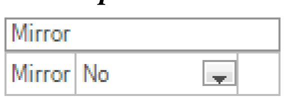
8. ***Set*** *Start Distance* ***to*** *334+00.65*



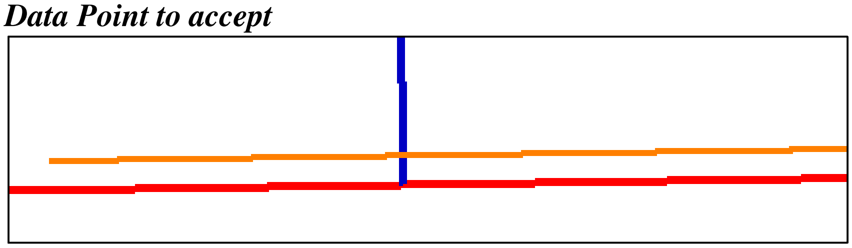
9. ***Data point to accept***

10. ***Data point to accept the End Distance***

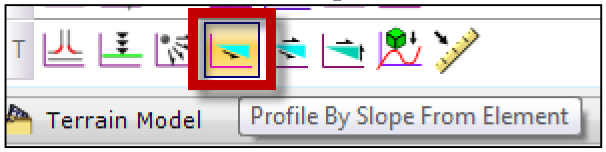
11. ***Set the*** *Mirror* ***option to*** *No*



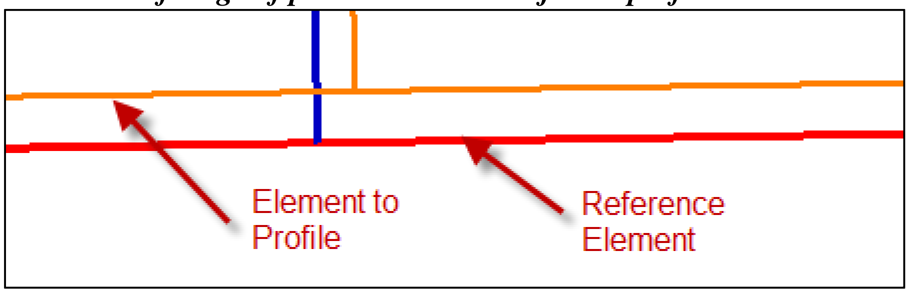
12. ***Data Point to accept***



13. Select the vertical** Profile By Slope From Element **command to create a profile based on normal crown cross slope



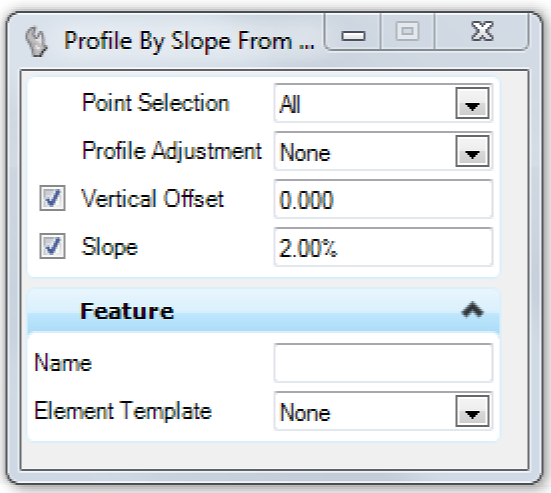
14. Select the left edge of pavement as the object to profile



15. Select the centerline alignment as the reference element. Then reset to accept

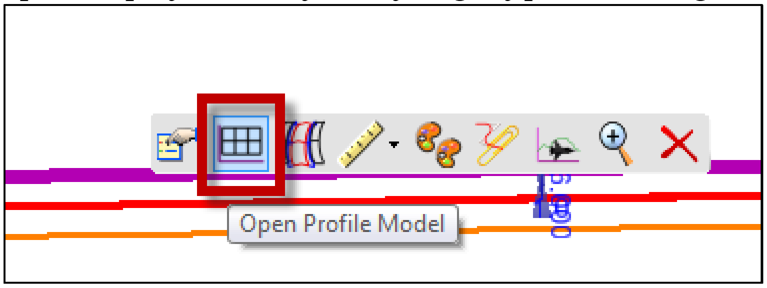
***16. Set the slope to** 2.00%*

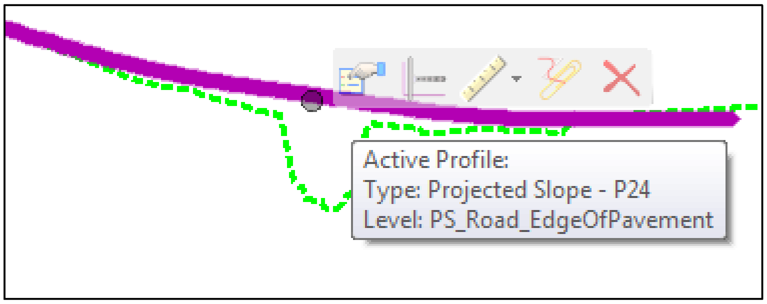
***17. Point Selection =** All, **Profile Adjustment =** None, **Vertical Offset =** 0*



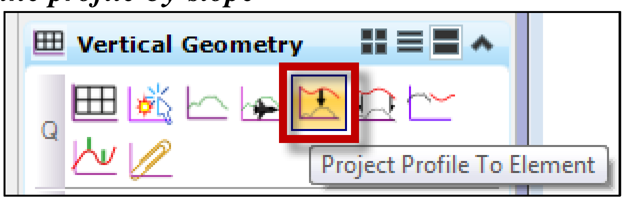
18. Data point through the prompts to accept

