



# Best Practice: Civil Cells

Presented by: Ian Rosam

# Session Description

This best practice session intends to introduce the Civil Cell technology, the methodology and some commonly asked questions on the use. This session intends to provide something for the novice user through to expert user.

## Reference sessions

- QuickStart: OpenRoads Technology Geometry (Workshops)
- Creating and Editing Alignment Geometry (Workshops)
- Civil AccuDraw, MicroStation AccuDraw, or Both (Lecture )
- QuickStart, OpenRoads Technology Corridor and Intersection Modeling
- Terrain Modeling (Workshops)

# Agenda

- Introduction
  - What is a Civil Cell
  - Where Can they be used
  - How can they be distributed
- Civil Cell Content
  - Essential constructions
- Using Civil Cells



# The problem we face

- Engineering designs typically include redundant and tedious modeling tasks that while similar to design standards require engineering judgment in modification of parameters.
  - Manual creation is a time consuming process, fraught with potential errors
  - ‘Standards Driven’ does not mean ‘Standard’ in practice and need engineering decisions
  - Traditional wizards are too restrictive, making the simple easy but the complex impossible, as they only allow what has been programmed
  - The engineering judgment behind the configuration needs to be maintained in order to modify after placement and reuse it.
- What is needed is a way to capture standard designs and parametrically adapt to new situations.

# Civil Cells

- What is a “*Civil Cell*”?



# Civil Cells

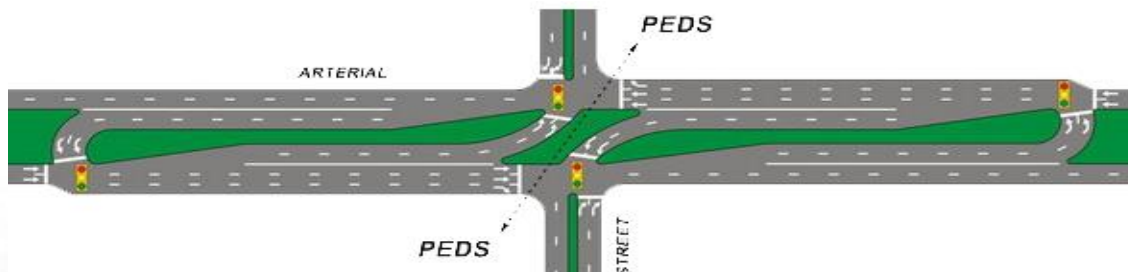
- What is a “**Civil Cell**”?

OpenRoads Technology

+

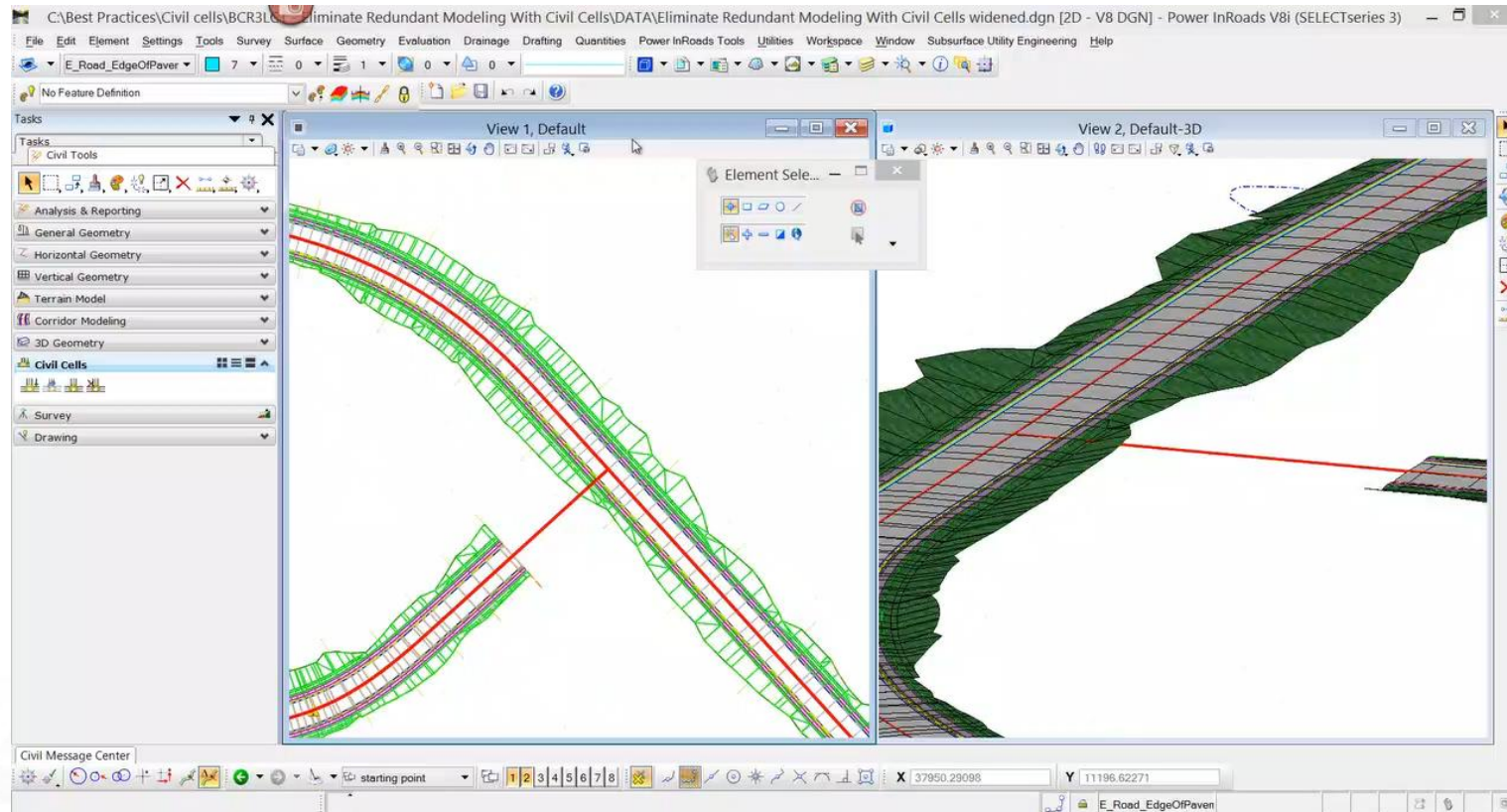
MicroStation Cell

At it's simplest it can be thought of as a ‘Visual Macro’ for repeated use of pre-configured **2D and 3D** geometric layouts that maintain design intelligence.



# Where can they be used ?

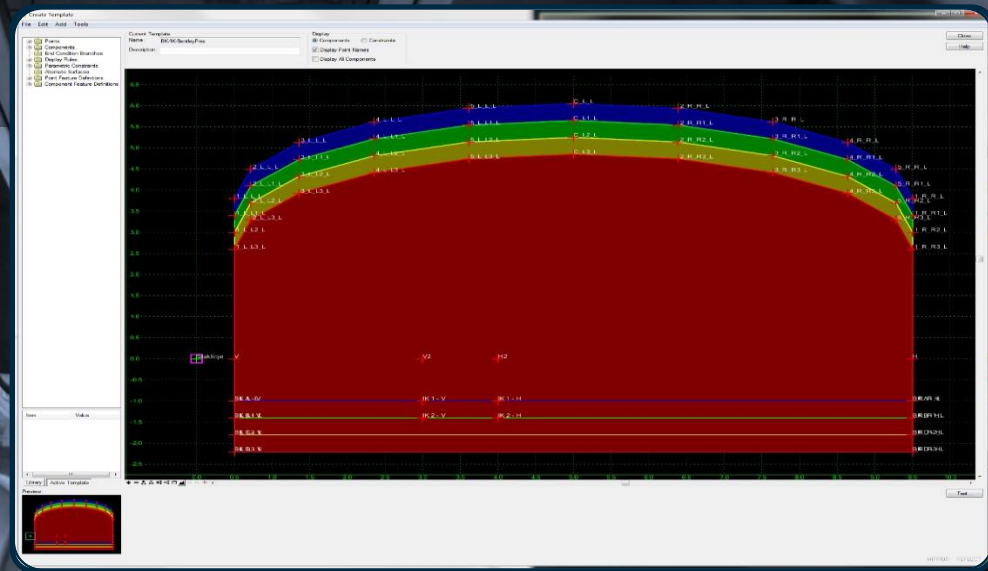
- Engineering Detail Modeling
  - Quickly advance to detail modeling in repeatable situations
  - Evolve the civil cell and adapt to the new situation



