



# OpenRoads Best Practice - Civil Cells

Presented by:

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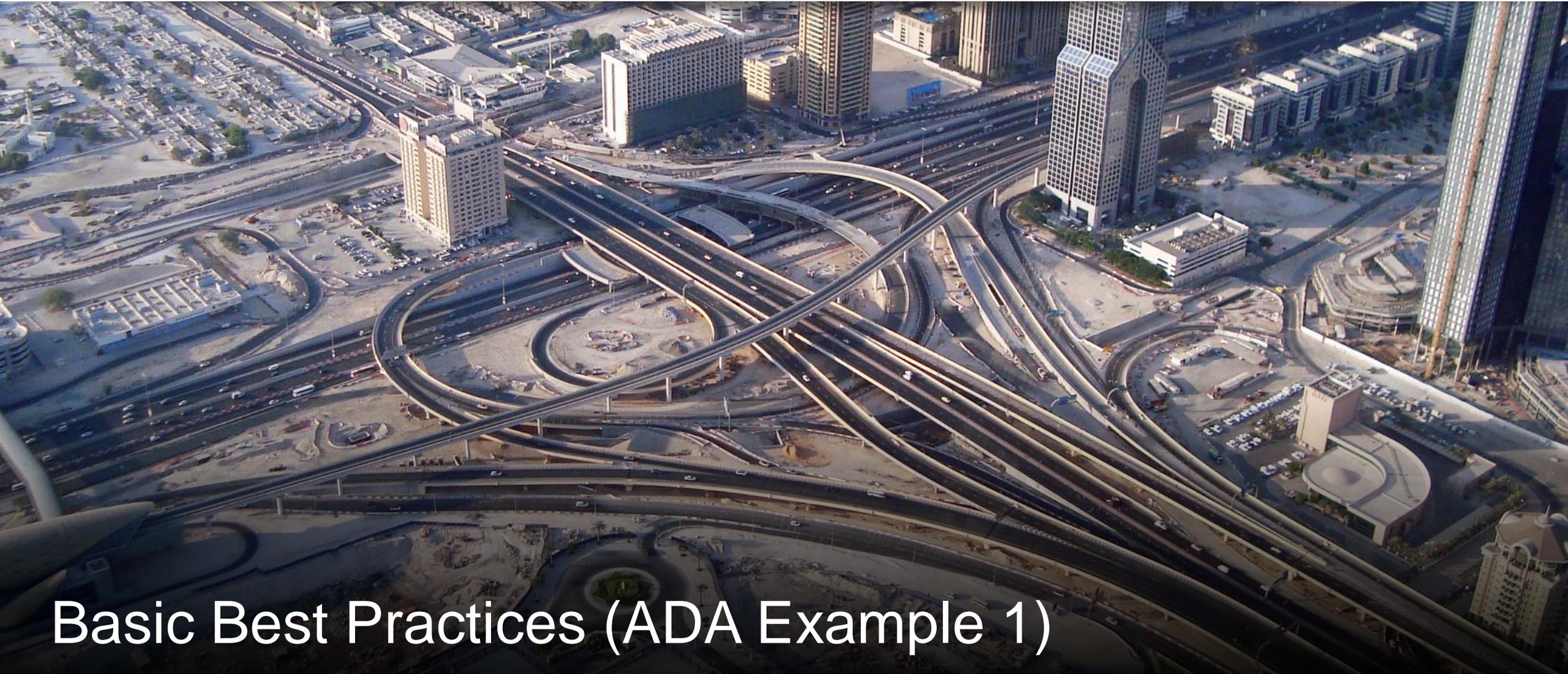
# Learning Objectives – Best Practices Civil Cells

- Basic (ADA Ramp Example)

- References
- Use of Construction/Working Elements
- Horizontal & Vertical Processes
  - Create 3D Toggle
- Cell Testing through the Build
- Terrain & Templates
- Creating the Civil Cell
  - Adding a Clipping Reference
- Placing the Civil Cell/Edits

- Advanced

- Controlling Horizontal Length with a Profile View Snap. (ADA)
- Using Points as Ref's
- Handling Reconstruction Projects
- Replacing References/Removing Intervals
- Modular Based Cells
- Task after Placement

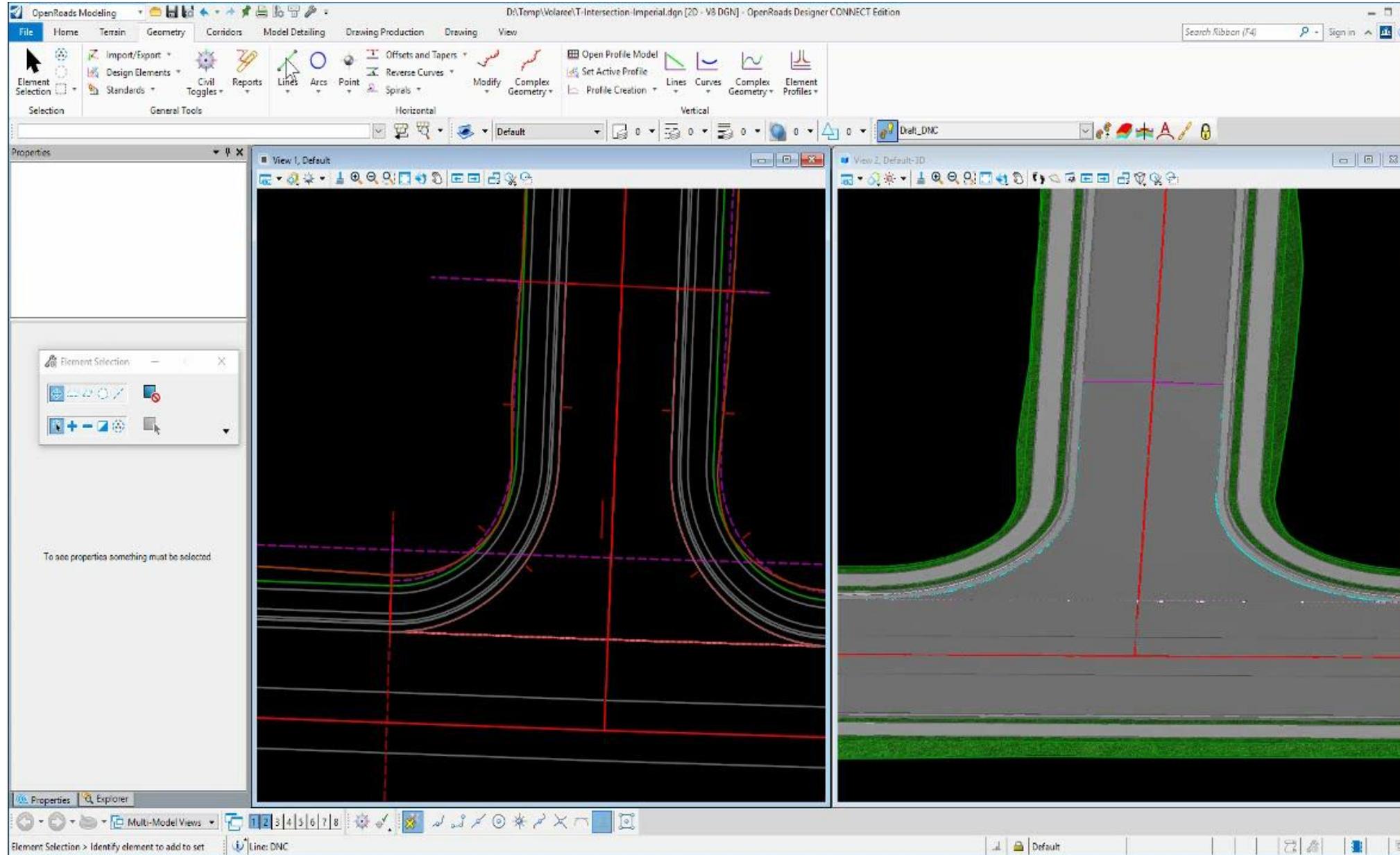


# Basic Best Practices (ADA Example 1)

This section covers Basic Best Practices of building Civil Cells while building an ADA Ramp Civil Cell.

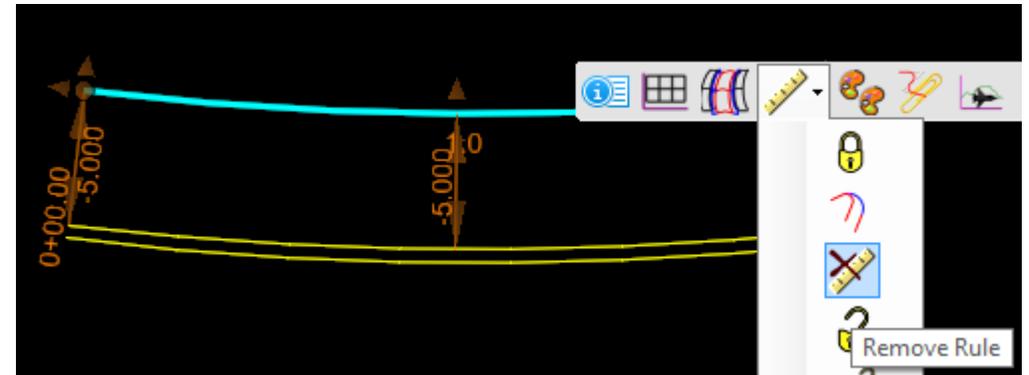
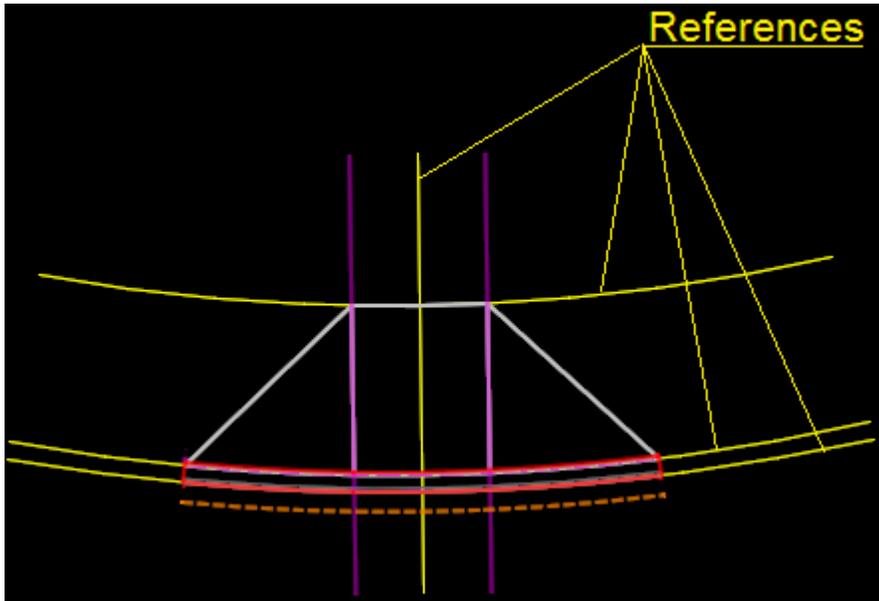