19. Open the profile view of the left edge of pavement alignment in View 2

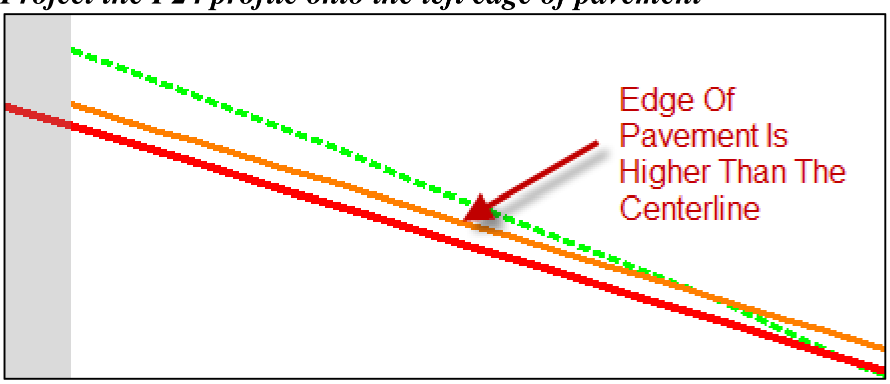




20. Select the *Project Profile to Element* ***command to compare the*** *P24* ***profile to the profile-by-slope***

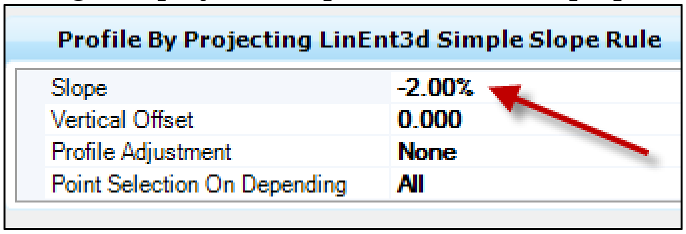


21. Project the P24 profile onto the left edge of pavement



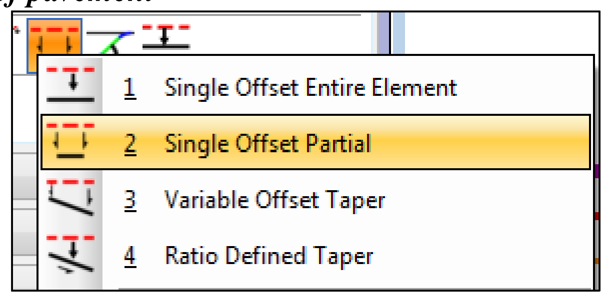
22. Select the edge of pavement profile open the *Element Properties*

23. ***Change the projected slope to*** *-2.00%* ***in its properties***

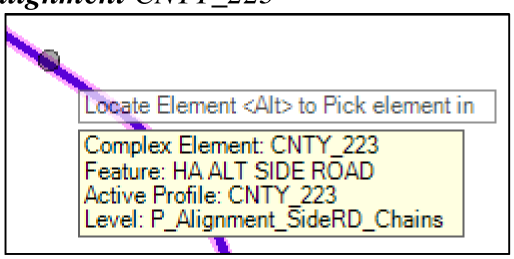


<u>Create Cross Road Geometry</u>

1. ***Select the horizontal*** *Single Offset Partial* ***command to create the county road edges of pavement***



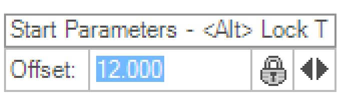
2. ***Select alignment*** *CNTY_223*



3. ***Set*** *Start Distance* ***to*** *16.0*

4. ***Check the*** *Lock To End* ***box***

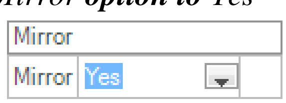
5. ***Set*** *Offset* ***to*** *12.0*



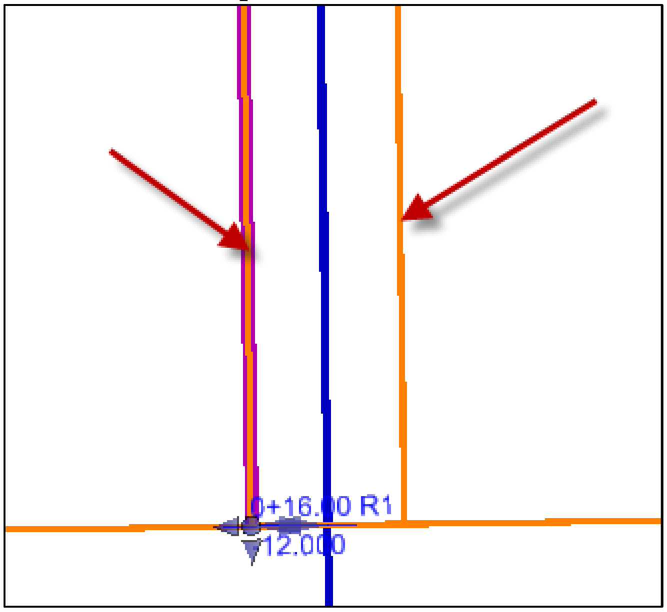
6. ***Data point to accept***

7. ***Data point to accept the End Distance***

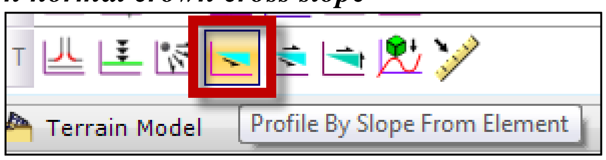
8. ***Set the*** *Mirror* ***option to*** *Yes*



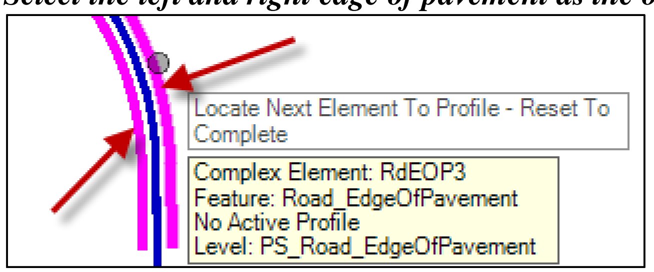
9. ***Data Point to accept***



10. ***Select the vertical*** *Profile By Slope From Element* ***command to create profiles based on normal crown cross slope***



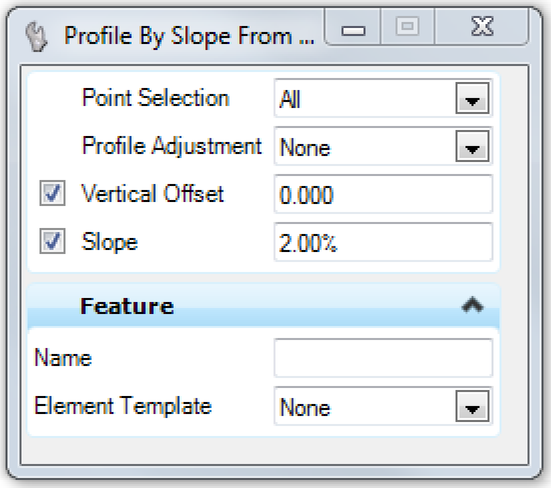
11. ***Select the left and right edge of pavement as the objects to profile***