## Bentley Power Civil

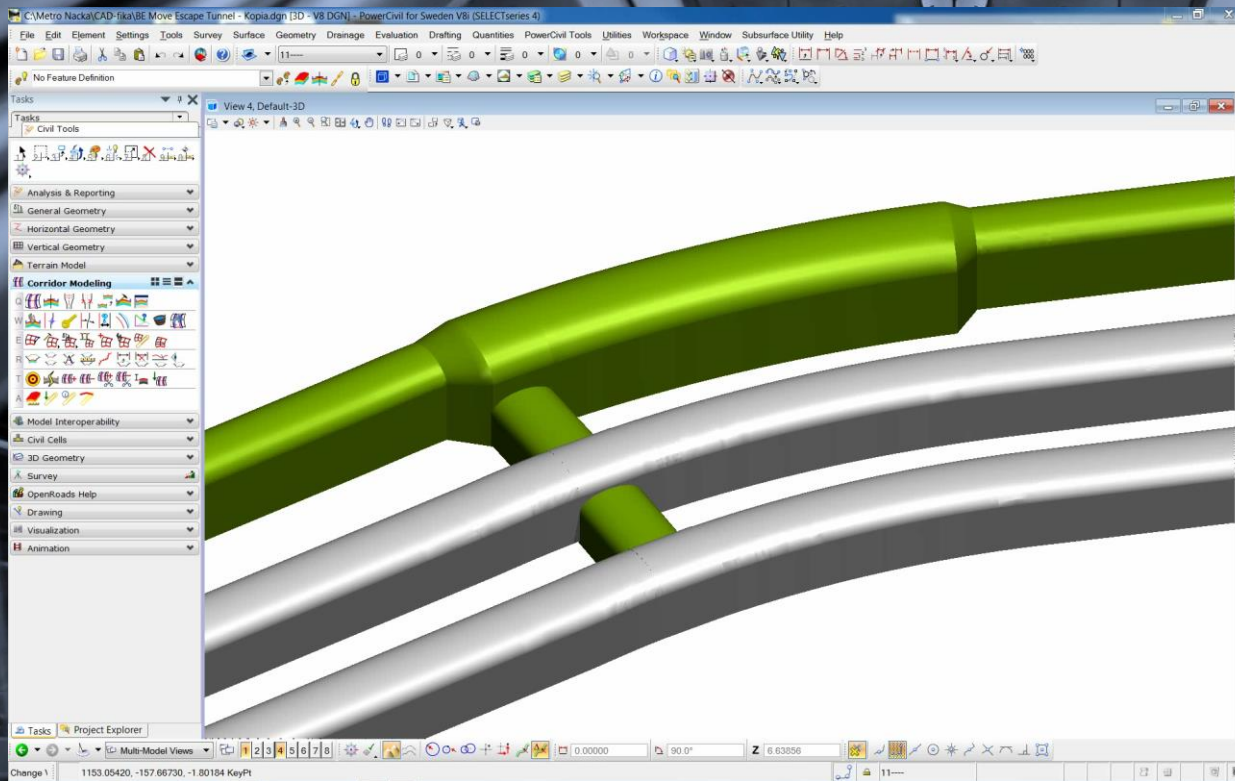
*"Bentley's Civil Cells allow us to make intelligent entities that are associated with certain elements"*

*Mats Lind, Rock Designer*





# Bentley Power Civil



# Where can they be used ?

## – Conceptual modelling

- Adding placeholders into the model that will be designed elsewhere and can be substituted in later.
- Think 'Hollywood BIM'



# Where can they be used ?

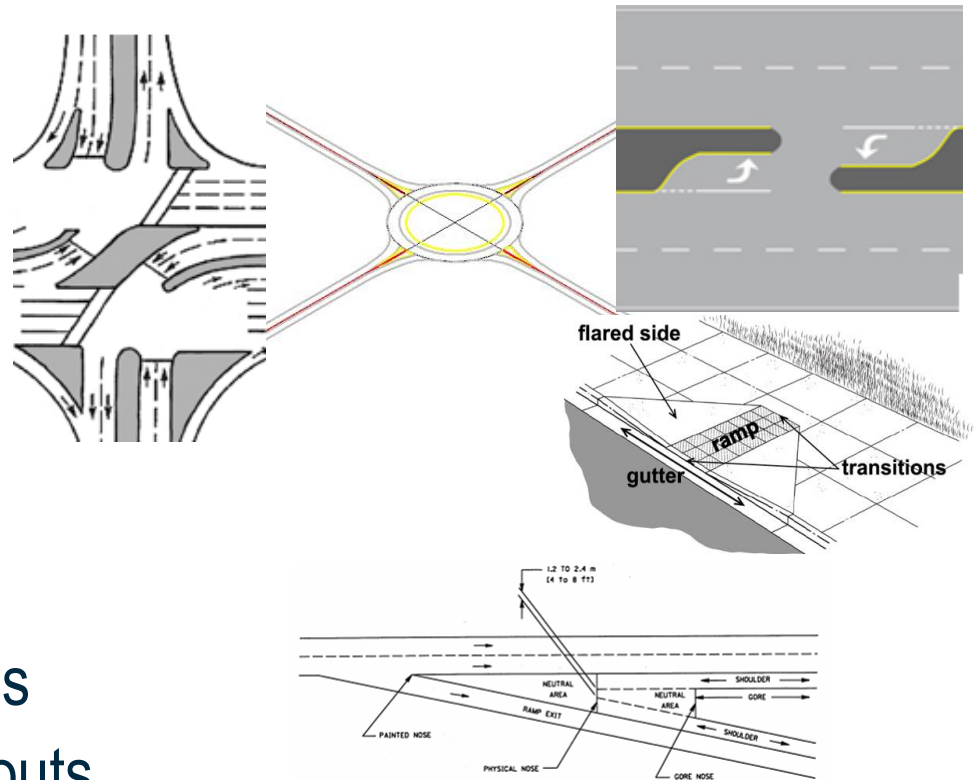
- Think repeatable situations
  - Must be geometrically constrained / well defined
- Think tedious geometric modelling
- Consider ‘Simple’ 2D geometry layouts through to ‘full’ 3D layouts
- Get creative and think out of the box....

# Where can they be used ?

‘Simple’ 2D geometry layout right through to ‘full’ 3D layout

## Examples

- Junctions
- Driveways
- Median Cross Overs
- Roundabouts
- Ramps
- Parking bays
- Pedestrian access ramps
- Traffic Management layouts