# The ADA Ramp we will Create



# References

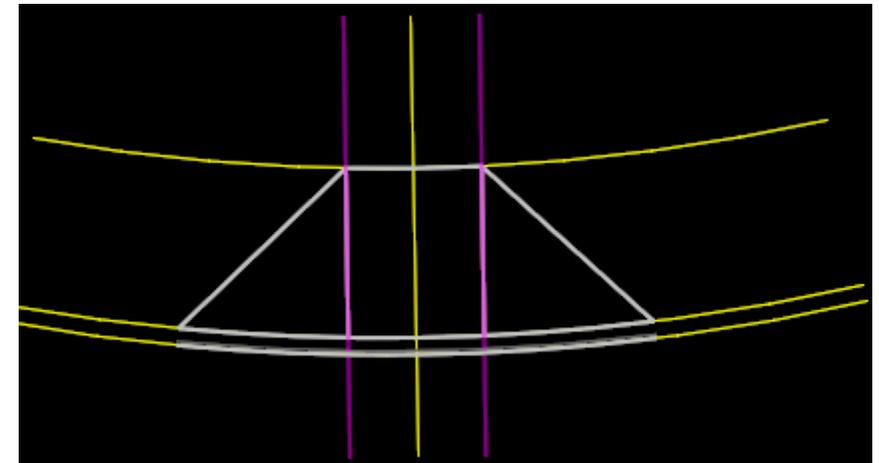
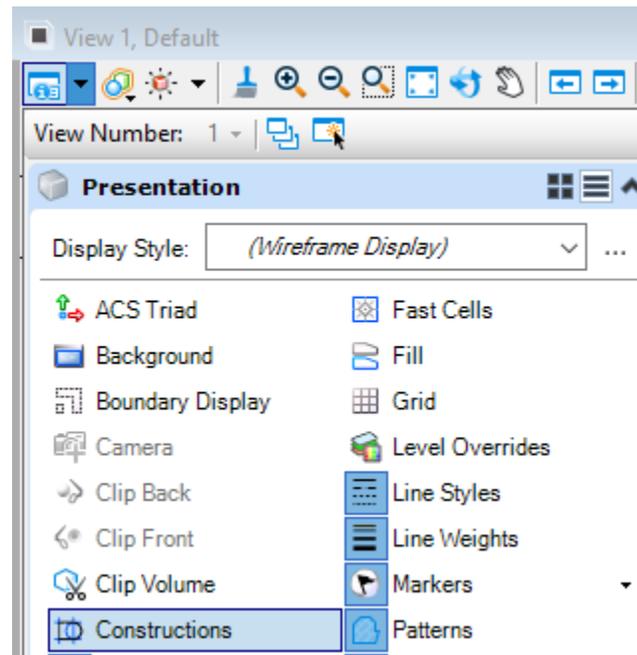
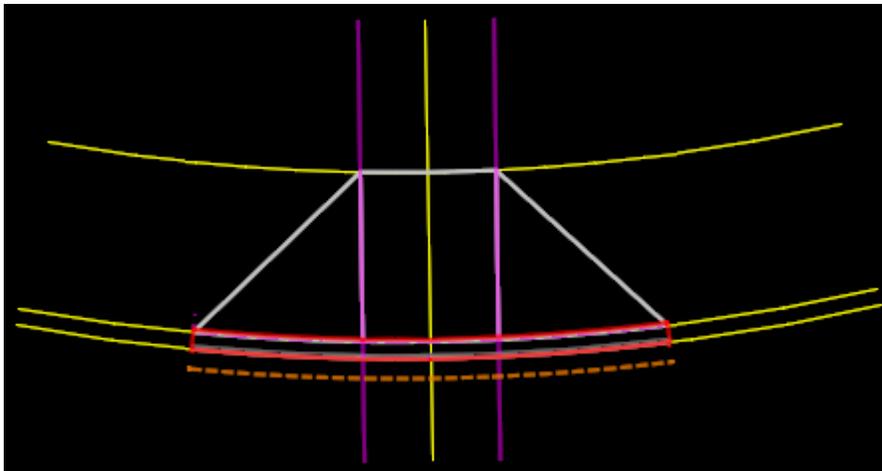
- Different Symbology than Civil Cell Elements
- Delete Rules - Can't be dependent on each other
- Different Reference Geometry – How will it affect the Civil Cell?
- When is Vertical applied? Any time prior to dependent cell geometry vertical being applied.



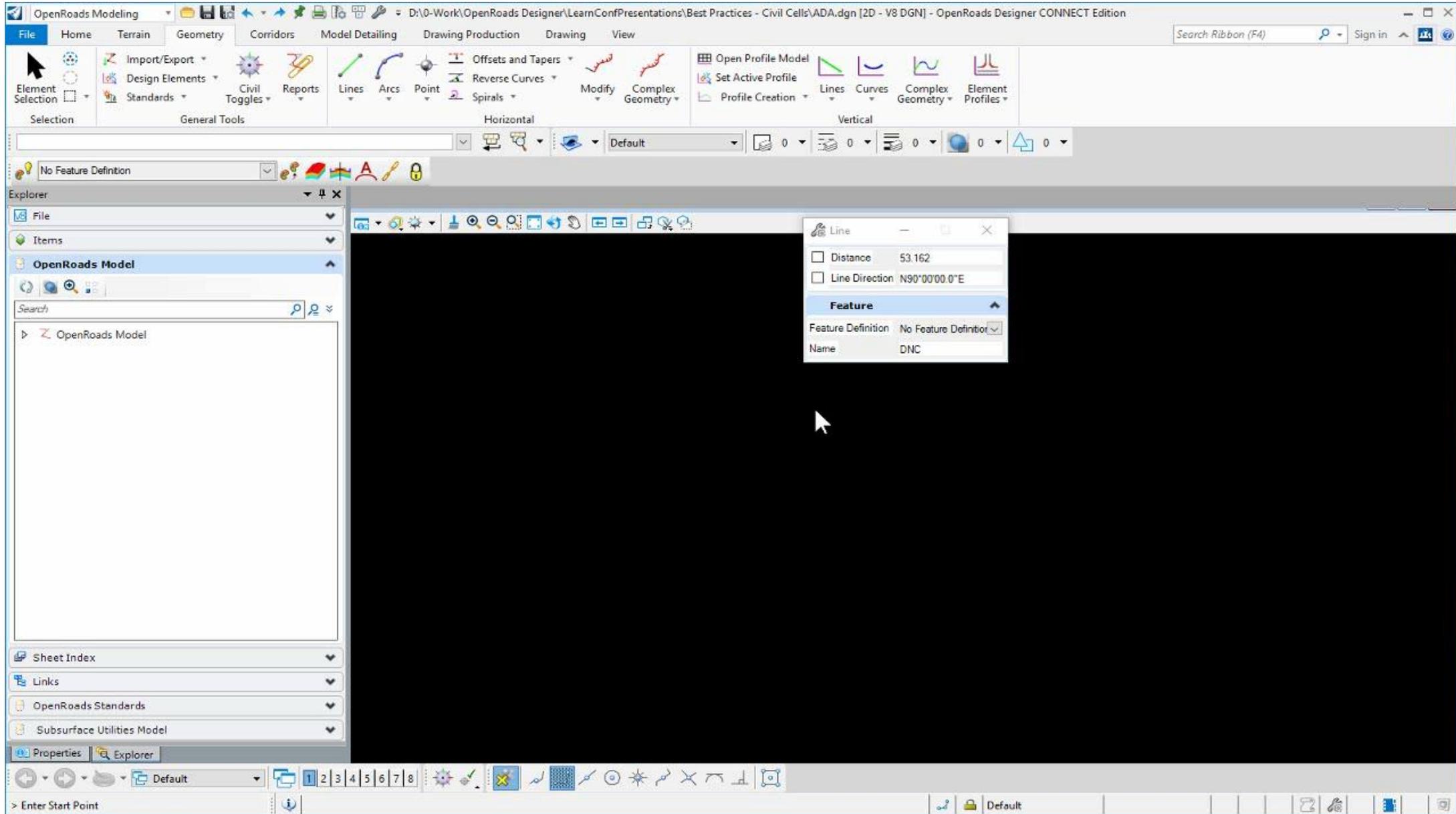
# Construction/Working Elements

## –Construction/Working Elements

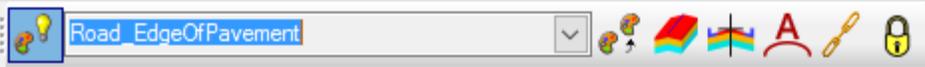
- Additional Horizontal Geometry Elements, which are non-essential to the plan drawing but needed to build the Civil Cell, are generally required for construction of most Civil Cells.
- Construction Class or Not? - Some of these “Additional” elements should be construction class and some should not. When a user turns off construction class, all elements that control horizontal geometry of a Civil Cell should be displayed.



# References & Construction/Working Elements



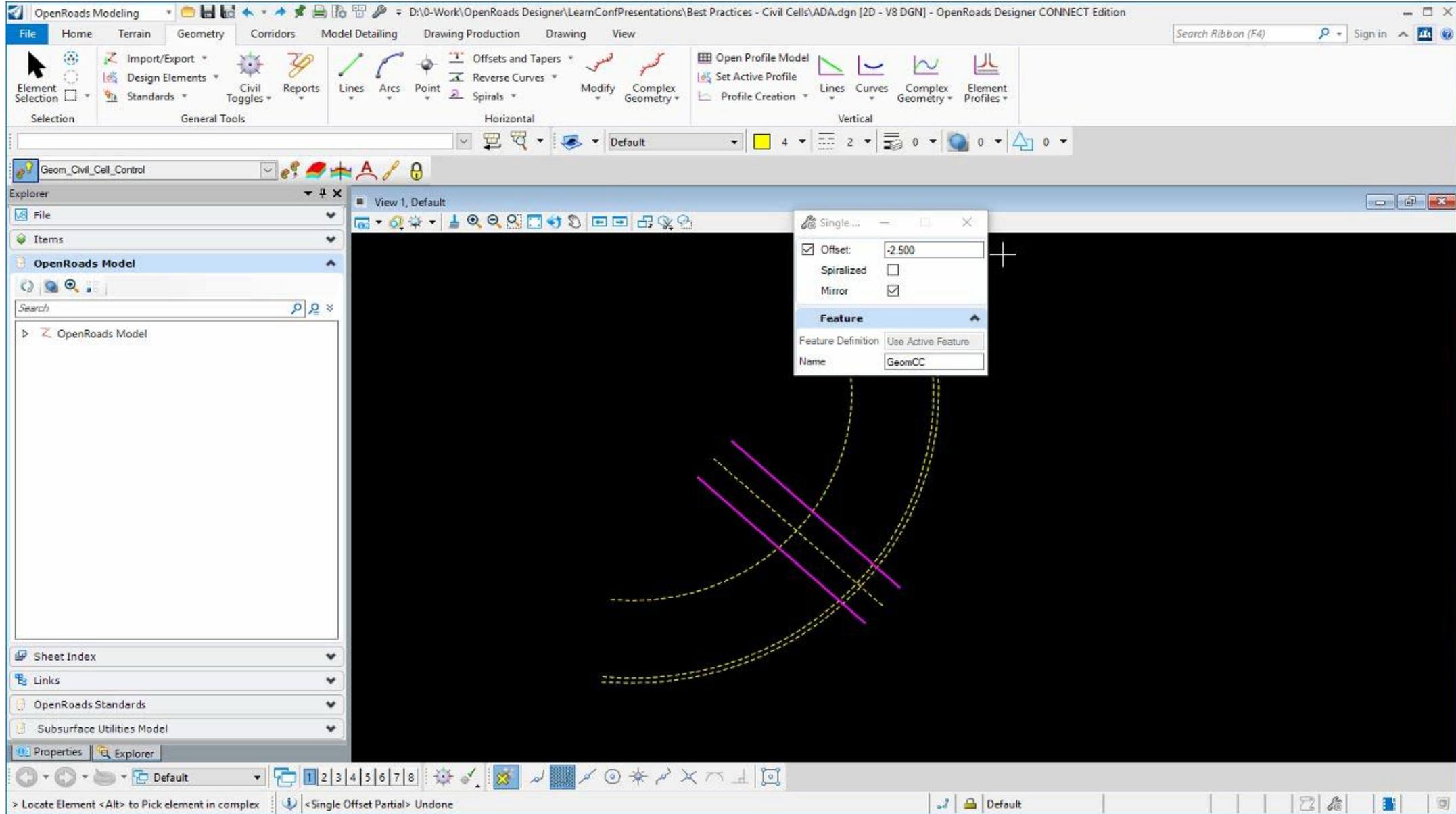
# Horizontal & Vertical Geometry

- Requires Geometry references
- Captures fully constrained Rules to Children Elements
  - Direction and location of reference elements are used to try and find best placement solution
- Snaps
  - Civil Accudraw constructions maintained
  - Constrained MSTN snaps are maintained
  - **Good snaps** – end point, intersection, perpendicular, tangent, center, mid point (used carefully..)
  - **Bad snaps** – XY, Nearest
- Intervals
  - Be careful with the Vertical aspect of a trimmed Horizontal element.
  - A work-a-round to an Interval is a Partial Offset to create an underlying element. This is demonstrated in the ADA Ramp with the 1<sup>st</sup> two Civil Cell elements we've placed.
- Feature Toggle Bar 
  - Big time saver in lieu of assigning a feature with every command.