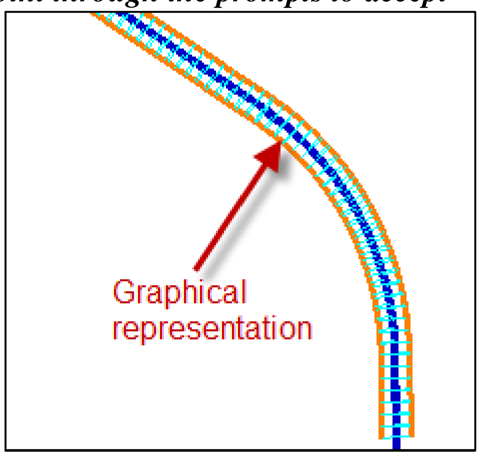
12. ***Select the*** *CNTY_223* ***centerline alignment as the reference element***

13. ***Set the slope to*** *-2.00%*

*14. **Point Selection** = All, **Profile Adjustment** = None, **Vertical Offset** = 0*

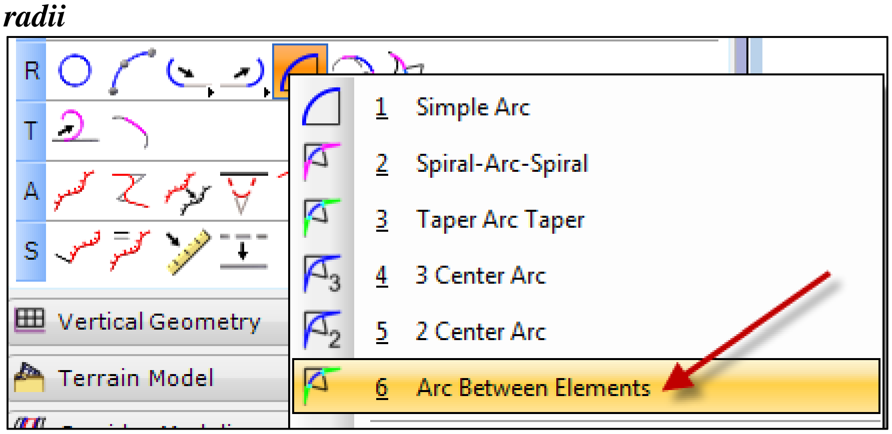


*15. **Data point through the prompts to accept***



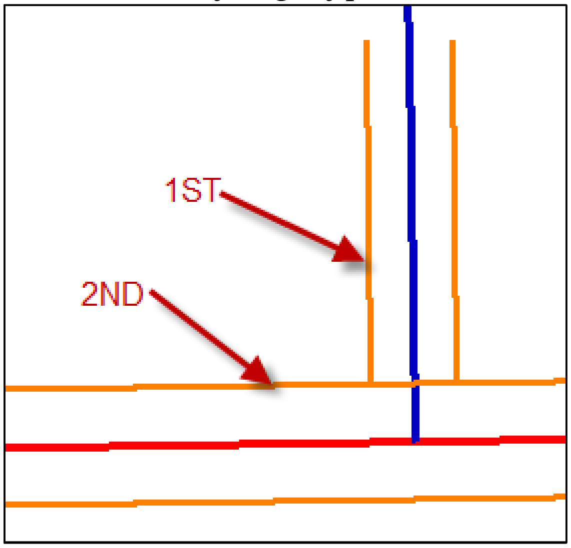
Create Approach Radii

1. ***Select the horizontal** Arc Between Elements **command to create the approach radii***

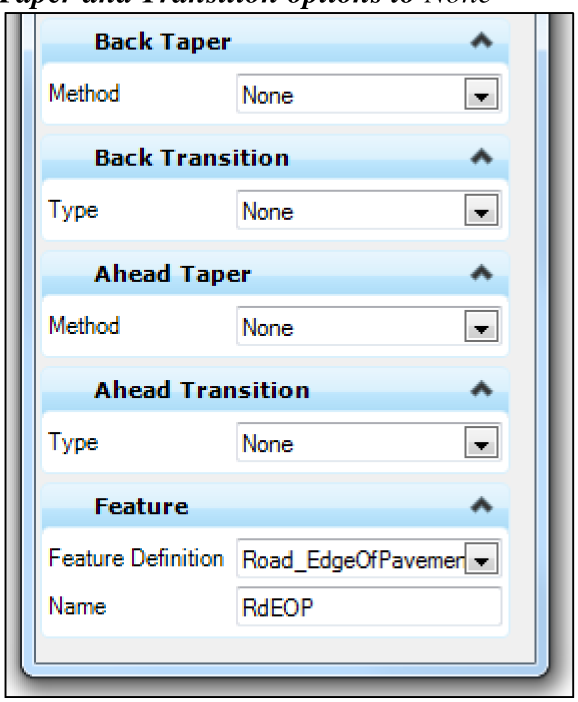


2. ***Select the CNTY_223 left edge of pavement as the first element***

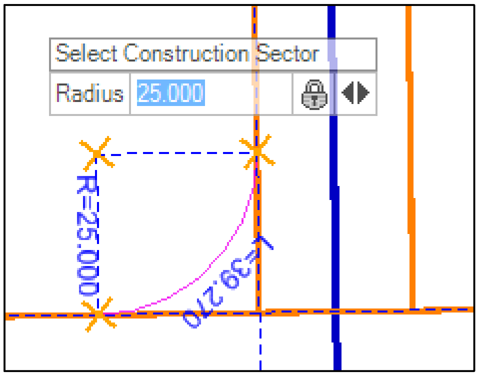
3. ***Select the P24 left edge of pavement as the second element***