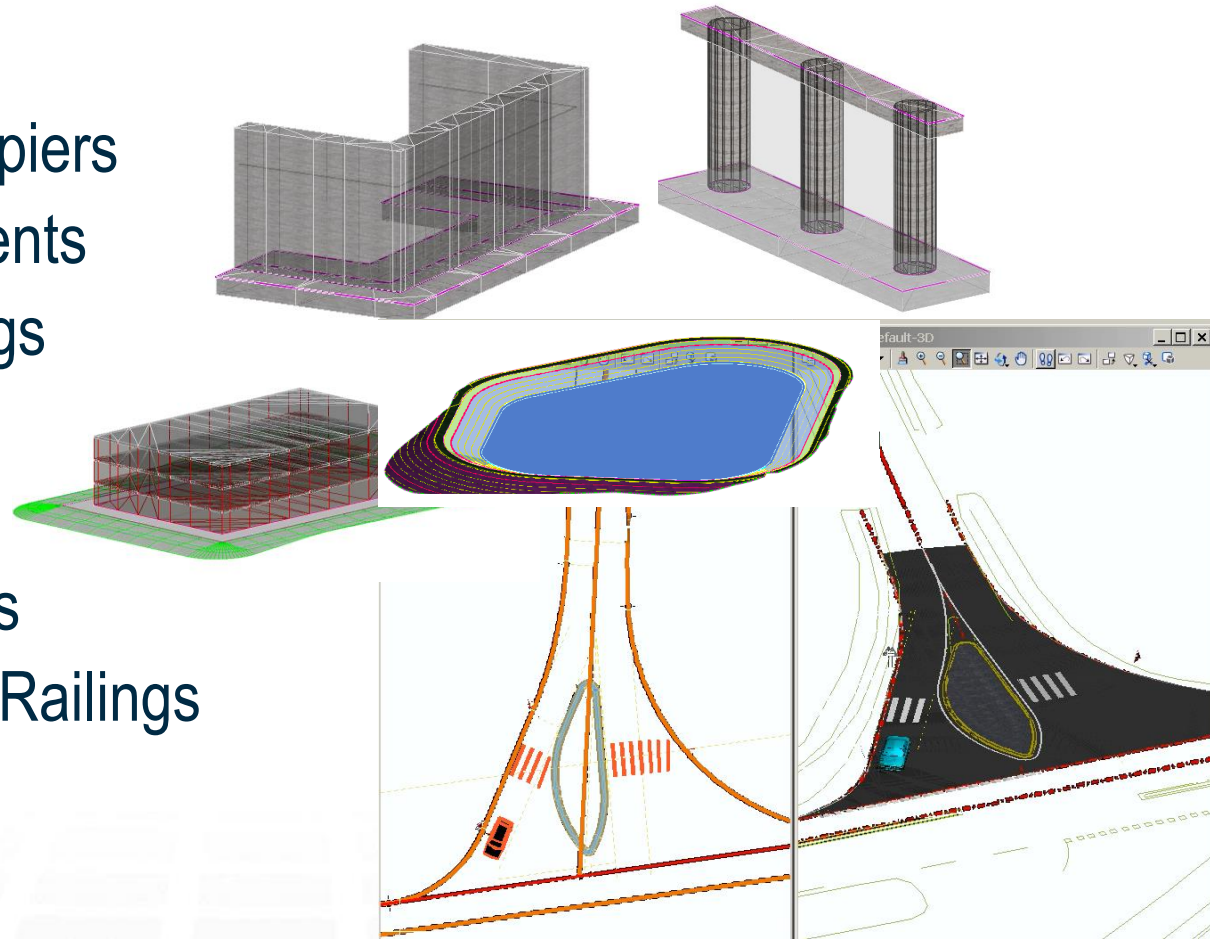


# Where can they be used ?

But also think about conceptual and 'Hollywood BIM'

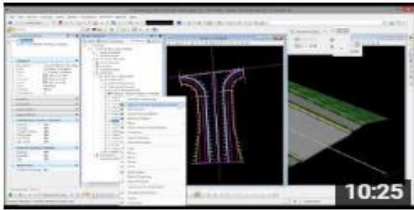
## Examples

- Simple Bridge piers
- Simple Abutments
- Simple Buildings
- Lakes / ponds
- White lining
- 3D cells - Signs
- 3D linestyles - Railings



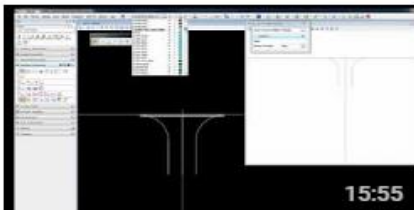
Filters

About 227,000 results



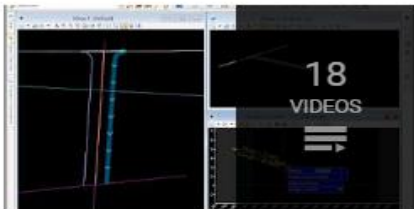
### Civil Cell Creation

CivilTSG  
1 year ago • 1,005 views



### CREATING THE BASICt CIVIL CELL.mp4

mbuilds  
4 years ago • 3,793 views  
Creation of a basic Civil Cell This is New advanced technology not available in any other software.

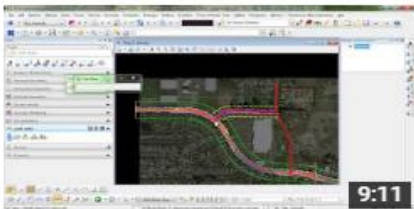


### Civil Cells

Michael Christensen

Driveway Design	44:02
Create Chamfered Entrance Civil Cell	19:47

[View full playlist \(18 videos\)](#)



### Modeling an Intersection with a Civil Cell

CivilTSG  
2 years ago • 1,439 views  
This video demonstrates how to model a T intersection complete with curb returns and side slopes using a civil cell.



### Civil Cells Basics

FDOT Training  
3 months ago • 115 views

# Civil Cell Distribution

- DGNLib
- Defined by cfg variable

CIVIL\_CIVILCELLDGNLIBLIST

\WorkSpace\Projects\Examples\Bentley-Civil-Metric.pcf

CIVIL\_CIVILCELLDGNLIBLIST =  
\$(\_USTN\_PROJECTDATA)/dgnlib/Civil\_Cells\_Metric.dgnlib