# Horizontal Geometry Commands

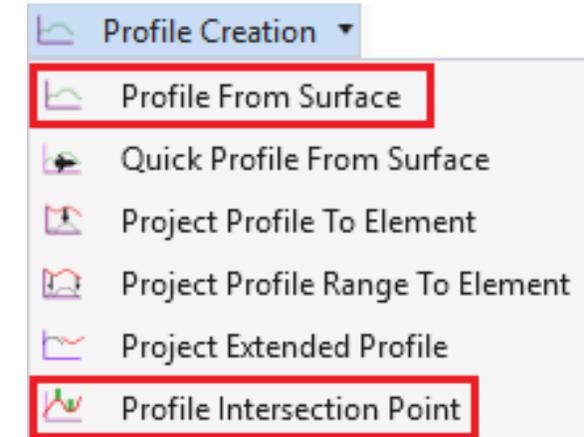
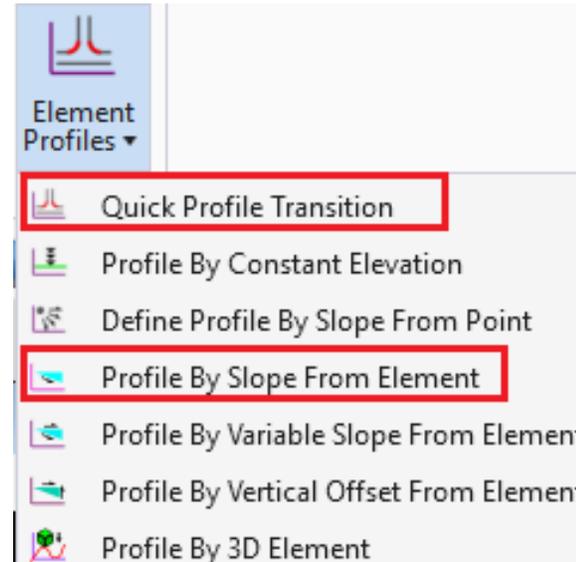
- **Single Offset Partial**
  - A very valuable tool in Civil Cells
  - Switch to Length instead of End Station to control length, even when using snaps.
- **Simple Arc Between Elements**
  - Can be changed to 2-Center or 3-Center curves
  - Tapers/spirals can be added after placement of the cell
  - Back & Ahead Offsets are available as well
- **Complex Elements**
  - It's ideal to complex adjoining elements to apply one linear template instead of multiple.
  - Remember to Complex the Vertical & Make Active after Complexing Horizontal.
  - Exceptions or Notes:
    - Note anything with a station is not supported in Civil Cells so when you have to apply a Template Point Control or Parametric Constraint over a given station range, do not complex but rather make the geometry length the same as the template length.
    - Simple Vertical Edits can only be accessed in the Project Explorer Model tree when elements are Complexed.

# Horizontal Constructions

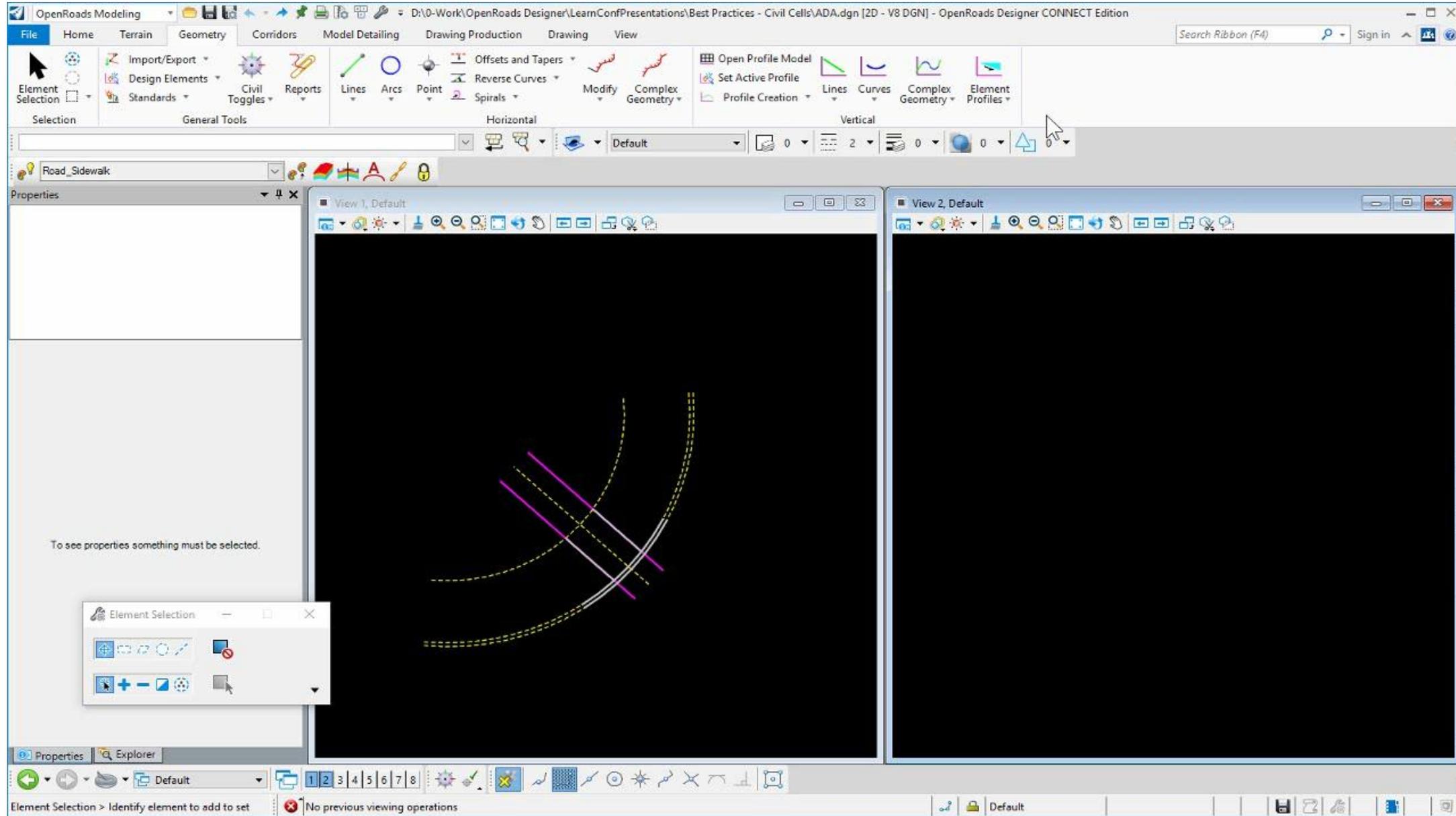


# Vertical Geometry Commands

- Key Commands:
  - **Profile by Slope from Element** is ideal for a majority of profiles as is Quick Profile Transition for Arcs between Elements.
  - **Profile From Surface** is ideal for creating profiles of islands, medians, etc. From an underlying terrain.
  - If **Profile Intersection Point** does not hold up in a Civil Cell, project slopes even to Perpendicular elements and then draw profiles to the Begin/End of those projected slopes.
- Create 3D Automatically
  - Ideal for creating Vertical for Line between Elements command where vertical exists.

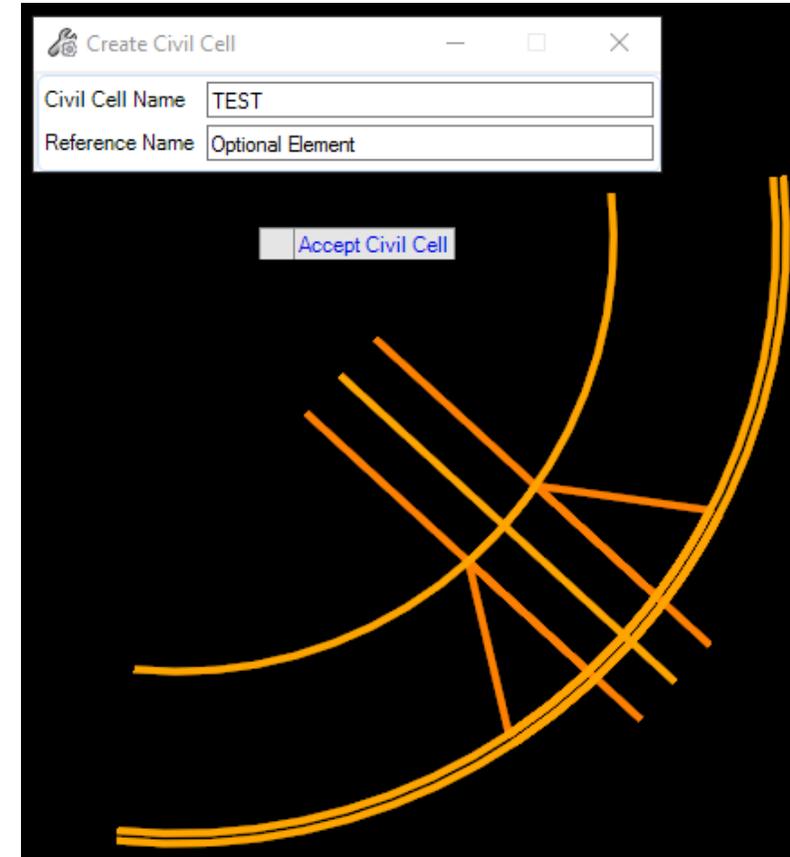


# Applying Vertical and Completing Horizontal



# Cell Testing through the Build

- Test, Test, Test during the build process, not after everything is complete.
- The Quick Test
  - Choose the Create Civil Cell command
  - Don't worry about Reference Names
  - Build the Civil Cell up to the point of Accepting
  - Make sure all the Civil Cell elements highlight
  - If they do, **Reset** to not create the cell
  - Continue building the cell.



# Cell Testing through the Build

- Other Testing
  - Test the placement with varying direction references & geometry
  - Test after placement by moving references
  - Does the cell heal correctly after adjustment ?
    - Yes – Have you considered enough test cases ?
    - No – check the construction and find element rule that is failing and see if it can be built differently, or is this a new requirement that needs a new civil cell