4. ***Set all Taper and Transition options to*** *None*

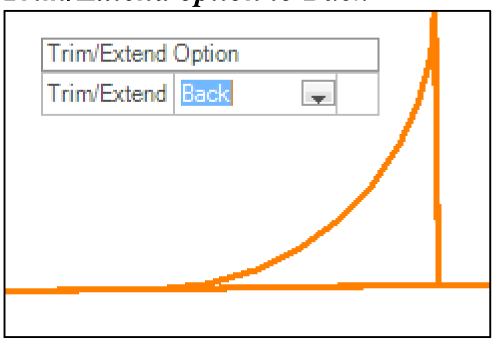


5. ***Set the radius to** 25*

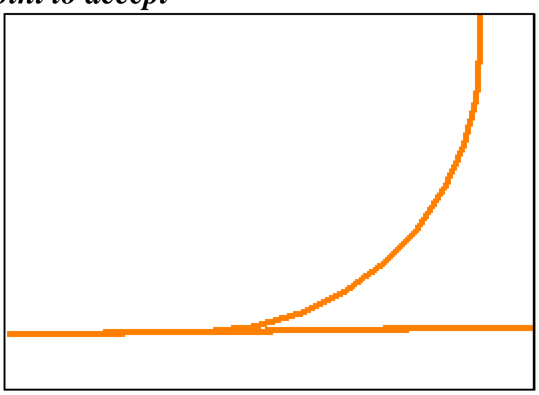


6. ***Select the top left Construction Sector***

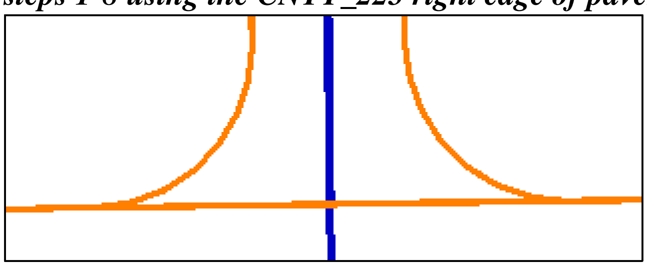
7. ***Set the Trim/Extend option to** Back*



8. ***Data point to accept***

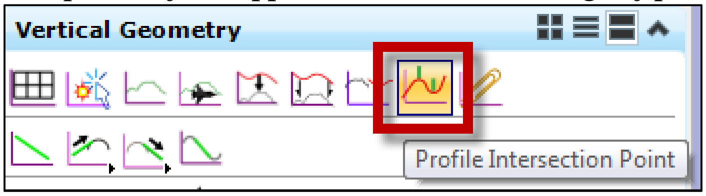


9. ***Repeat steps 1-8 using the CNTY_223 right edge of pavement***

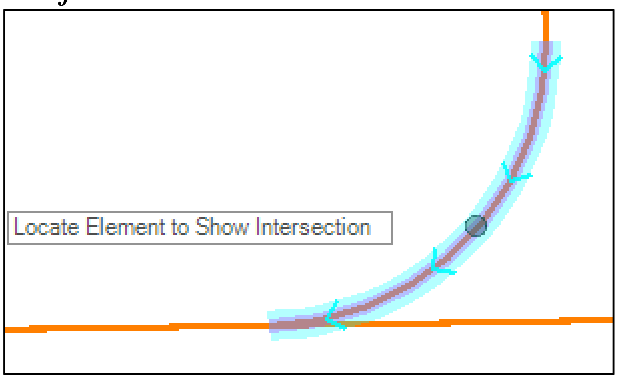


10. Open the Profile View of the left radius

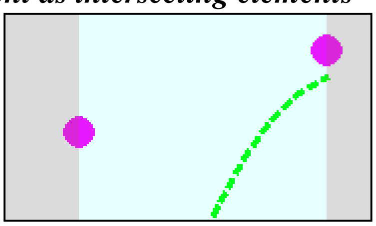
11. Select the vertical *Profile Intersection Point* ***command to place graphical intersection points of the approach and mainline edge of pavement profiles***



12. Select the left radii as the element to show intersection

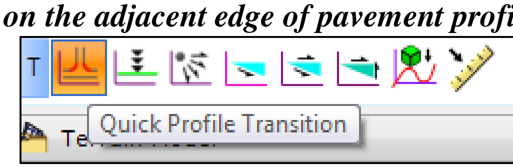


13. Select both the P24 left edge of pavement and the CNTY_223 left edge of pavement as intersecting elements

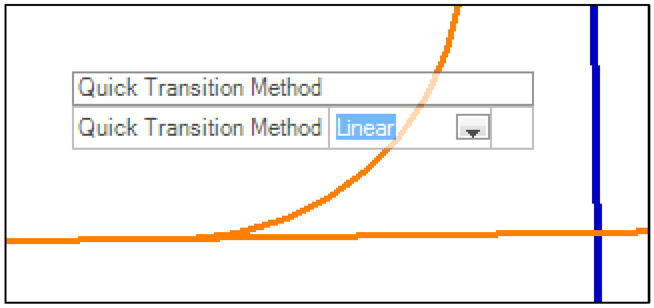

Note: This is for visualization purposes only.

14. Reset to accept

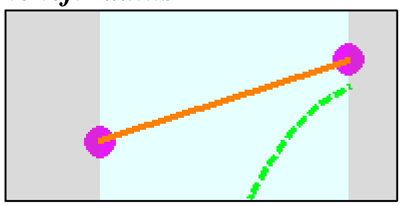
15. Select the vertical *Quick Profile Transition* ***command to create the radii profiles based on the adjacent edge of pavement profiles***



16. Set Quick Transition Method to Linear

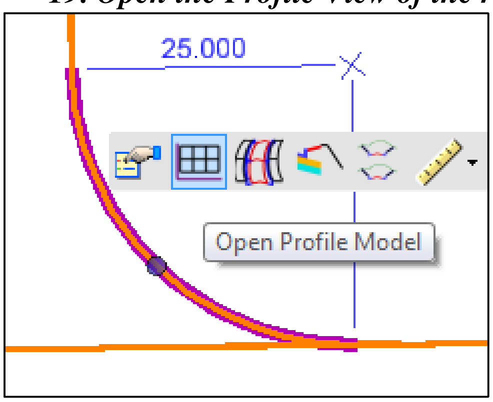


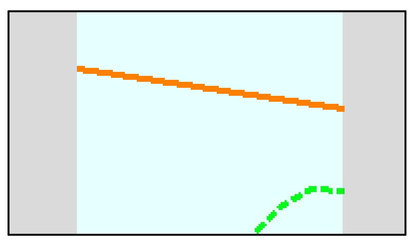
17. Select the left radius



18. Repeat steps 16-18 for the right radius

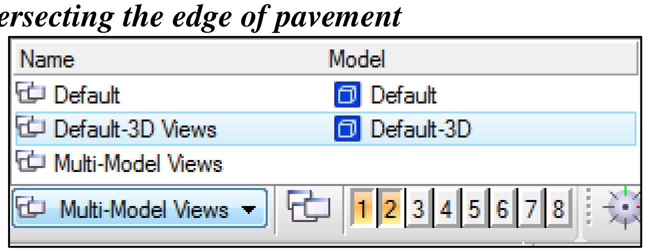
19. Open the Profile View of the right radius