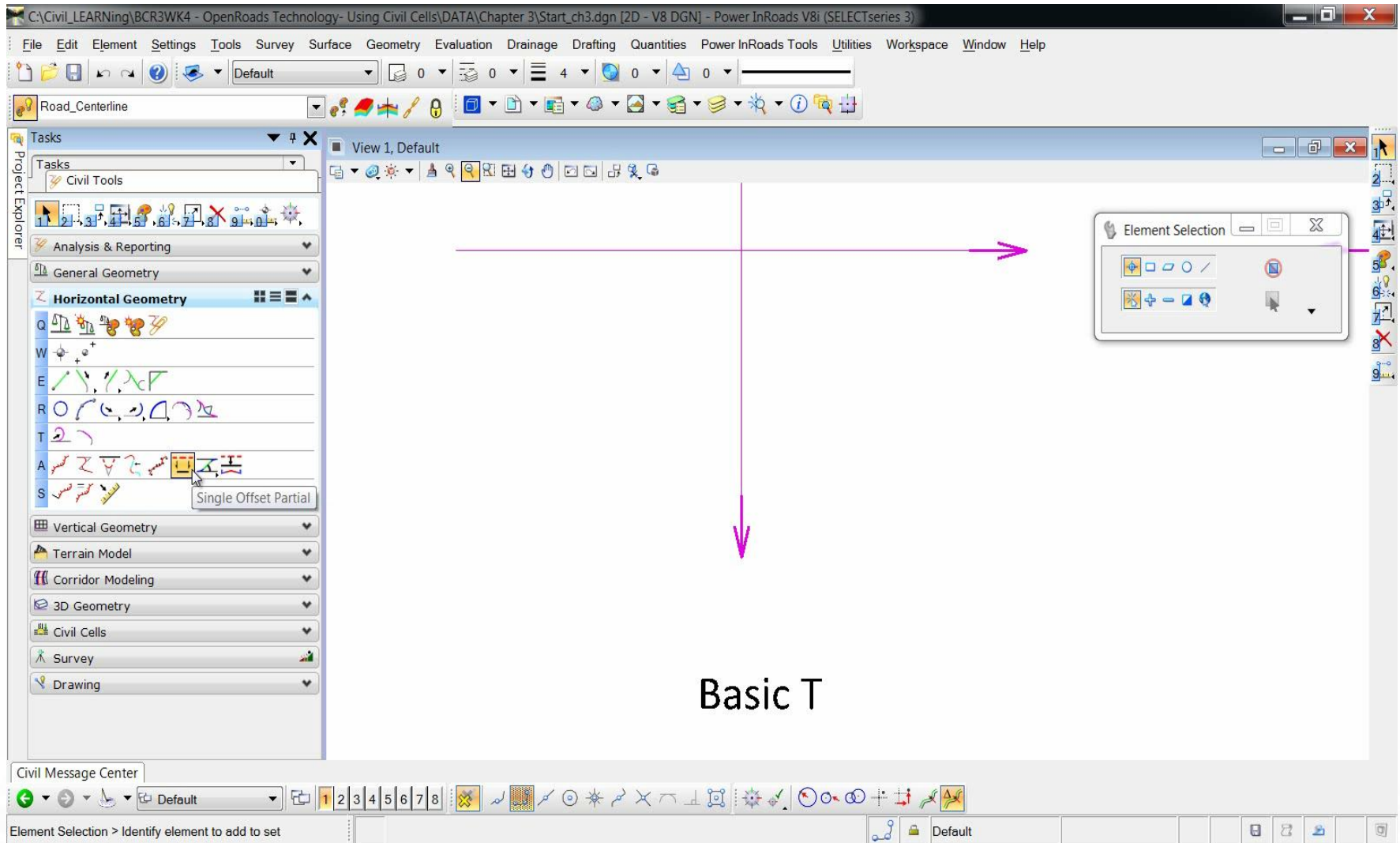
# Civil Cell Contents

## Geometry

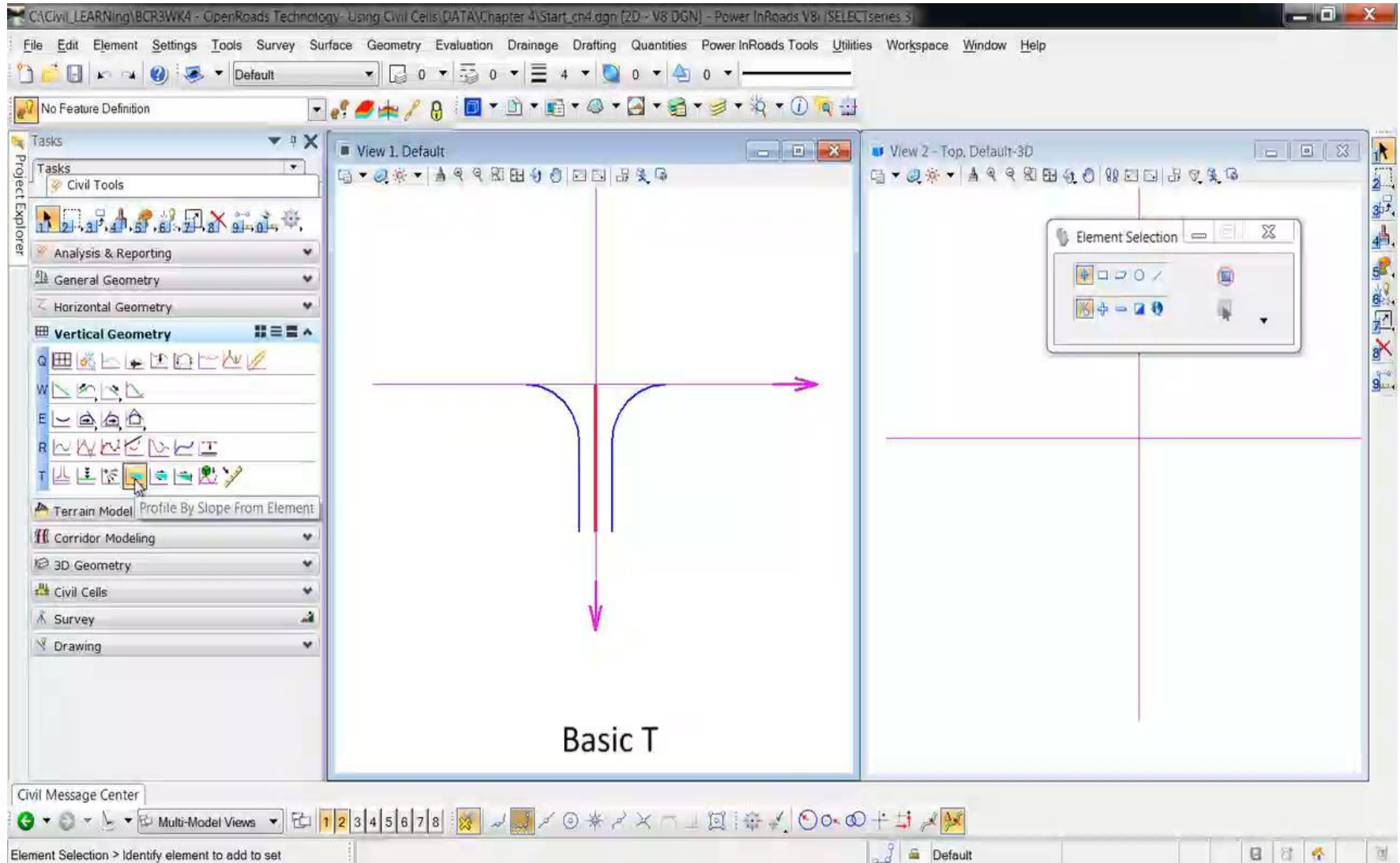
- Requires Geometry references
- Captures fully constrained Rules to Children Elements
  - Direction and location of reference elements are used to try and find best placement solution
  - Manages metric / imperial conversion automatically
- Snaps
  - Civil Accudraw constructions maintained
  - Constrained MSTN snaps are maintained



# Civil Cell Contents – essential horizontal constructions



# Civil Cell Contents – essential vertical constructions



# Best Practice



## Civil Cell Content – Geometry

Create Civil Cells in isolation. In place creation makes for problems as all dependants are picked up from the reference element.

Use civil accudraw and snaps to create overlaying control geometry (hint auto3D applies same elevation)

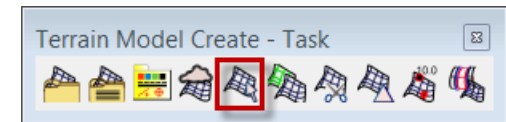
## Consider Constructions

- **Good snaps** – end point, intersection, perpendicular, tangent, center, mid point (used carefully..)
- **Bad snaps** – XY, Nearest

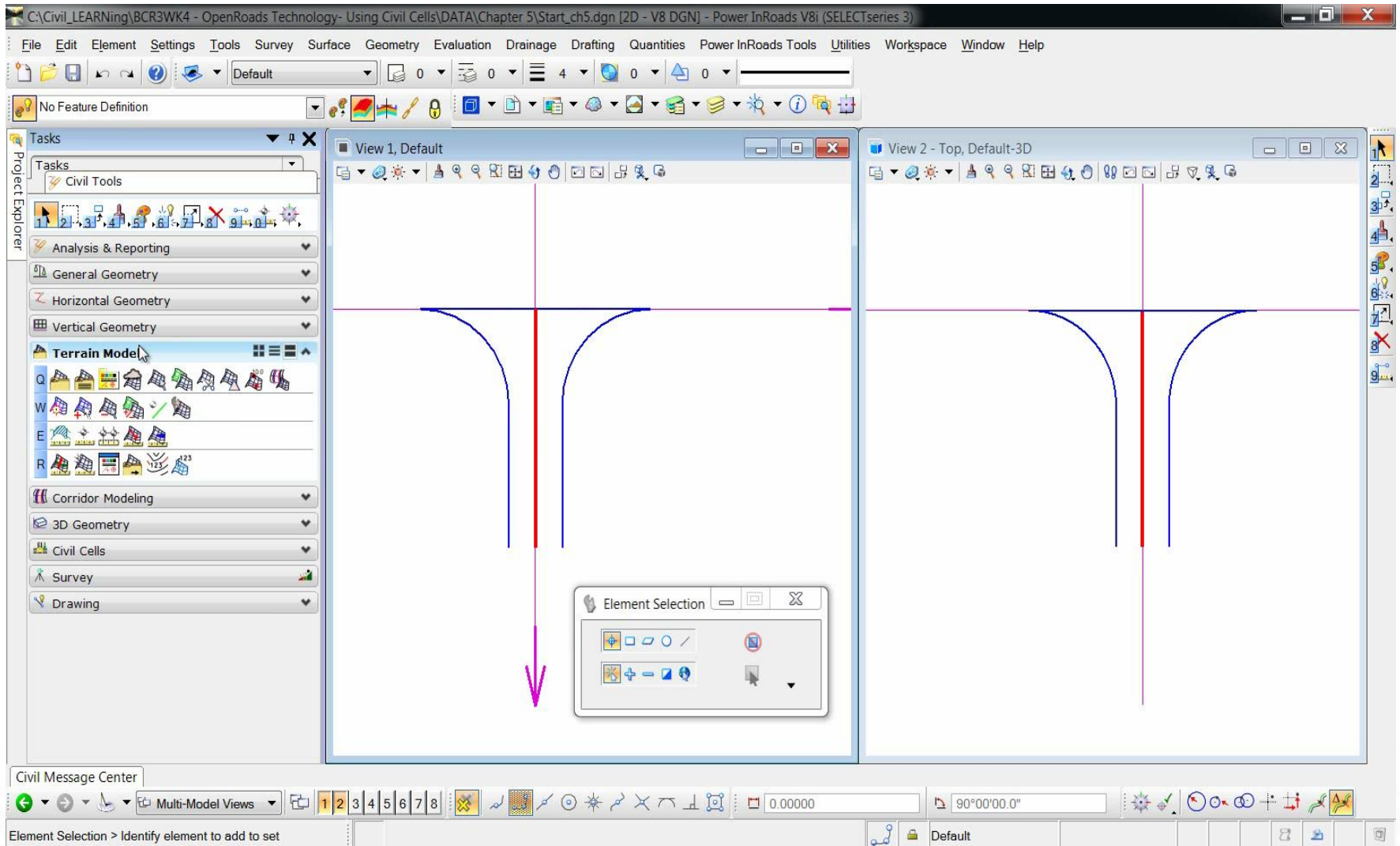
# Civil Cell Contents

## Terrain

- Created from Graphical elements
  - Ruled Terrain
  - Updates dynamically
- Can be created with an open boundary but pay consideration to the features in use and the impact on the boundary
- Temporary construction terrains made from geometry allow draping on the surface where required