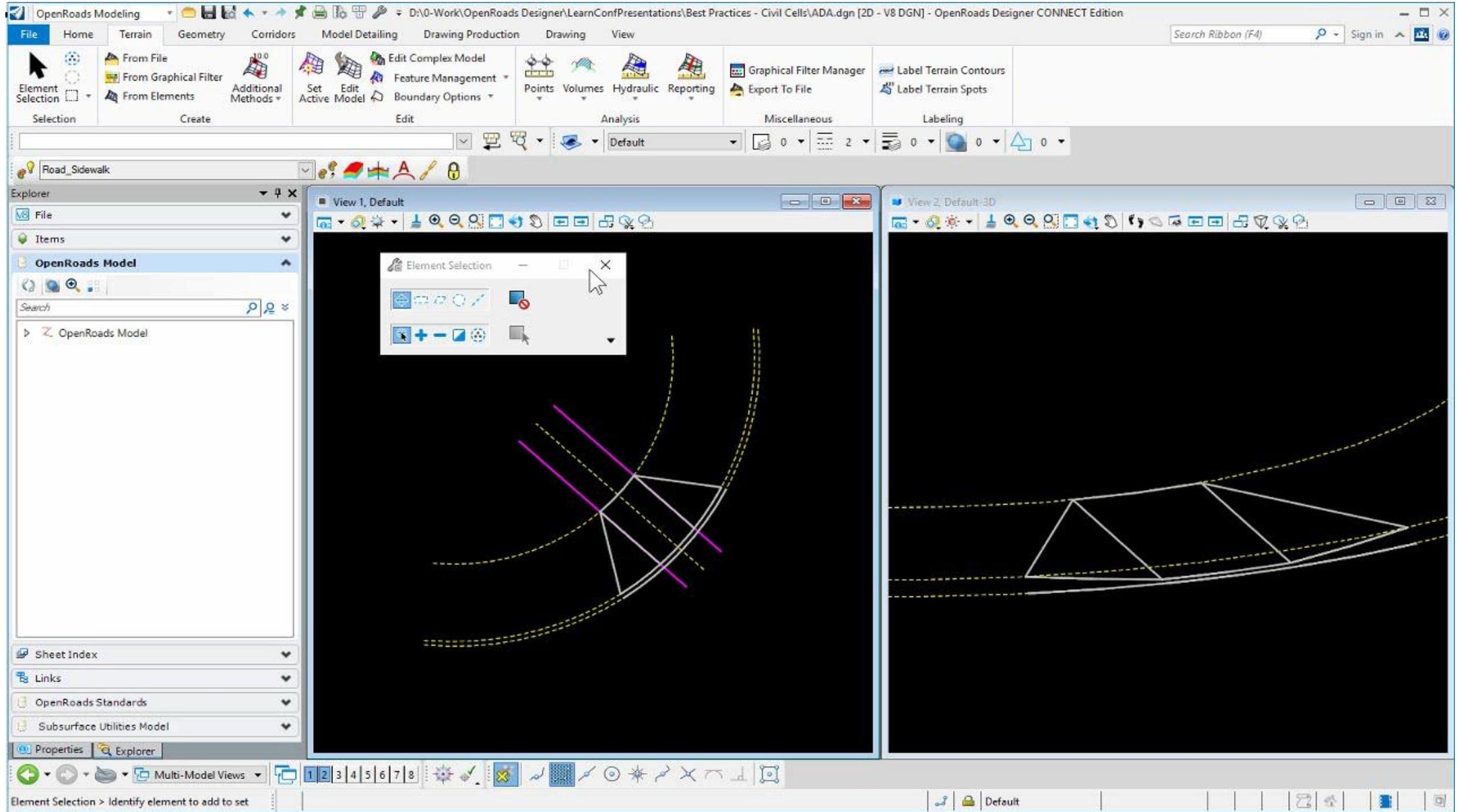
# Terrains in Cells

- Created from Graphical elements
  - Ruled Terrain
  - Updates dynamically
- Can be created with an open boundary but pay consideration to the geometry in use and the impact on the boundary
- Construction Class Terrains created from geometry are ideal for profiling islands, medians, etc.
- Consider Stroking Tolerances
  - Stroking tolerances are passed forward with placement
  - Set Curve and Profile stroking  $\leq 0.07$  as this will result in 'better' surface
  - Set Linear stroking appropriate to scale / units for site work
- Drainage Design - When a cell with a terrain in it is placed, the user should remember changing display characteristics to Contours or Flow Arrows to aid in drainage design.
- Can be built from Template Graphics - Ideal for island and median profiles.

# Templates

- Surface
  - Generally Enable Linear Features
- Linear
  - Don't duplicate 2D geometry already drawn (i.e. if EP is graphically drawn in the cell, don't place again as a template linear. Change the template EP feature to DNC.)
  - Parametric Constraints and Point Controls are useful tools in templates in the cell but station ranges are not supported so template drop elements should coincide with Parametric and Point Control lengths.
  - Unsupported corridor objects
    - Clipping Reference
    - External Reference

# Terrains & Templates Video



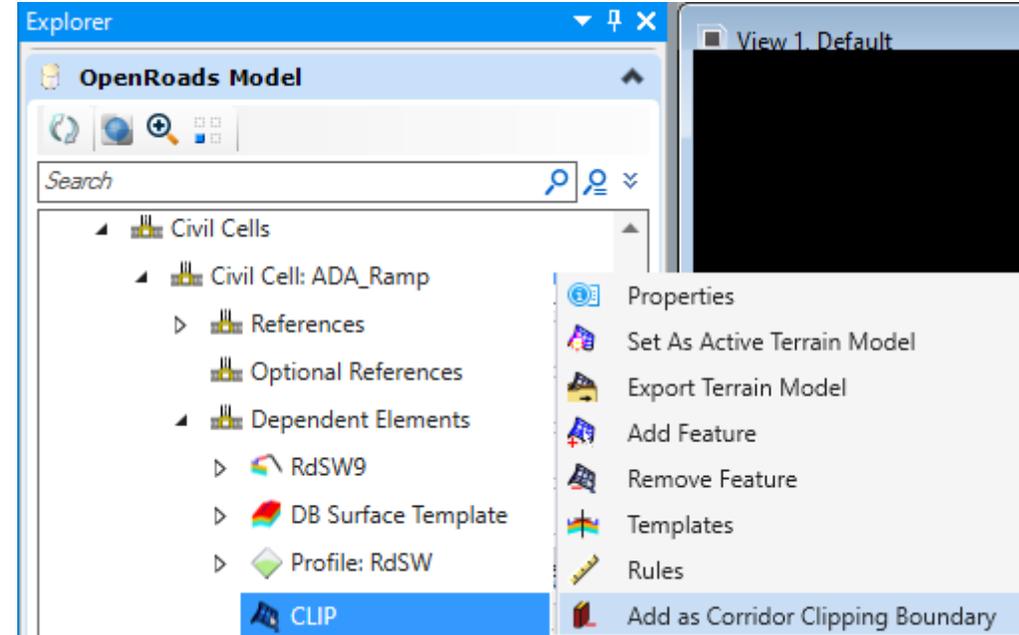
# Creating the Cell & Corridor Clipping Boundary

- Reference Names

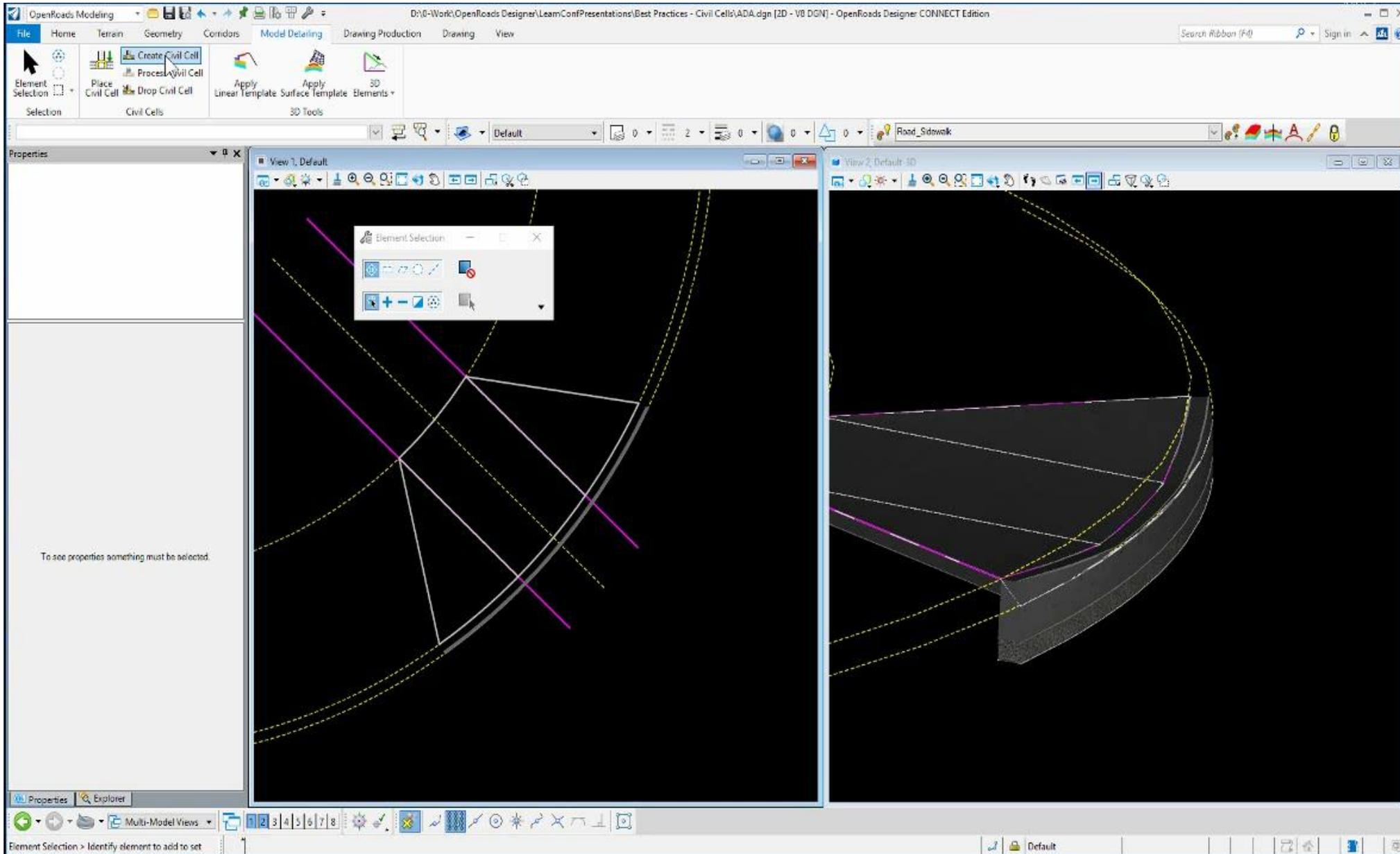
- Be as descriptive as possible.

-  Civil Cell: CurbRamp Perpendicular
  -  References
    - ▶  External Component: Curb FL (Profiled)
    - ▶  External Component: Curb Back Top (Profiled)
    - ▶  External Component: Face of SW or Ramp Back Tie (Profiled)
    - ▶  External Component: Ramp CL (Placed from EP to a Few Feet past Back Tie)