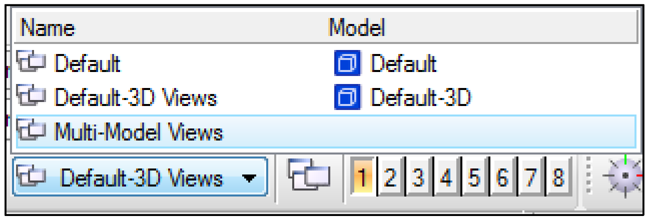


Note: *The profiles are different because of the downgrade of the mainline adjacent to the approach.*

20. Open the Default-3D model. There is an error in the CNTY_223 *profile. It is not intersecting the edge of pavement*

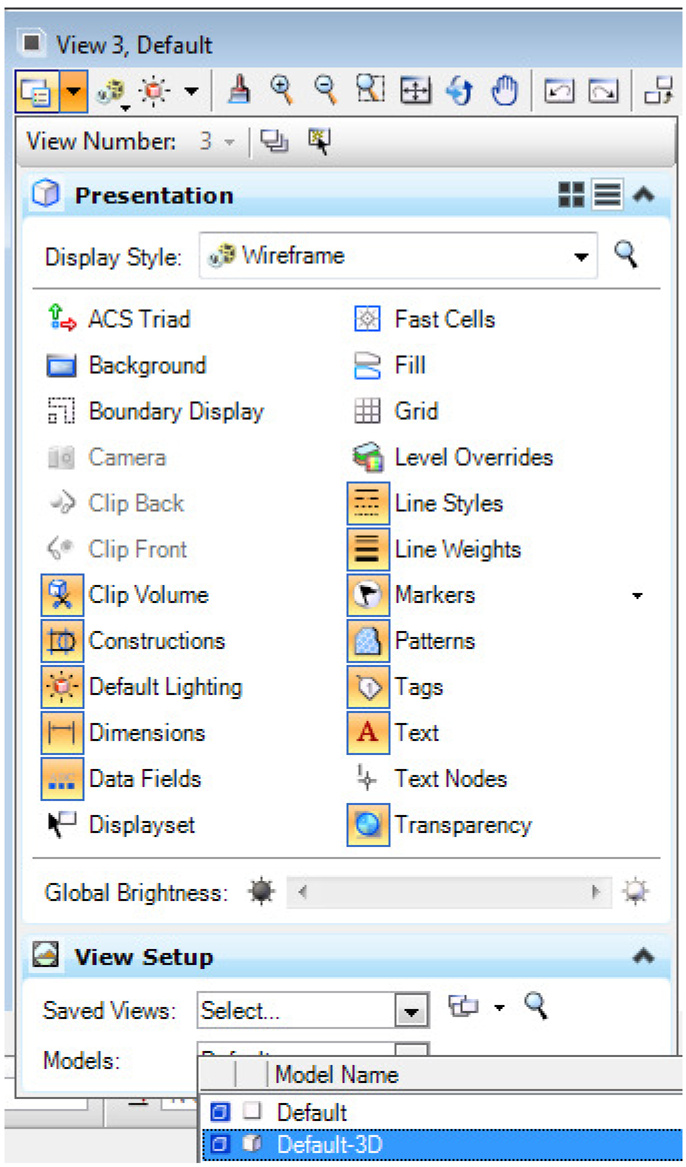


21. Return to the Multi-Model View



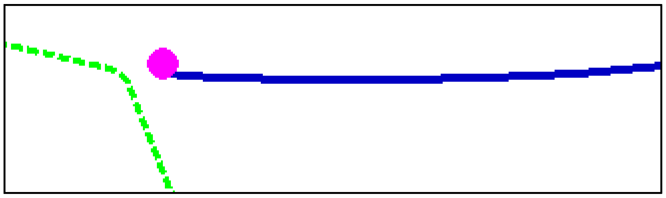
22. Open the CNTY_223 *Profile View in View 2*

23. Open View 3, set to the 3D model and zoom in to the approach geometry

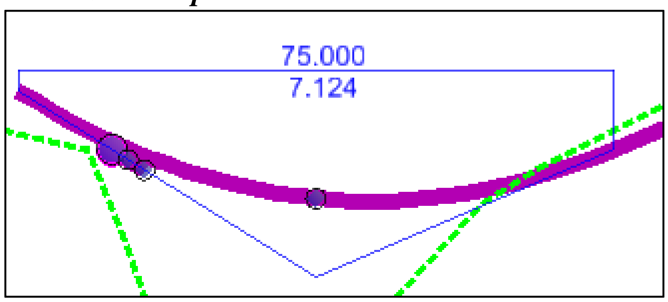


24. Select the *Profile Intersection Point* ***command to find the intersection point with the edge of pavement***

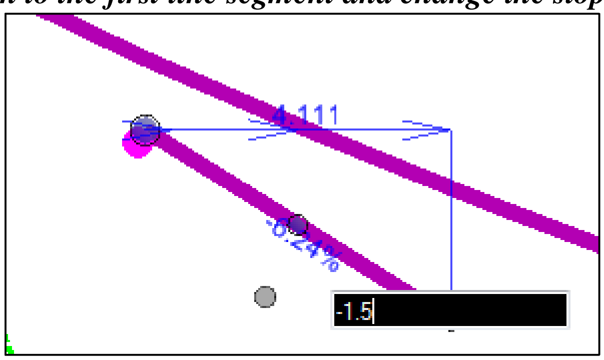
25. Project the *P24* ***left edge of pavement intersection point onto the*** *CNTY_223* ***profile***