# Civil Cell Contents – building the terrain





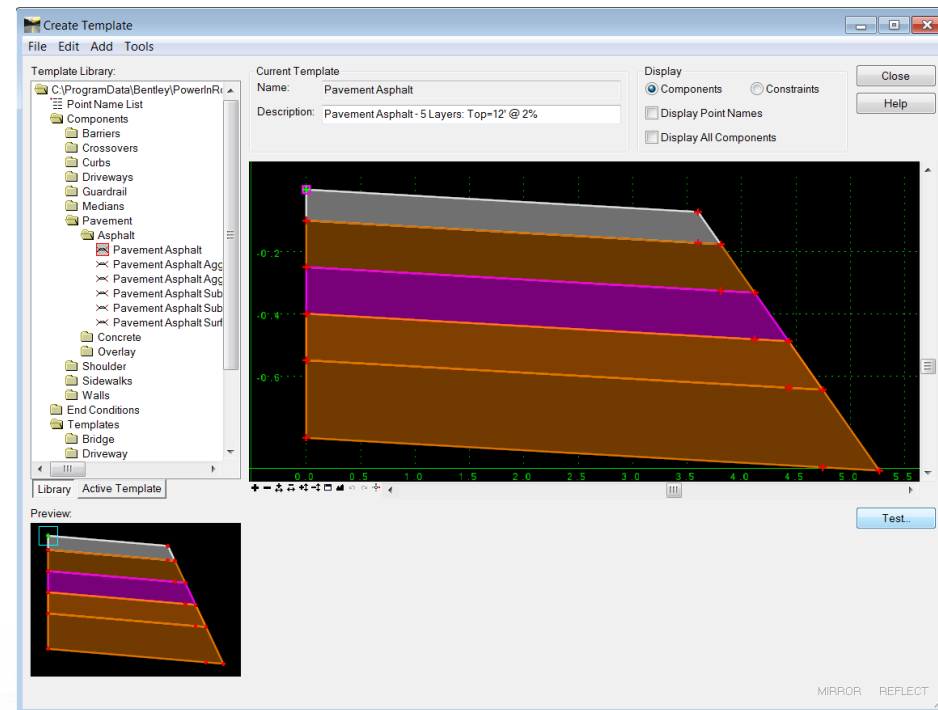
## Civil Cell Content - Terrains

- Only from graphical elements
- Consider 3D linestring stroking tolerances –
  - Stoking tolerances are passed forward with placement
  - Set Curve and Profile stroking = 0 as this will result in ‘better’ surface
  - Set Linear stroking appropriate to scale / units for site work
- Can contain multiple terrains in defined in the Civil Cell
- Remember only 1 ruled terrain per DGN

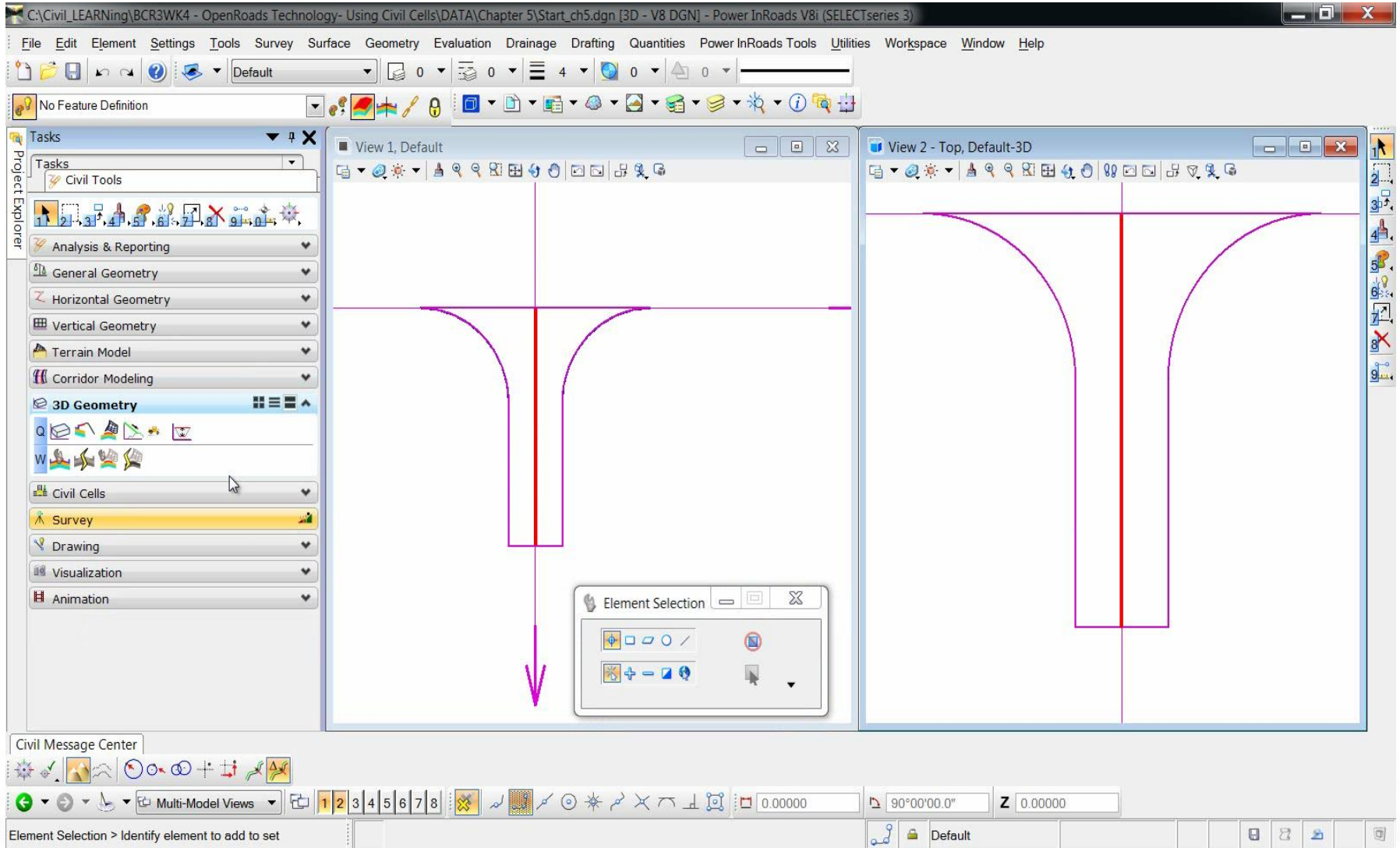
# Civil Cell Content

## Area Templates

- Depth components about origin
- Can only be applied to Terrains
- Only forms Vertical edge
- Allows overlay components
- Think up as well as down