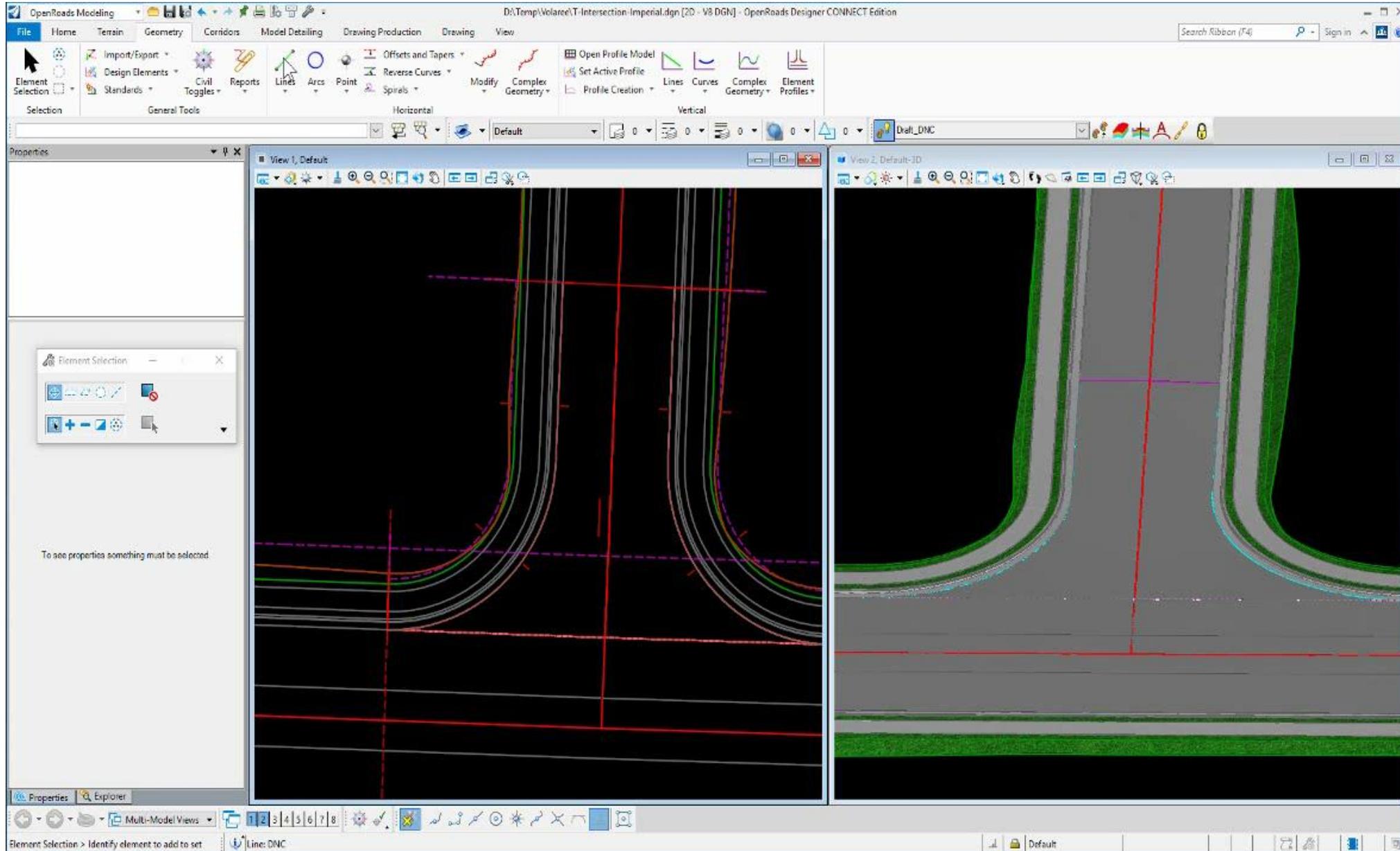
- Adding A Corridor Clipping Boundary

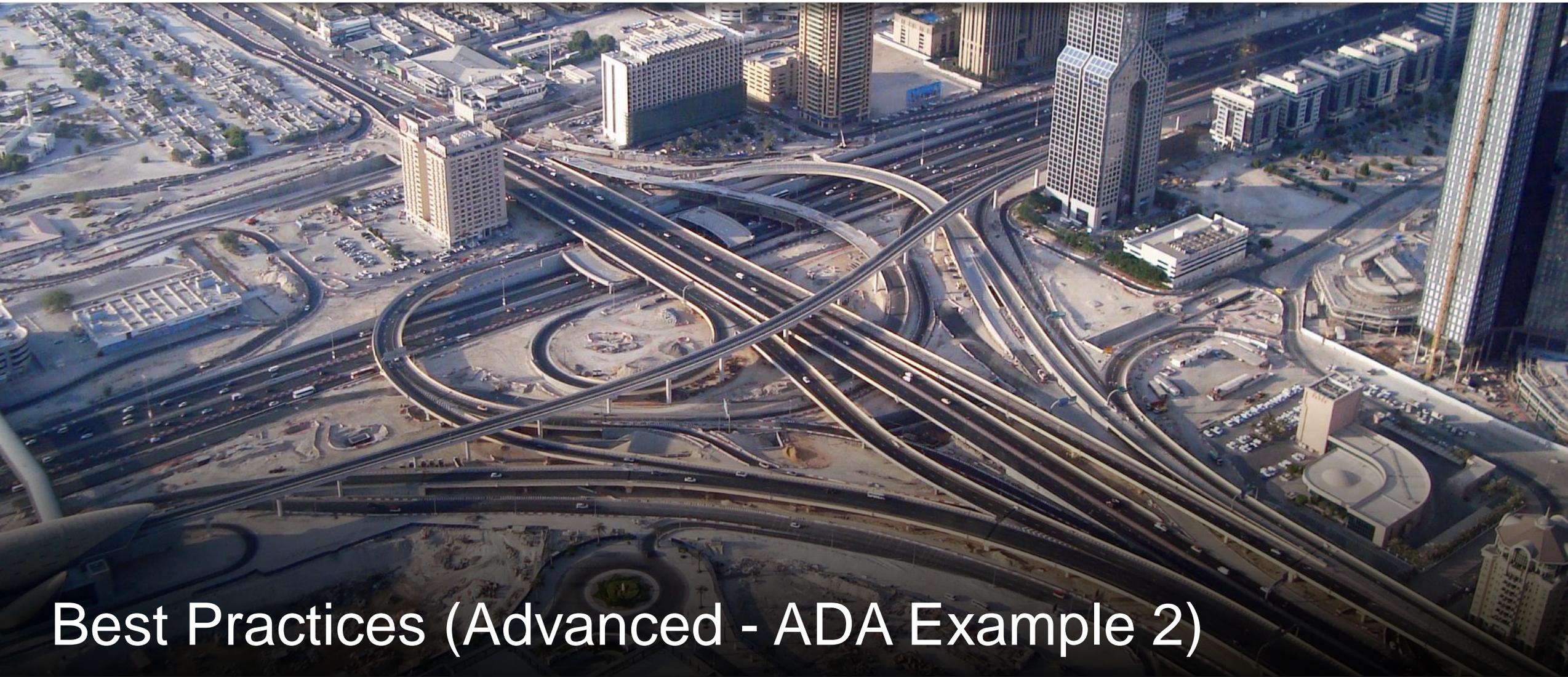


# Creating the Cell Video



# Placing the Cell & Edits Video



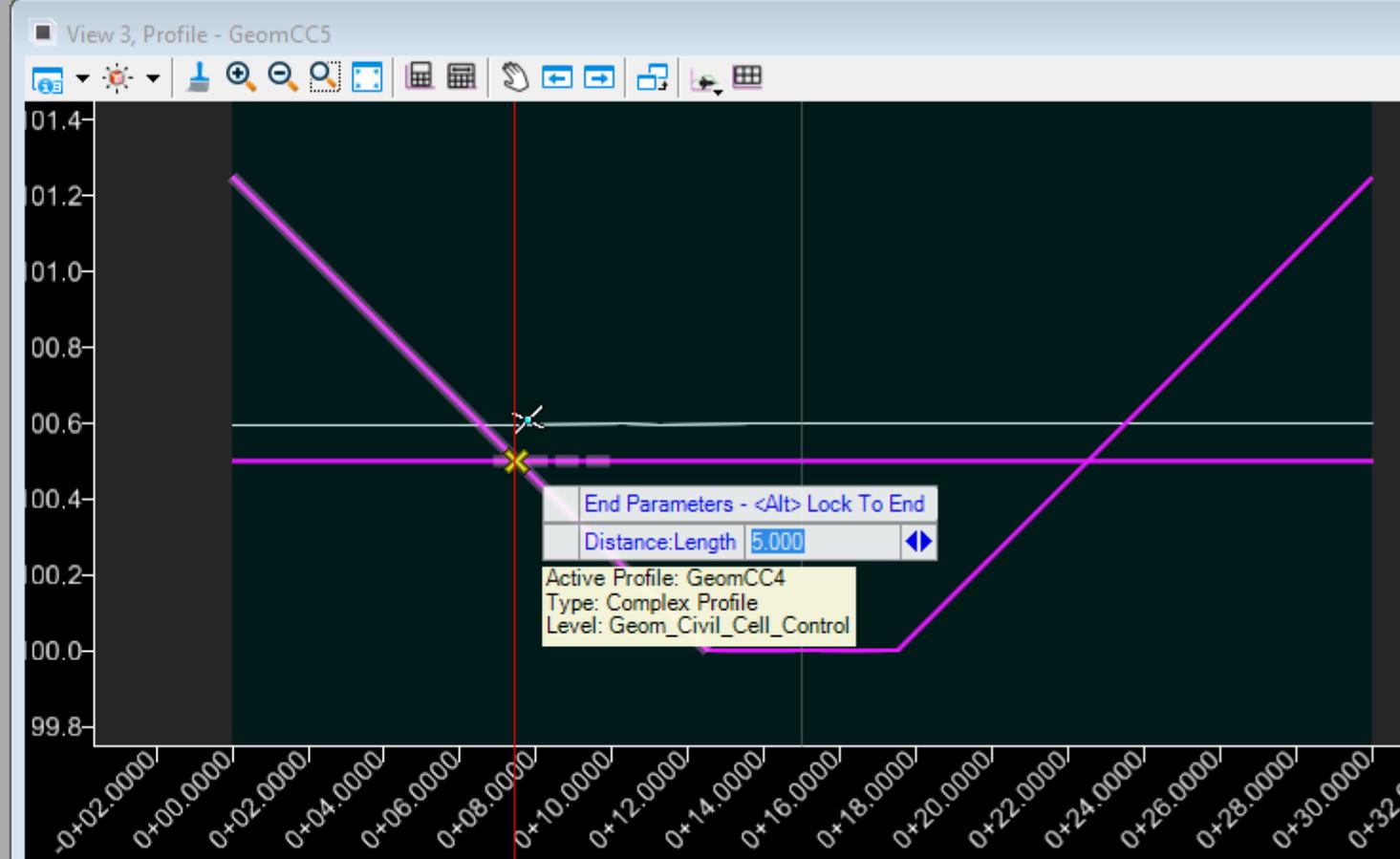
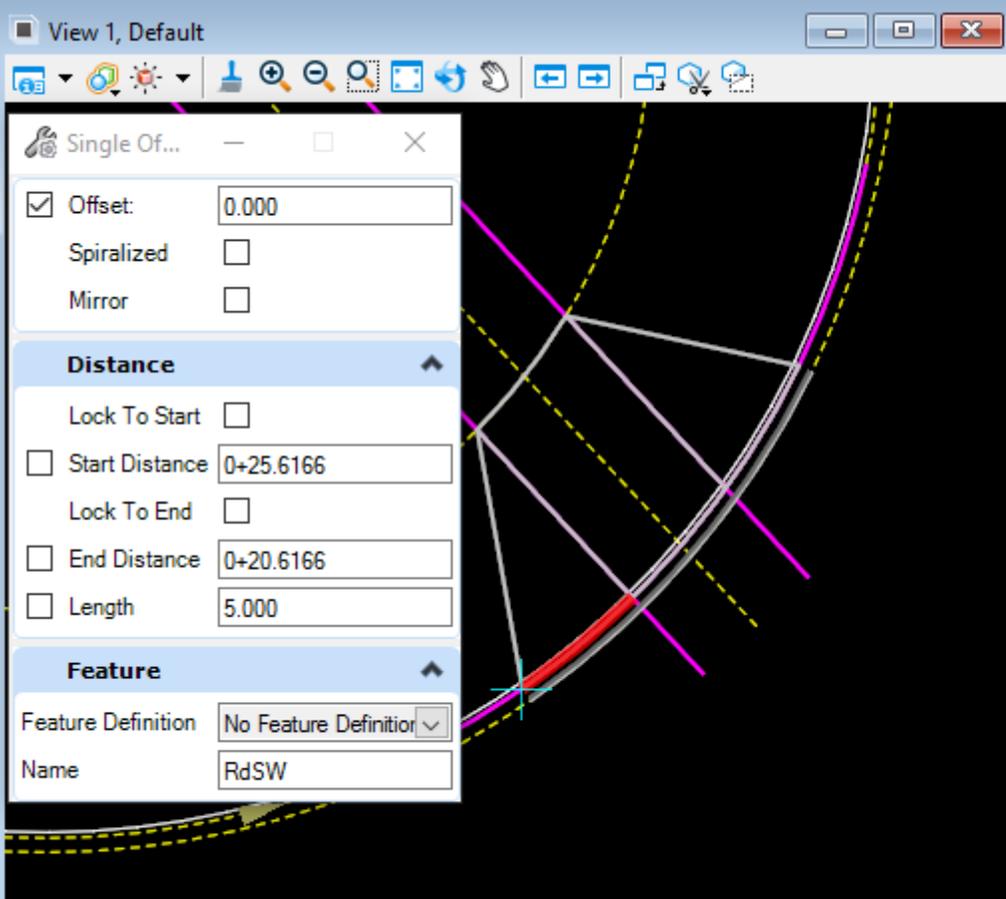