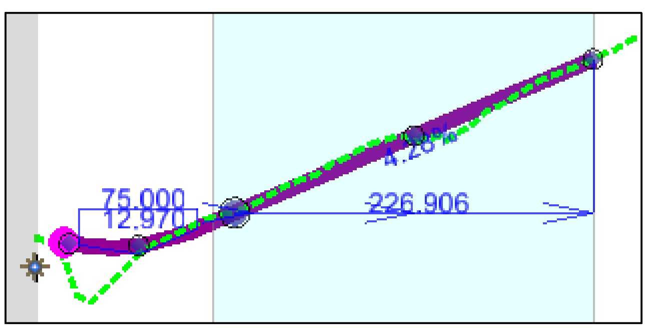


26. Click on the *CNTY_223* ***profile and move the first point to intersect with the projected intersection point***



27. Zoom in to the first line segment and change the slope to *-1.5%*



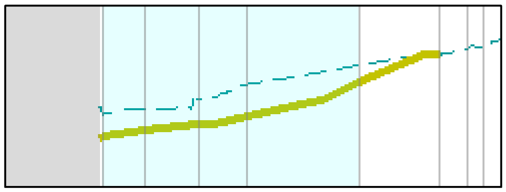


Exercise 5: Offset Profiles

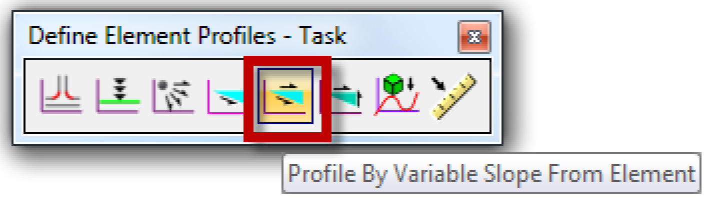
1. ***Start OpenRoads using the Enhanced Workspace***

2. ***Open file*** *4855001RDALN001.dgn*

3. ***Activate the profile view by data pointing in it. Part of the profile is already constructed***

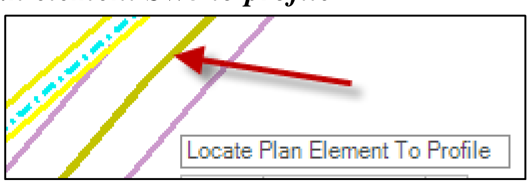


4. ***Select the*** *Profile By Variable Slope From Element* ***command to create a portion of the*** *SW3* ***profile base on the CURB3_TBC profile***

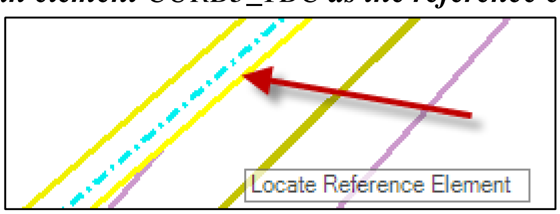


5. ***Set*** *Slope Style* ***to*** *Constant*

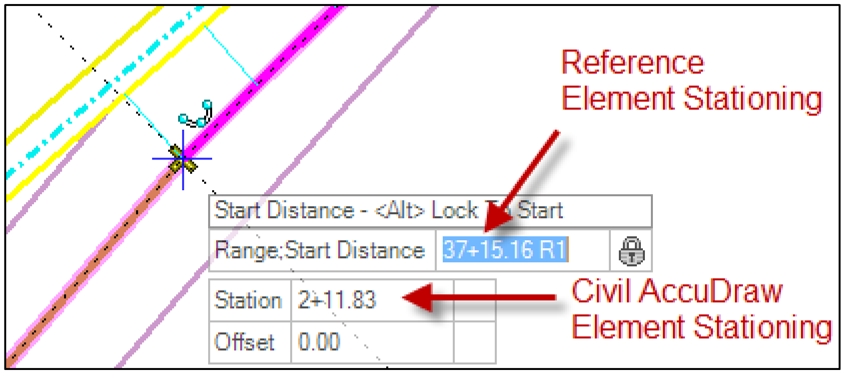
6. ***Select plan element*** *SW3* ***to profile***



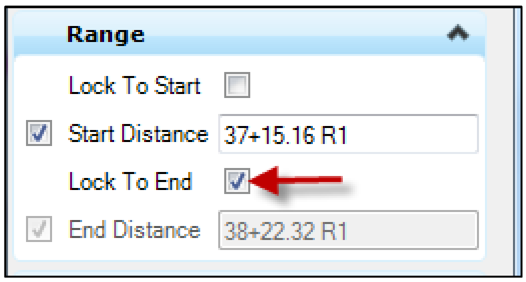
7. ***Select plan element*** *CURB3_TBC* ***as the reference element***



8. ***Using snaps, lock the start distance to the PI at the beginning of the sidewalk paralleling the curb***

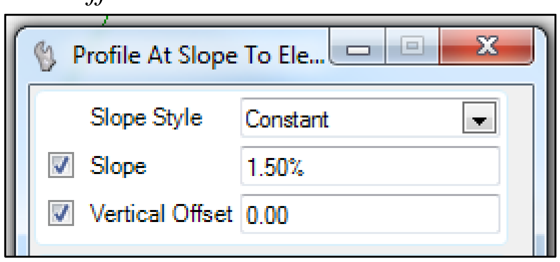


9. ***Check*** *Lock To End* ***to create a profile for the remainder of*** *SW3*