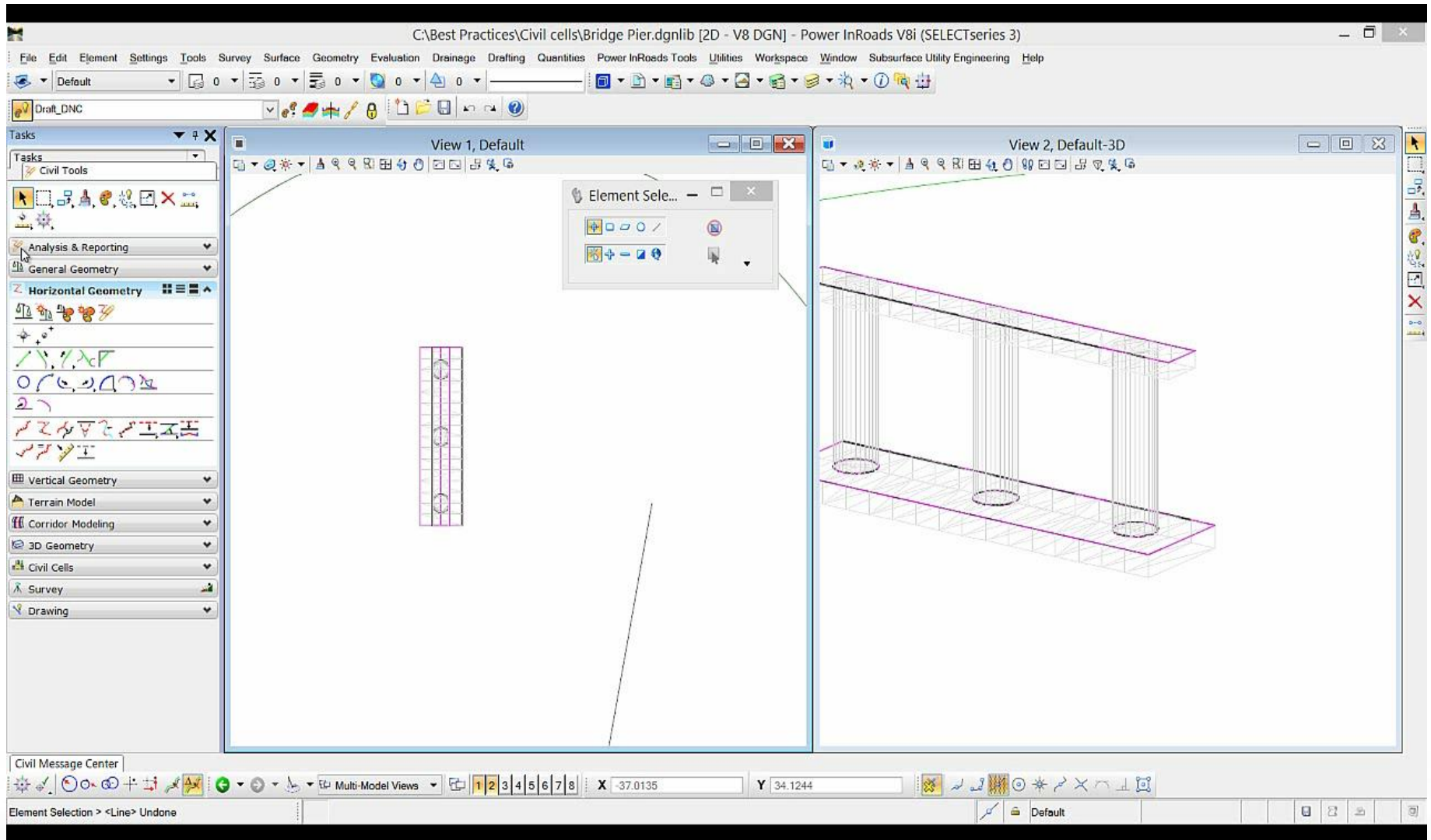


# Civil Cell Contents – applying surface template





# Civil Cell Contents – Hollywood BIM



# Best Practice



## Civil Cell Content – Area Templates

Copy from existing template libraries and remove to simply define the layers required.

If you are going up think about new feature definitions / materials.

# Civil Cell Contents

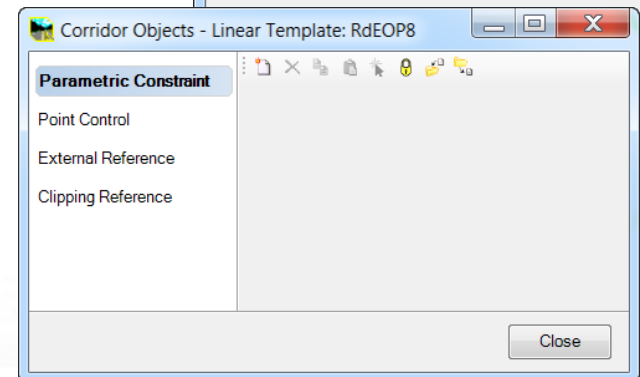
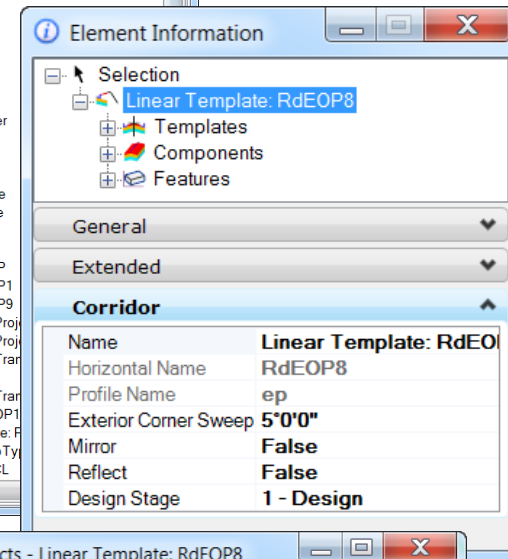
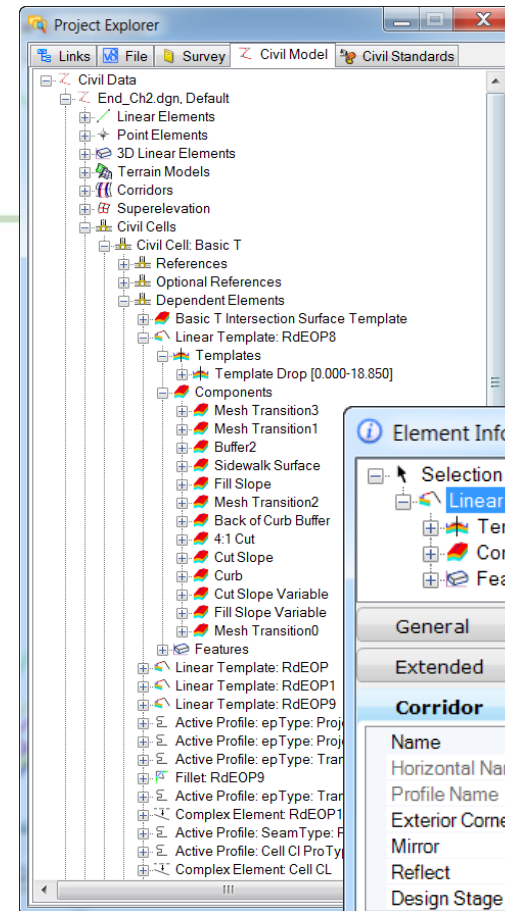
## Linear Templates

- Design Stage (different from corridor)
  - No drop multiplier – think site
  - No transitions
  - No critical sections
- Corridor objects – sub set of Corridor
  - Parametric Constraints
  - Point Controls