# Best Practices (Advanced - ADA Example 2)

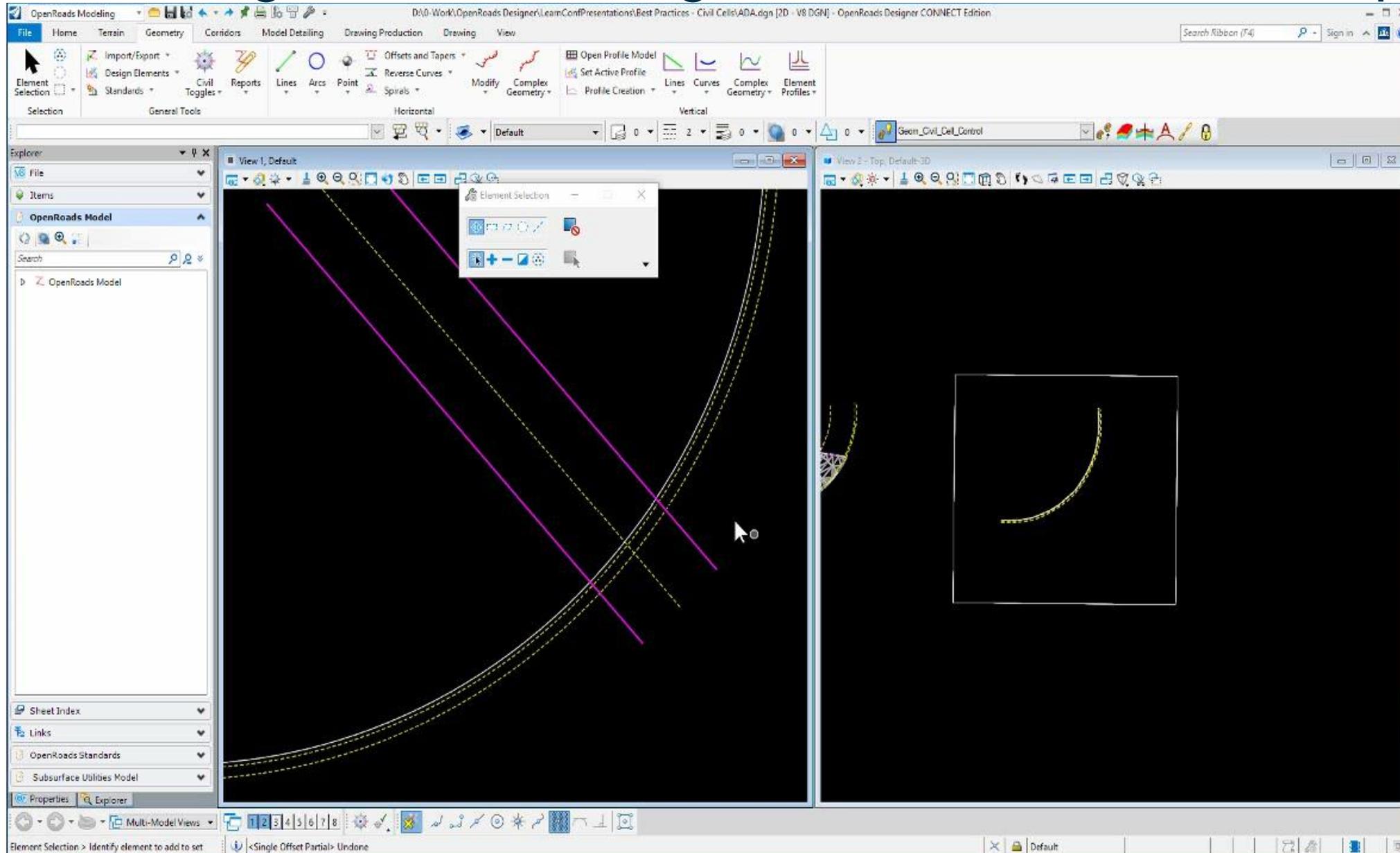
Controlling Horizontal Length with a Profile Snap

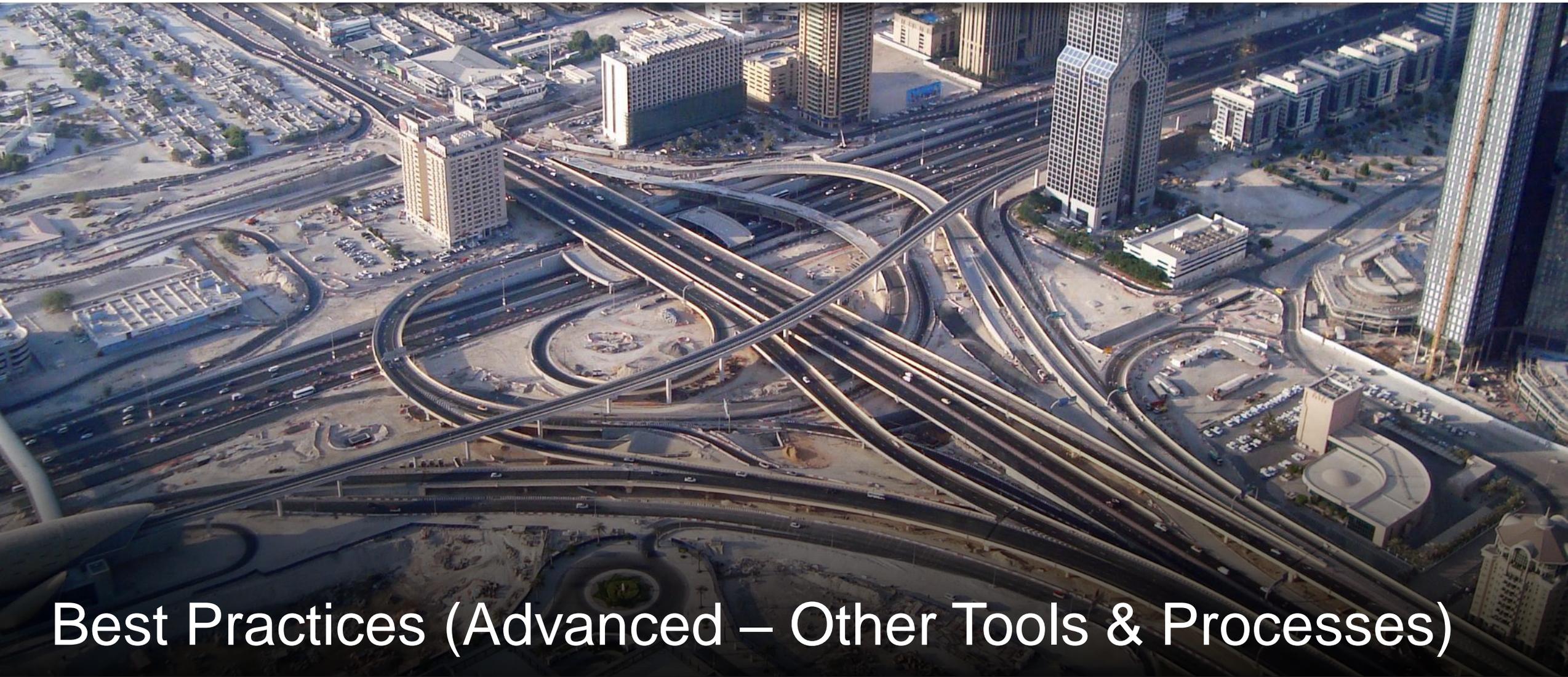


# Controlling Horizontal Length with a Profile View Snap



# Controlling Horizontal Length with a Profile View Snap Video





# Best Practices (Advanced – Other Tools & Processes)

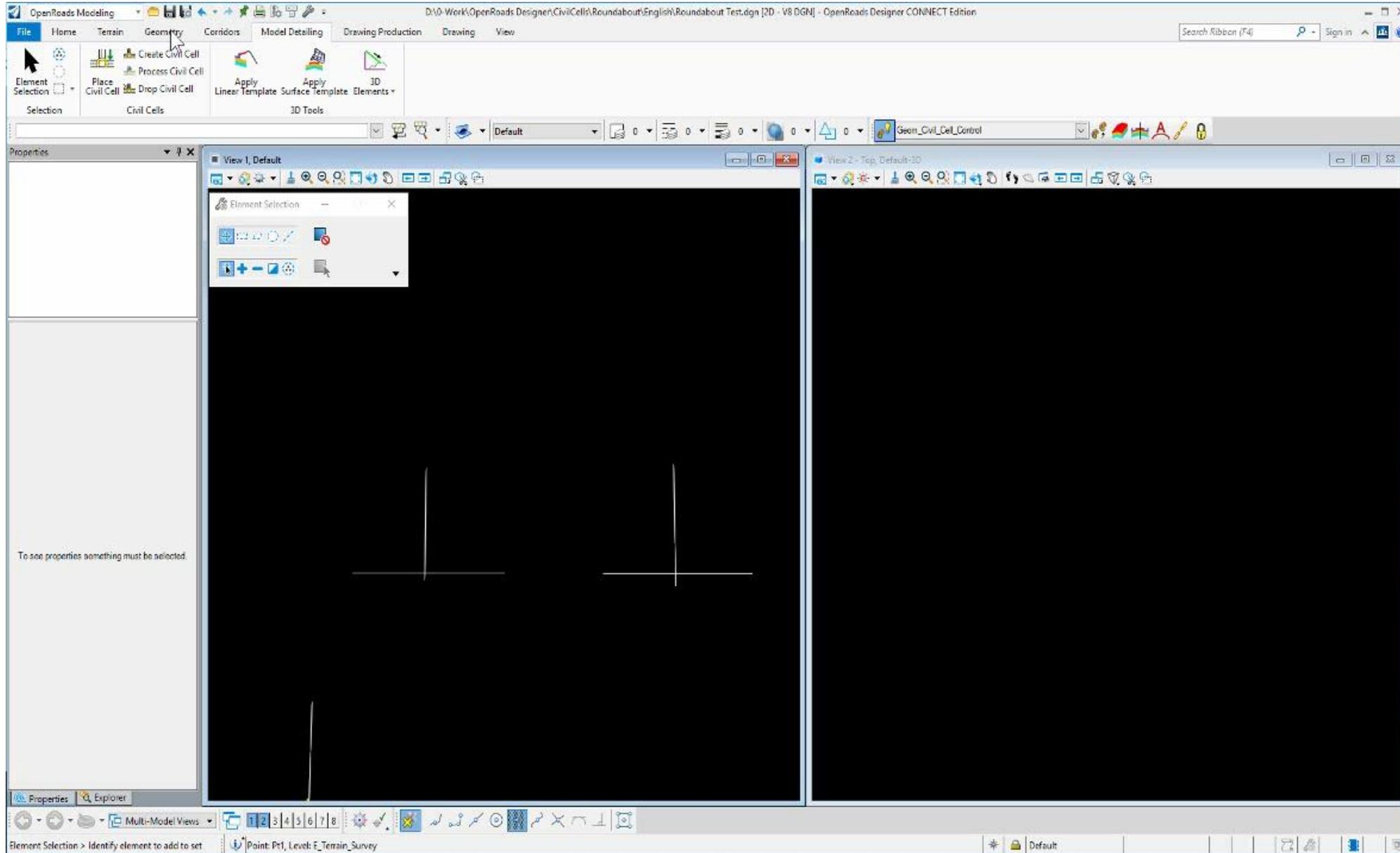
Other Advanced Best Practice Tools & Processes