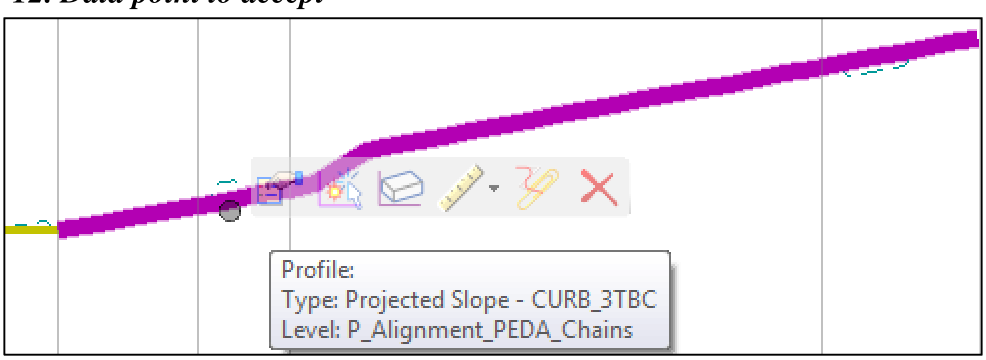


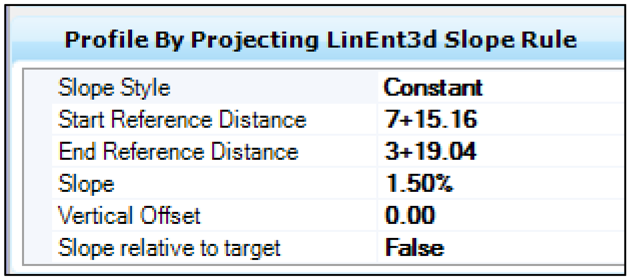
10. ***Set*** *Slope* ***to*** *1.50%*

11. ***Lock*** *Vertical Offset* ***to*** *0*



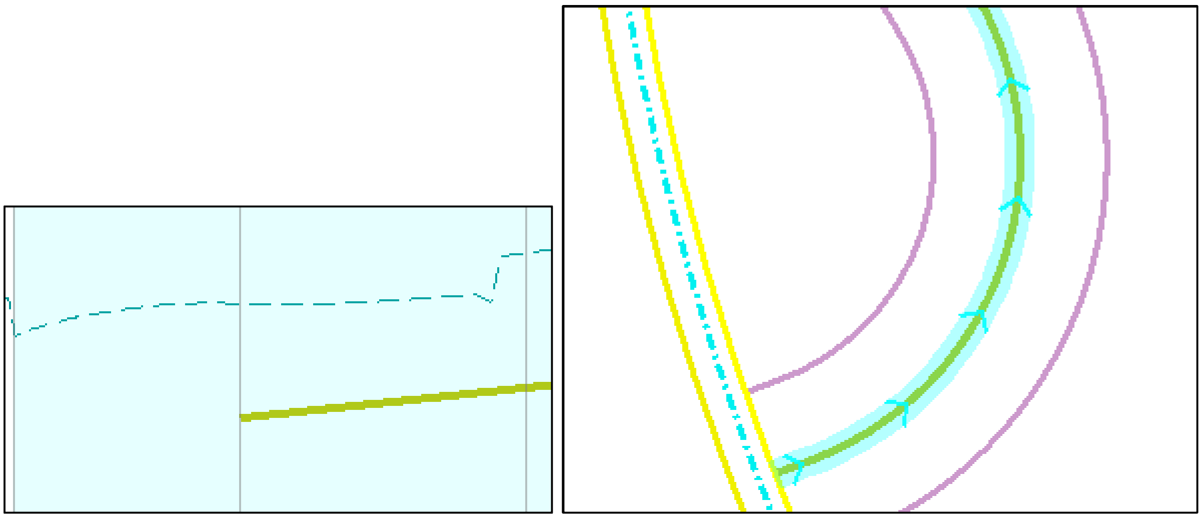
12. ***Data point to accept***



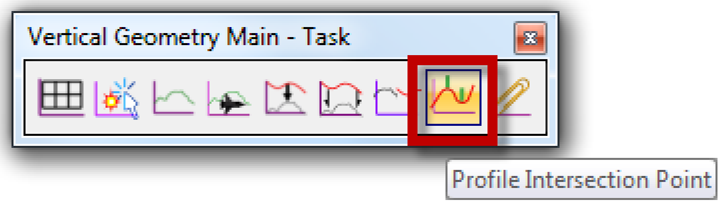


Profile By Projecting LinEnt3d Slope Rule	
Slope Style	Constant
Start Reference Distance	7+15.16
End Reference Distance	3+19.04
Slope	1.50%
Vertical Offset	0.00
Slope relative to target	False

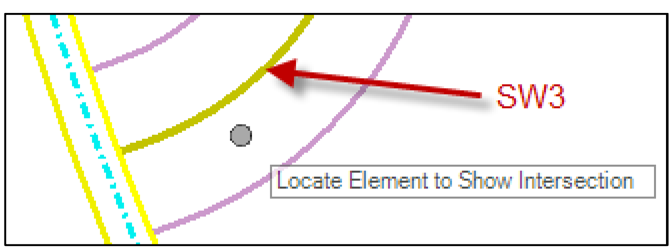
13. Zoom to the left side of the profile view



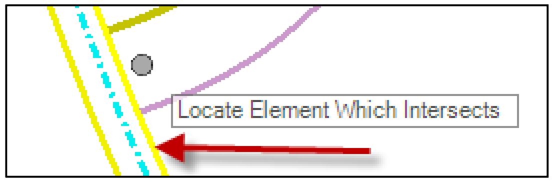
14. Select the** Profile Intersection Point **command to create the intersection point with CURB3_TBC



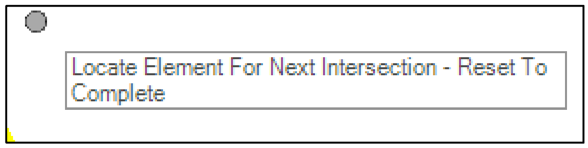
***15. Select the sidewalk centerline as the** Element to Show Intersection*

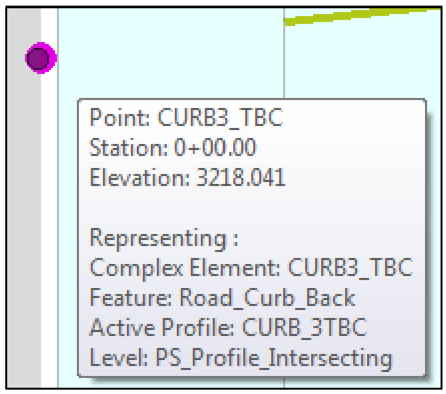


16. Select the top back of curb as the *Intersecting Element*

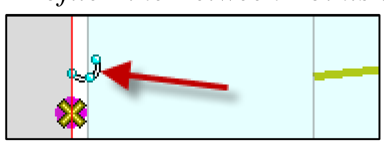


17. Reset to complete the command





18. Draw a profile line connecting the intersecting point to the next line segment using the *Profile Line Between Points* ***command***