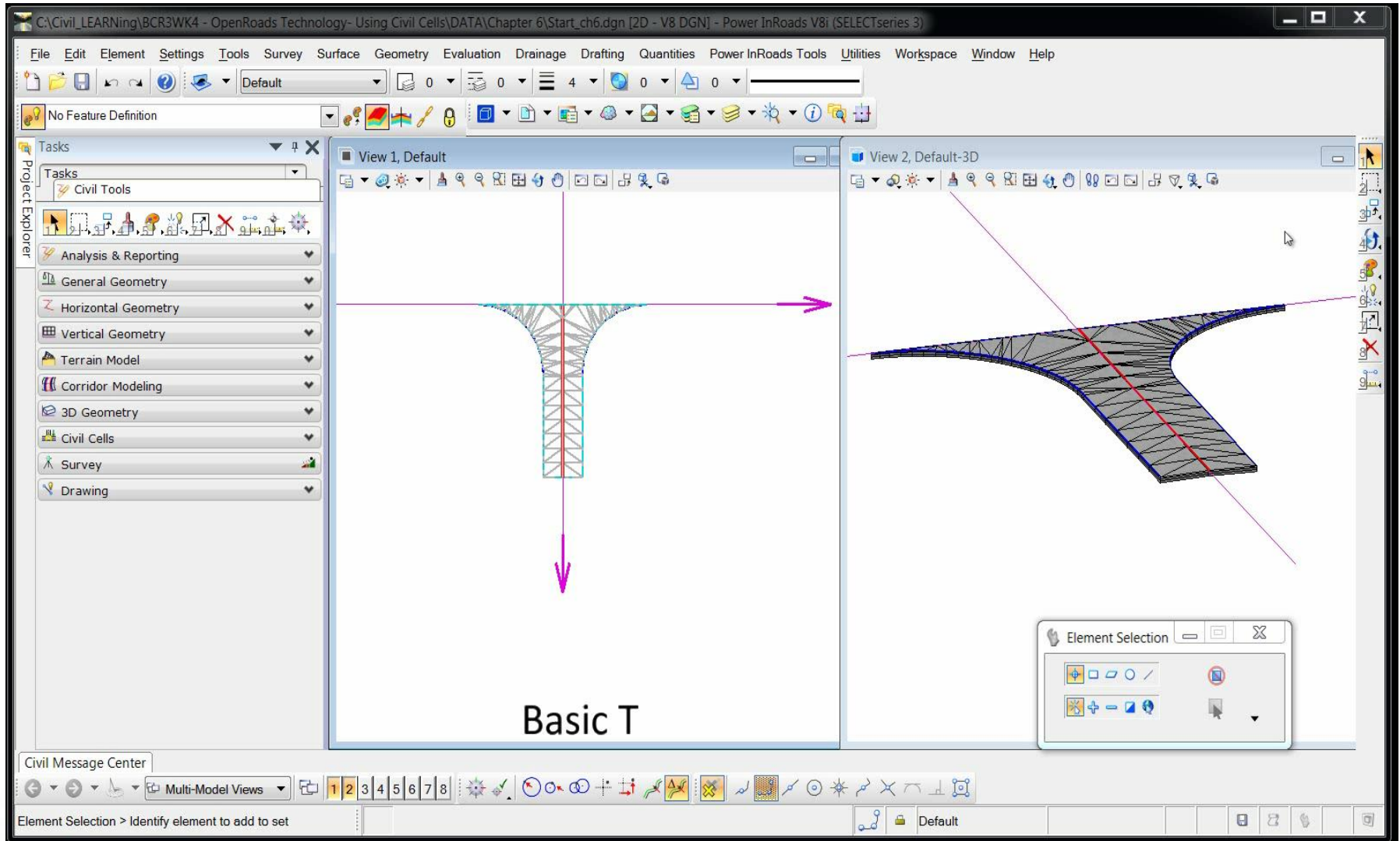
### Unsupported corridor objects

- Clipping Reference
- External Reference

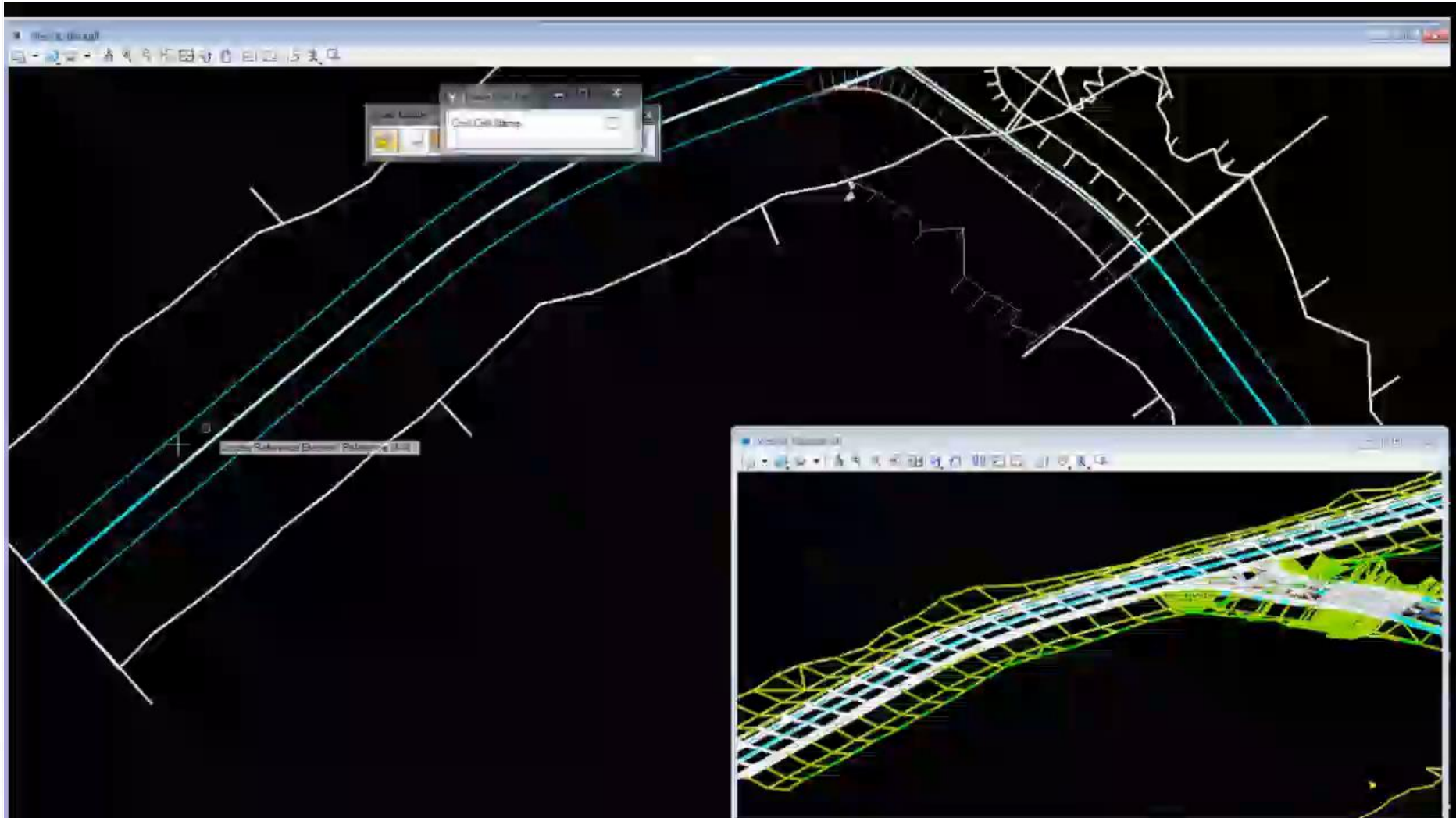
Note anything with a station is not supported in Civil Cells



# Civil Cell Contents – applying linear templates



# Civil Cell Contents



# Best Practice



## Civil Cell Content – Linear Templates

Copy from existing template libraries and remove to the hang point. This will ensure templates match when tying into main corridors.

If you apply and get side wrong, edit the properties rather than delete and recreate.

Linear templates are applied to the base geometry stroking, so consider this when creating the cell.

# Civil Cell Contents

## Corridors

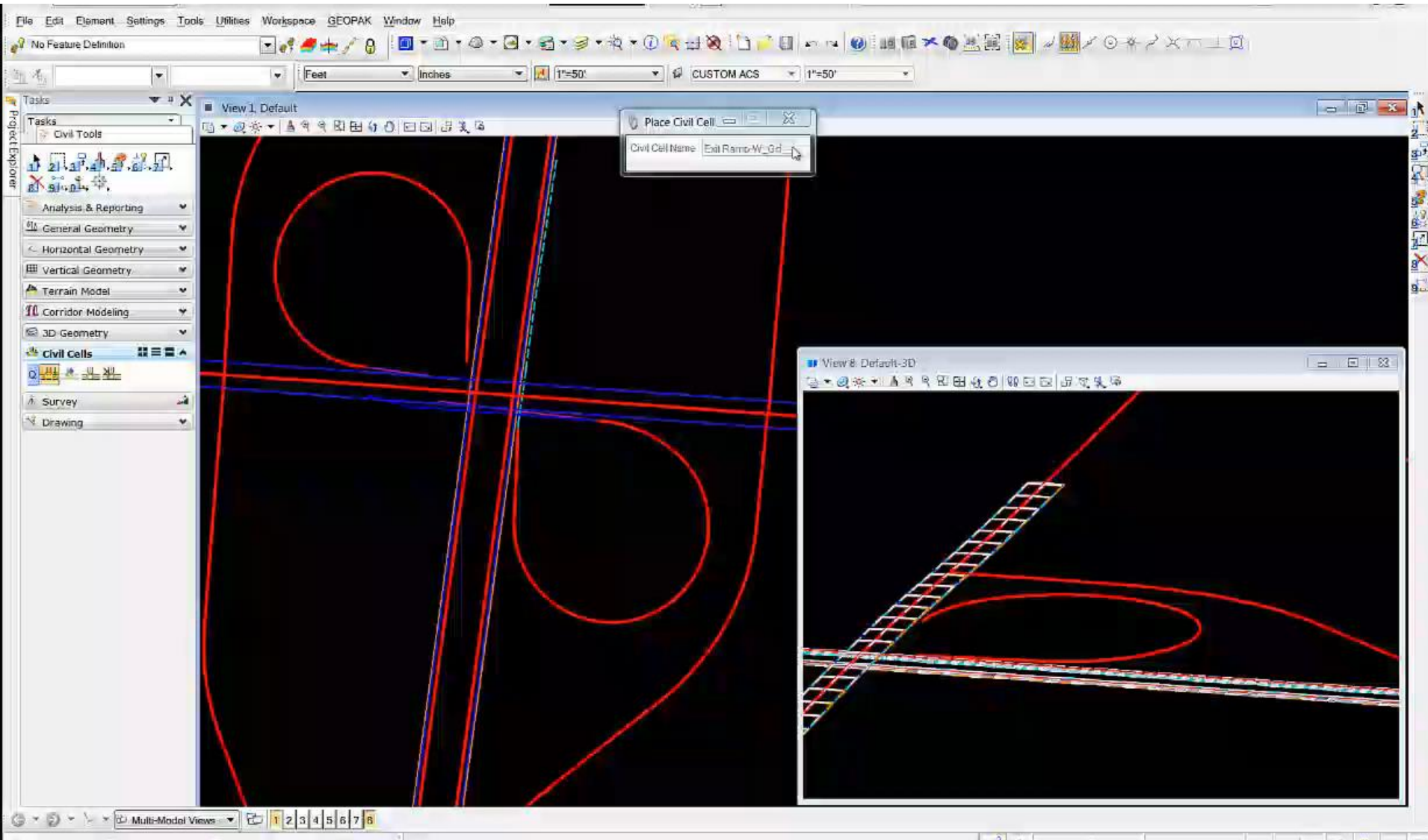
- Design Stage
- Drop Interval
- Corridor objects - restricted
  - Parametric Constraints
  - Point Controls