# Using Points as Civil Cell Reference Elements

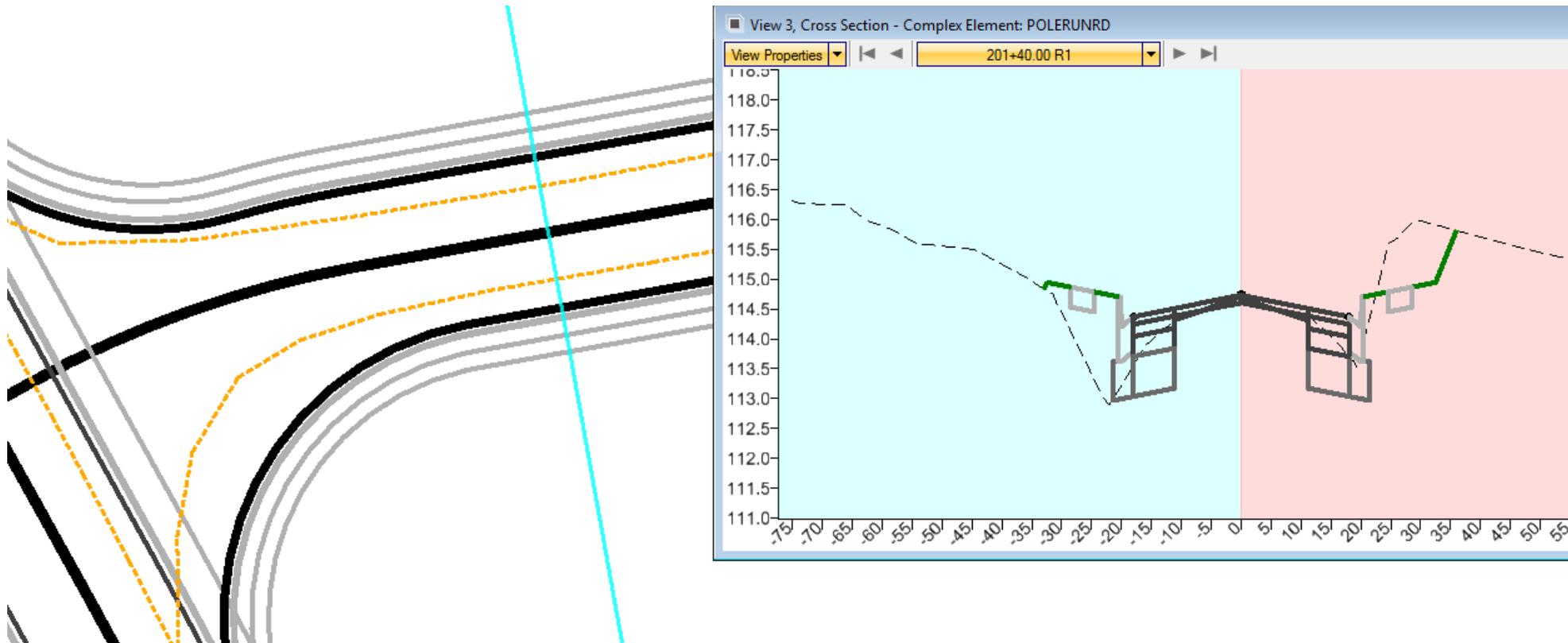
- Why?
  - Length Controls
  - A Through Point instead of a Default Radius
  - Identifying the proper intersection location if multiple intersections exist.
- Point Requirements
  - Point needs to be placed on an assigned feature.
  - Can't be placed by snapping to any of the reference elements.
- Examples of Use
  - Controlling the length of an Intersection cell along the Secondary Road
  - Enter Thru Point instead of placing a pre-established radius
  - Reverse Curve Detours, Roundabout/Approach Alignments, etc. (Any geometry where there are multiple intersections consider a Point reference if an intersection snap gives you inadequate results).

# Using Points as Civil Cell Reference Elements Video



# Handling Reconstruction Projects w/ Civil Cells

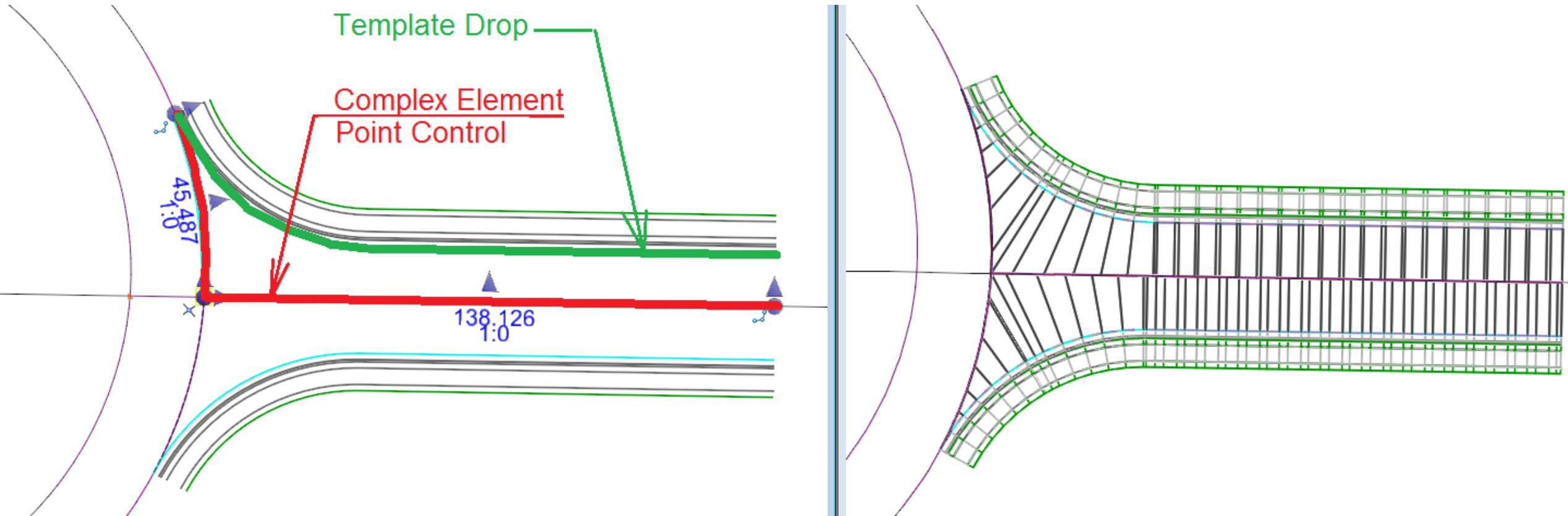
- Problem
  - Overlay Templates are currently not supported in Surface Templates
- Solution
  - Use a Linear Template instead



# Handling Reconstruction Projects w/Cells

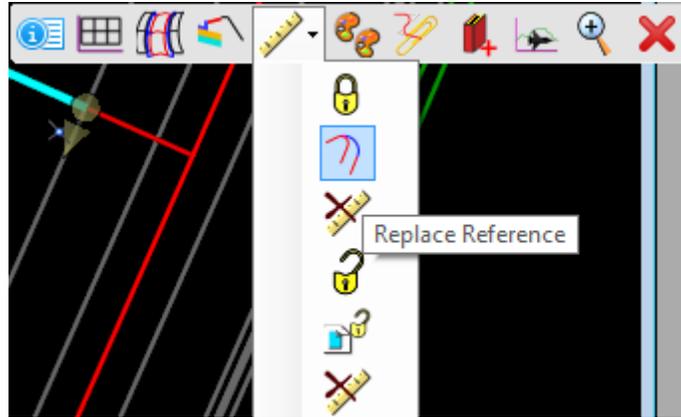
- How?

- Place the Linear Template on the EP & target a Complex constructed as shown in red below with a Point Control
- Process is performed for Left & RT sides.
- Use an Overlay/Milling Template as needed.