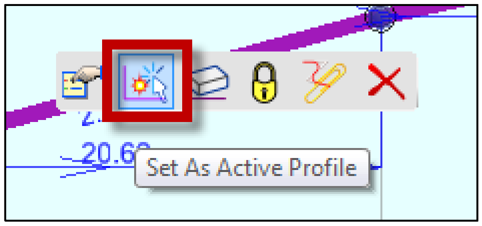
19. Select the *Profile Complex By Elements* ***command to combine all of the element into one profile***

20. Set the *Method* ***to*** *Automatic*

21. Name the vertical profile *SW3.* ***The element template will auto-populate based on the feature definition of the plan element***

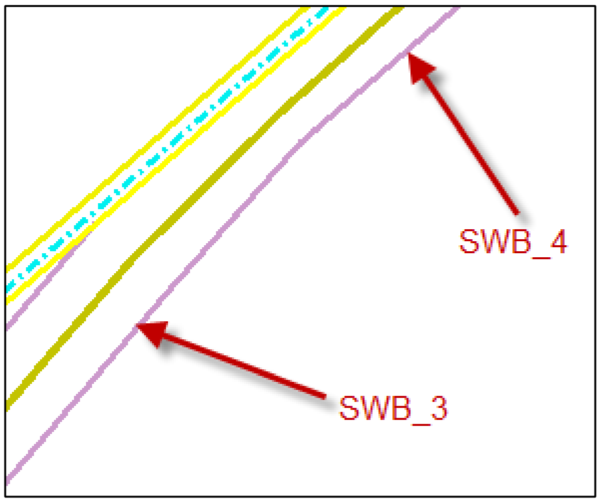
22. Select the first profile element, the rest will auto-select. Data point to accept the profile

23. Set profile *SW3* ***active.***



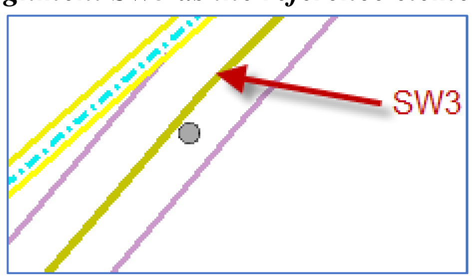
24. ***Select the*** *Profile By Slope From Element* ***to create projected profiles for the back of sidewalk alignments***

25. ***Select*** *SWB_3,* ***&*** *SWB_4*



26. ***Reset to accept***

27. ***Select alignment*** *SW3* ***as the reference element***



28. ***Set*** *Slope* ***to*** *1.50%*

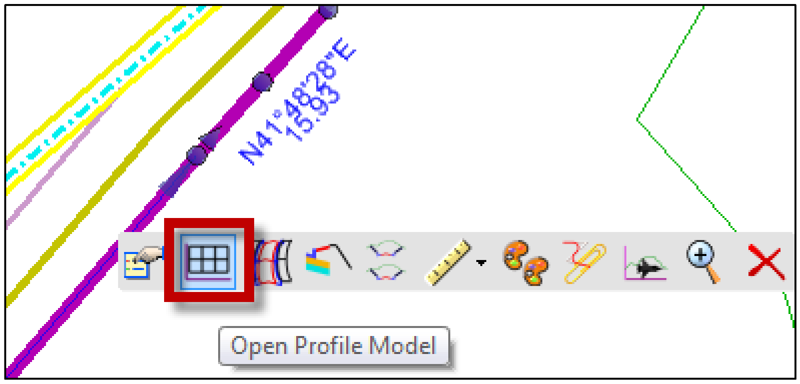
29. ***Leave*** *Point Selection* ***set to*** *All****, and*** *Profile Adjustment* ***set to*** *None*

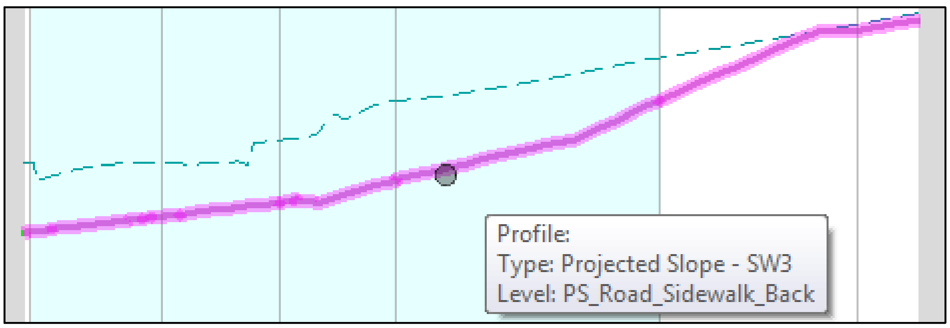
30. ***Set*** *Vertical Offset* ***to*** *0*

31. ***Leave*** *Name* ***blank and*** *Element Template* ***set to*** *None*

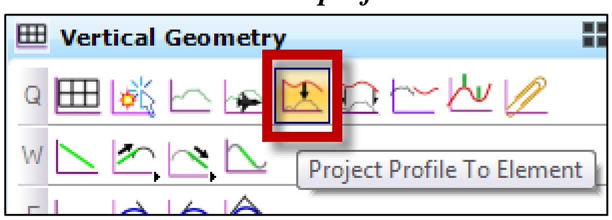
32. Data point to accept

33. Open the profile view of SWB_3





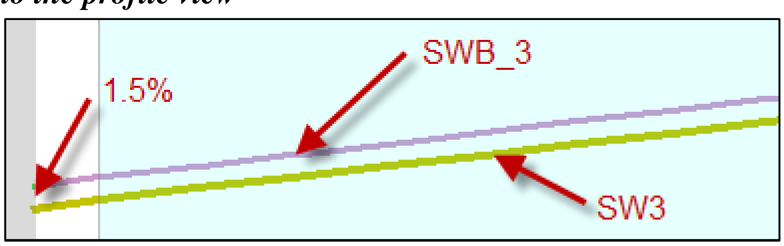
34. Select the Project Profile To Element *command to compare the back-of-walk profile to the sidewalk centerline profile*



35. Select plan element SW3 *to project*

36. Select plan element SWB_3 *as the plan element to project onto*

37. Zoom in to the profile view



2. Vertical Geometry Reports