### Unsupported corridor objects

- Secondary Alignment
- Key Station
- Curve Widening
- End Condition Exception
- Clipping Reference
- External Reference

Note anything with a station is not supported in Civil Cells

# Civil Cell Contents





# Best Practice



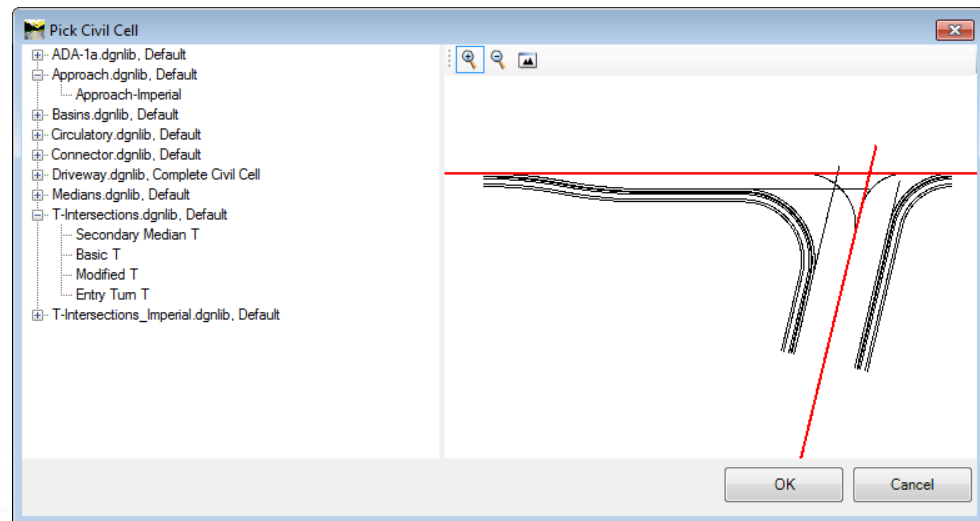
## Civil Cell Content – Corridors

Consider hanging corridors on control geometry not on the actual alignment, this provides a simple length control.

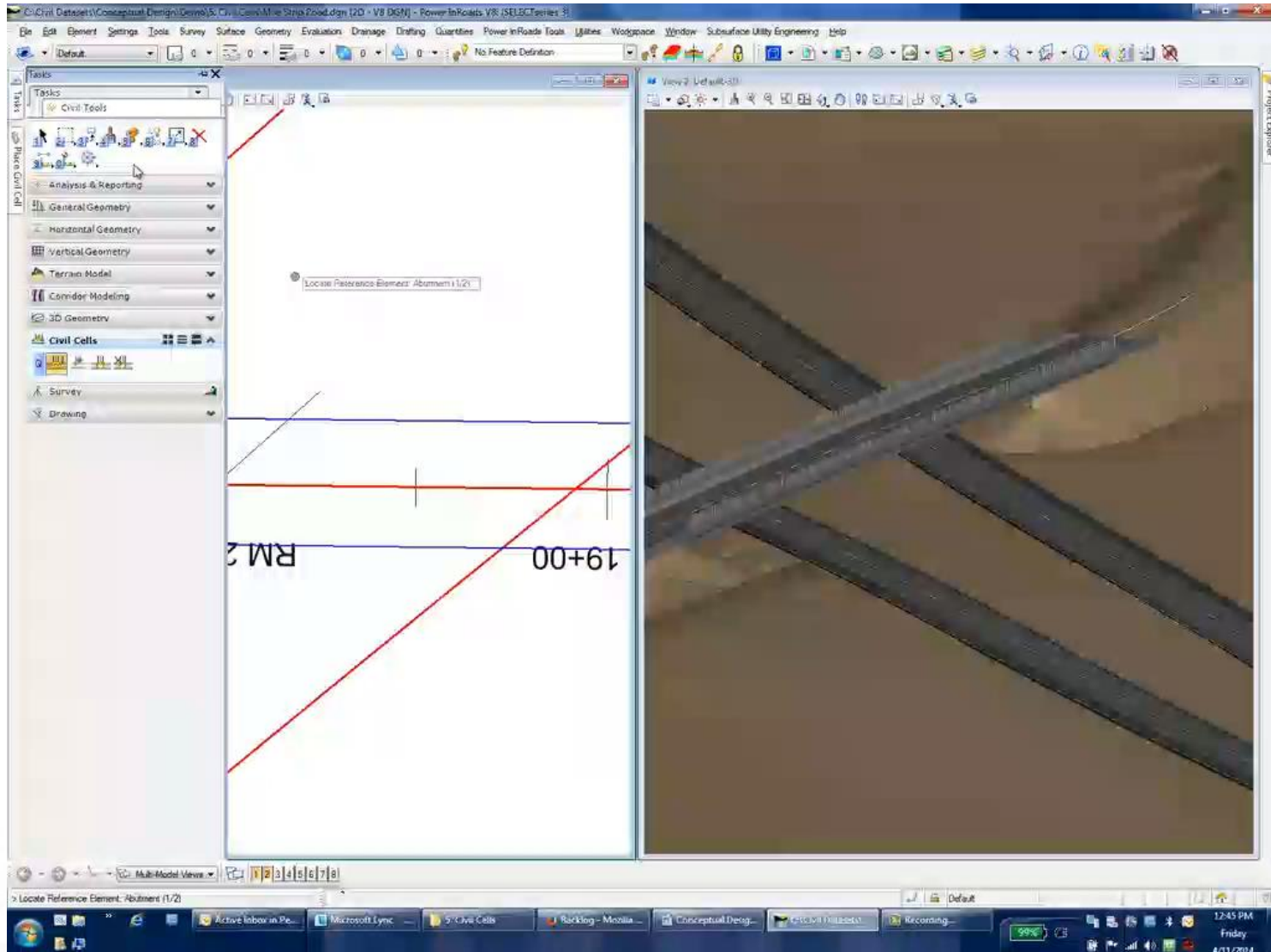
Particularly handy with looping alignments where a split would be required.

# Getting Started - Placing Civil Cells

- Selection from distributed DGNlib
- Requires base Geometry for References and where defined Optional References
- 3D linestrings not acceptable as references – create geom from 3d element
- Direction control
- Corridor to Clip - optional



# Placing Civil Cells on single 2D reference





## Placing Civil Cells

Placement can occur on simple 2D line, the cell can work out the elevation relative to the active terrain.

The more reference elements the greater the potential to need to switch element direction.

Remember element direction does not 'mirror' so Left and Right hand constructions are required junctions as there no mirror option.

Consider clip as a secondary process, clipping takes time and adds to rule propagation for updating. Also consider reference files and federated workflows will require manual clipping.

# Getting Started - Manipulating Civil Cells

- Civil Cell Selection
  - Priority is to the Civil Cell, right click to get through to comprising components is often necessary.
  - Dropping a cell takes it back to the constituent parts but note you may not be able to rebuild the cell in situ due to other dependants on the reference elements.
  - Process civil cell may be necessary where active terrain is changed and needs to be reapplied.

# Best Practice



## Manipulating Civil Cells

Many edits will 'dirty' the cell for placement elsewhere, including adding point controls, editing geometry that snaps to freespace or a non constrained elements.

Thankfully you have the cell library to revert back to.

# Civil Cell Creation – getting started

- Workshop
  - BCR3WK4 - OpenRoads Technology- Using Civil Cells
- Best Practices Guide available off the OpenRoads web page
- Bentley YouTube Channel

# Best Practice



- Use Control Geometry
  - Civil Accudraw
  - Construction Elements
  - Consider Keeping the 2D
- Think about your approach to Corridor Templates
  - Plan ahead
  - Build small sub components and test
  - Consider how it might be modified
- Consider Element Naming
- Consider user prompts



# Civil Cell Creation – getting started

KEEP  
CALM  
AND  
THINK  
LOGICALLY

# Civil Cell Creation – getting started

- Test the placement with varying direction references
- 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

# Civil Cells – Limitations

- Terrains can't be references only linear. So using drape option on active will drape on the active terrain in the recipient model.
- Cells placed as symbology in a civil cell can't be rotated at placement time and require subsequent adjustment.
- Currently reporting of volumes is manual process for constituent parts – currently being addressed for future release.



# Best Practice: Civil Cells

Presented by: Ian Rosam