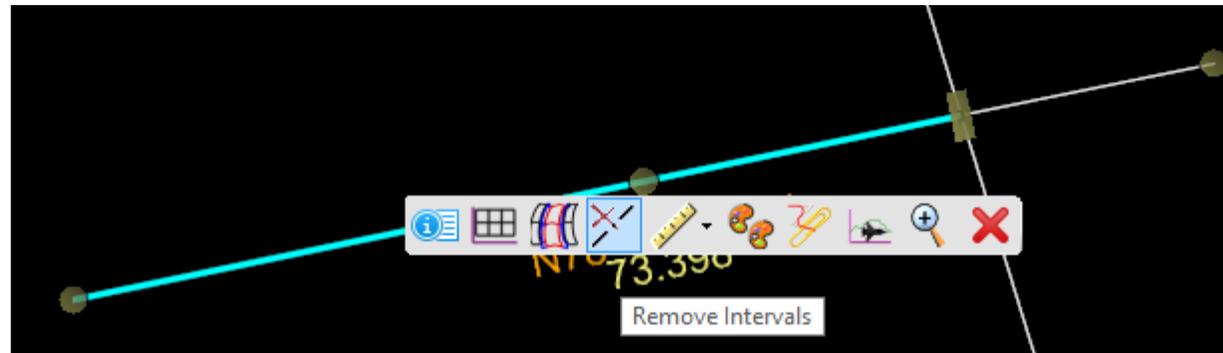


# Replacing References/Removing Intervals

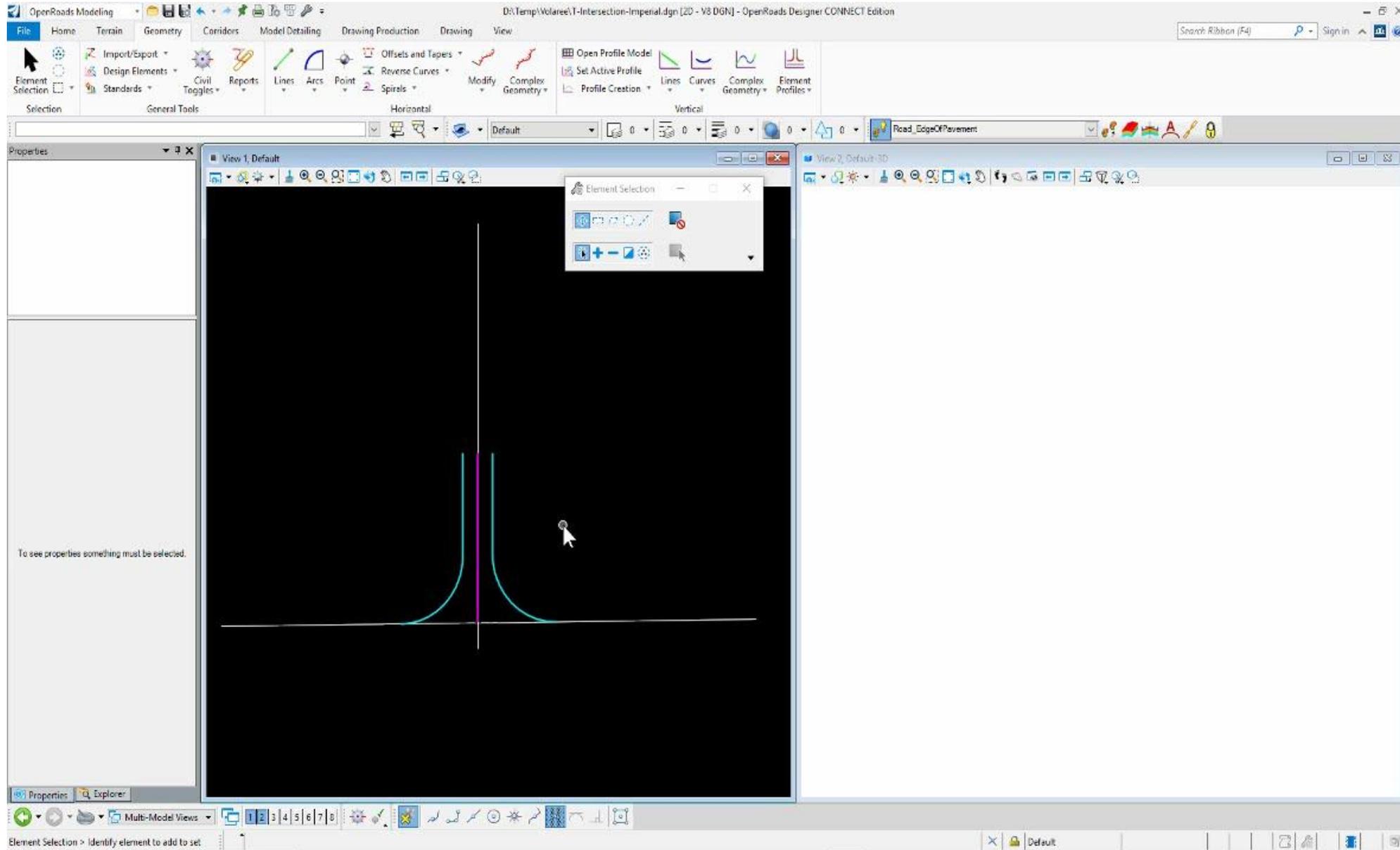
- Replace Reference



- Remove Interval



# Replacing References/Removing Intervals Video



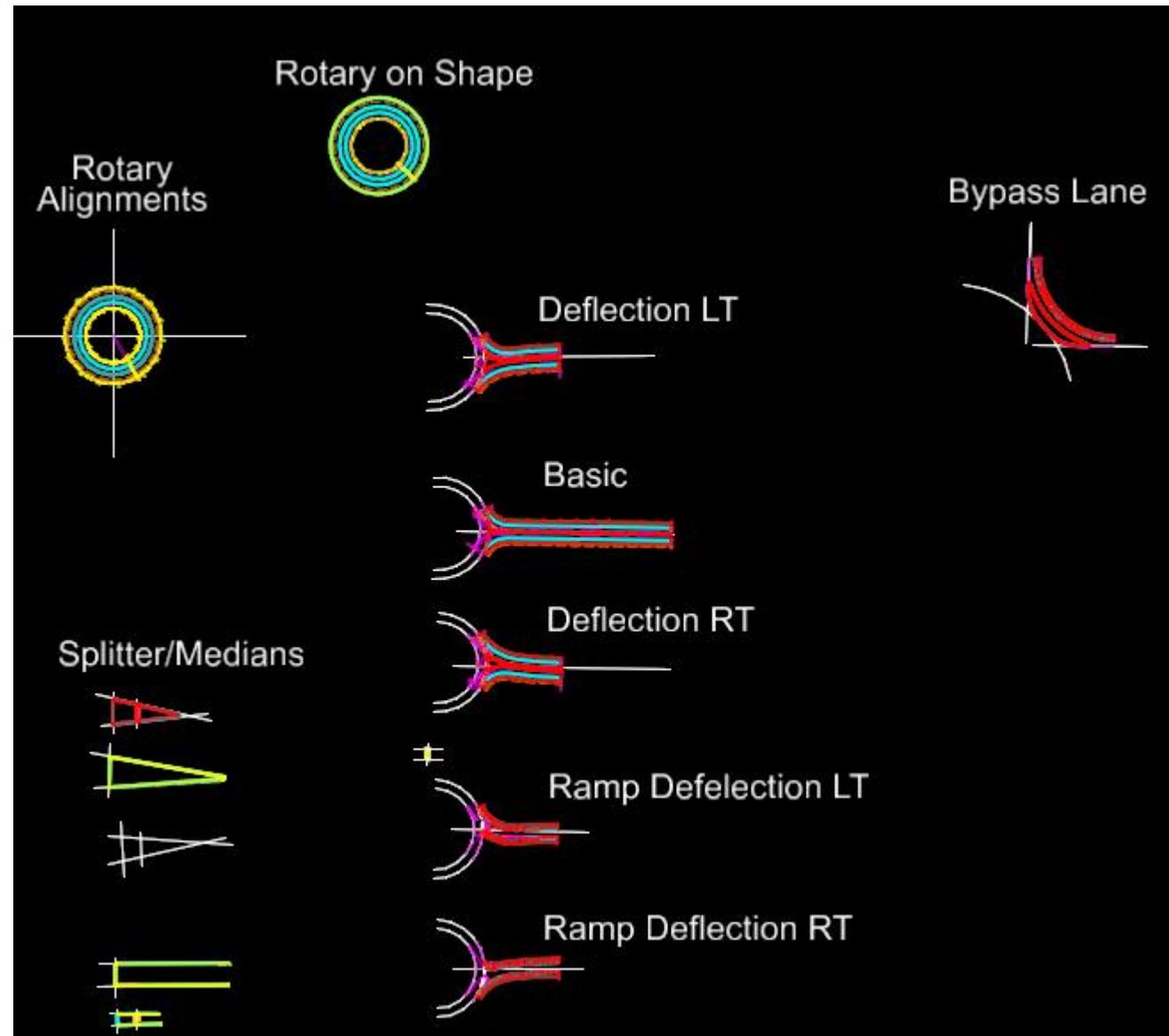
# Modular Based Civil Cells

- What?

- Build Civil Cells for individual pieces instead of building multiple cells for the varying pieces.

- Why?

- Simpler Cells (Creating & Placement/Edits)
- Reduce the number of Civil Cells in your library
- No other feasible method to accommodate different adjoining roadways
- Makes you much more flexible if the design changes. Change the cell instead of replacing it entirely.

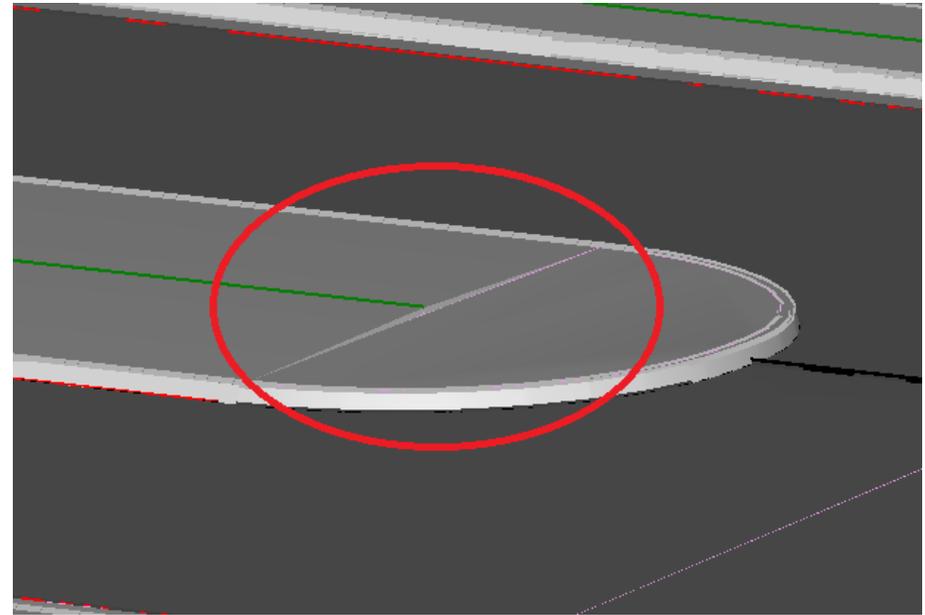


# Modular Based Civil Cells

- Examples:
  - T-Intersection
    - Create the T-Intersection where it can accommodate Turn Lanes
    - Create island cells to add if needed.
  - Roundabout:
    - One Approach may need a splitter island and another may need a median.
    - One Approach may need a Bypass lane
    - Island or Median Needed
    - Etc.

# Task after Placement

- It may not be feasible or possible to complete everything in a Civil Cell so end users may have to perform some additional functions after placement.
- Examples
  - Adding features to Terrains in Civil Cells.
    - The end users can add a spot or breakline to an terrain in a Civil Cell. Good Examples: Islands or Median
  - Terrain Display
    - Don't forget Terrains display capabilities within Civil Cells. These are very useful in downstream processes such as Drainage Design.



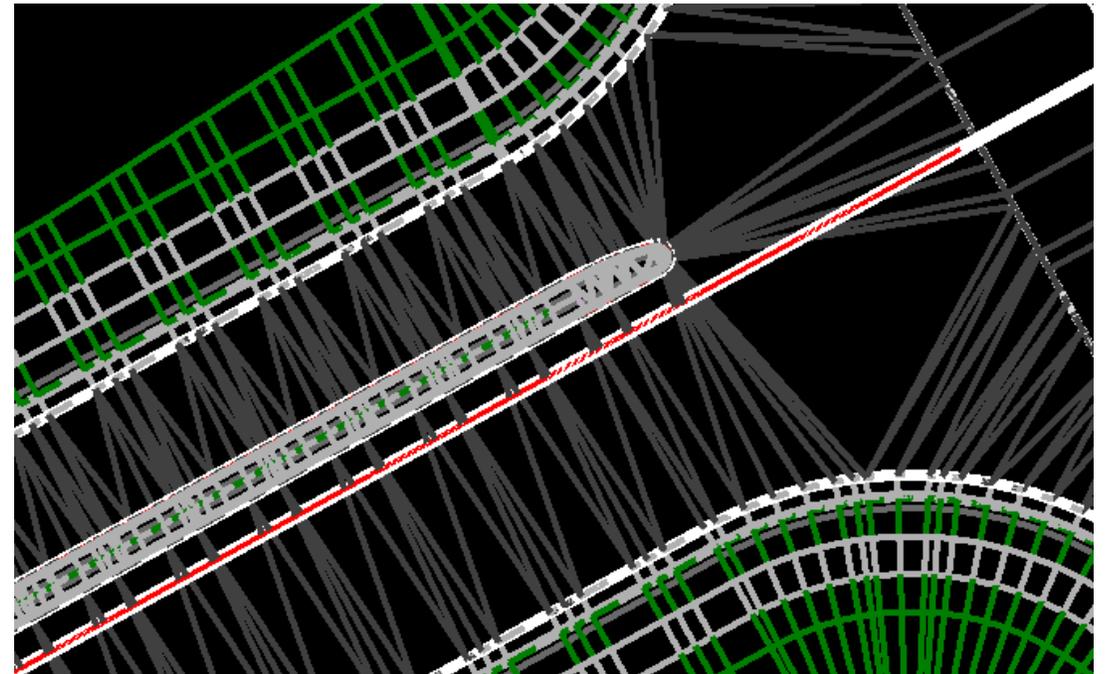
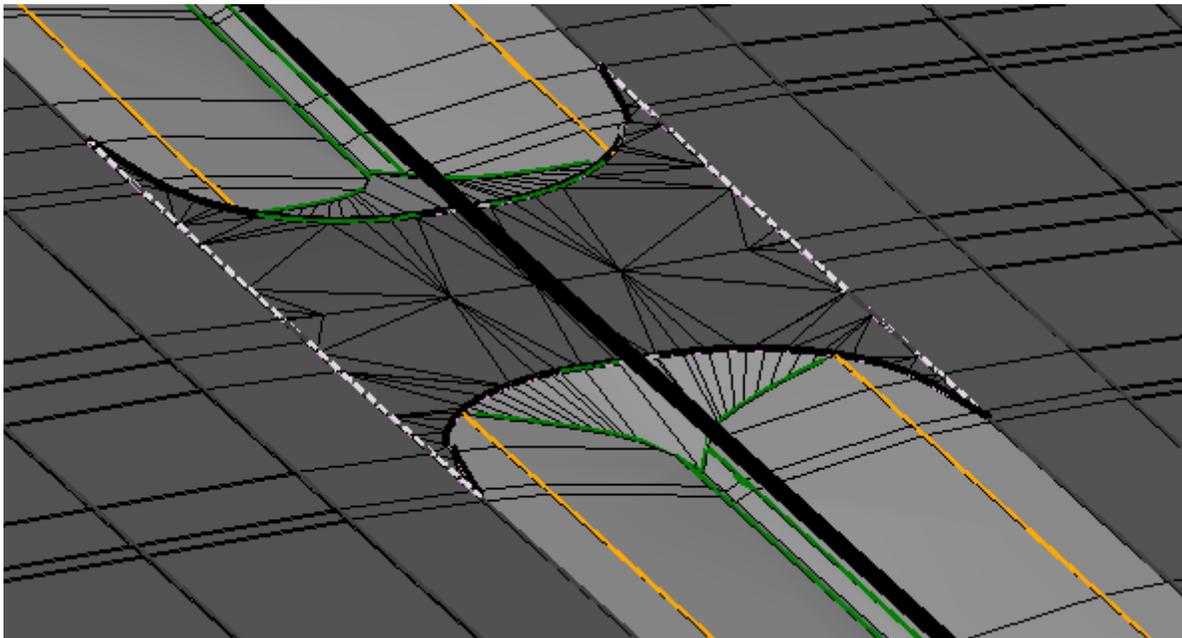
# Task after Placement

## – Target Aliasing

- A Corridor can't be defined as a Civil Cell reference so Target Aliasing, if needed, will have to be applied after placement.

## – Profiling

- Median geometry in a cell may change location in regards to the Road CL which could change the profiling method. A -2% projection may need to be changed to +2% after placement.



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Thank You!