

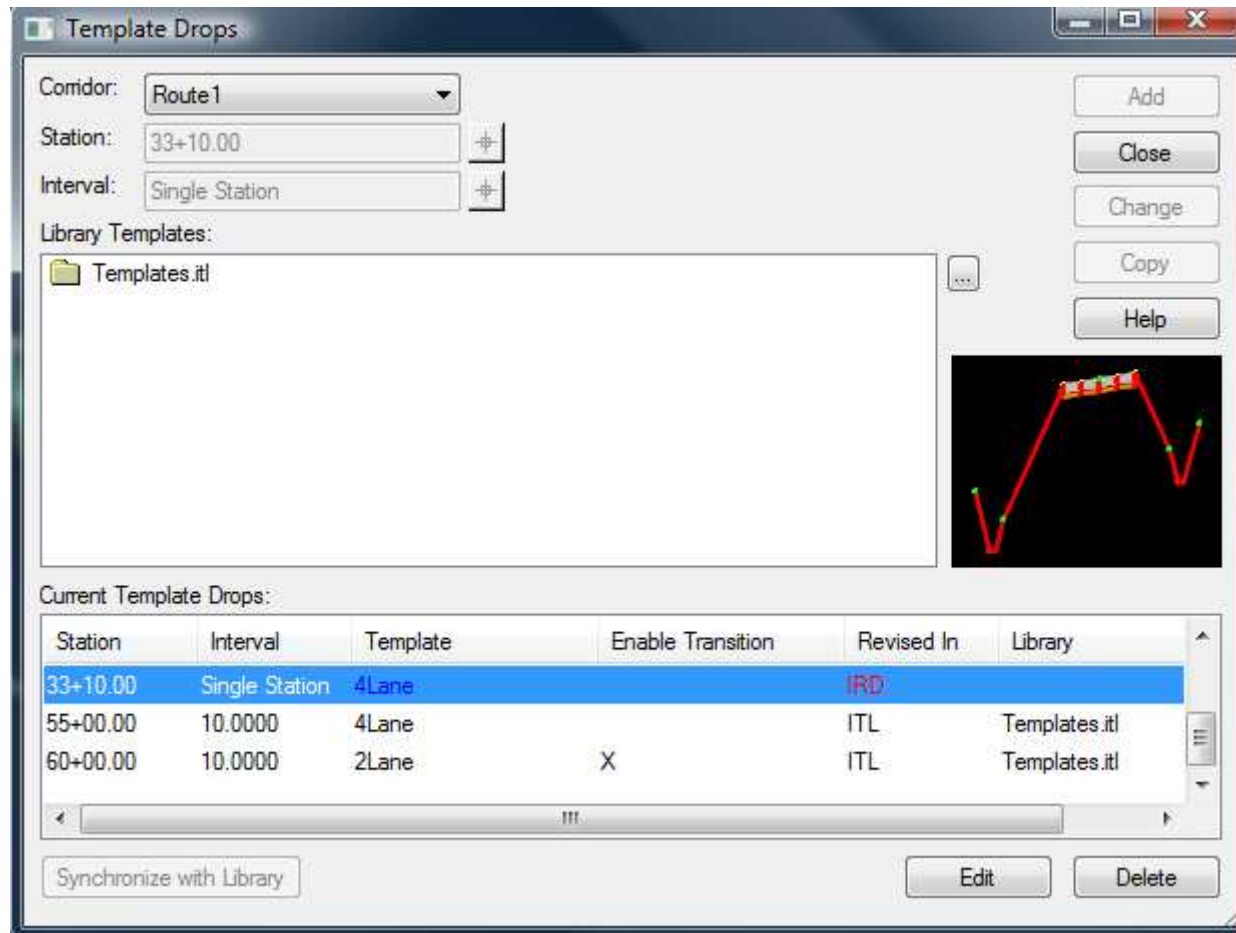
# Best Practices In Roadway Designer

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## Bad Practices ...



# Single Template Drop Caveats



## Single Template Drop Caveats

- Intended use → final design “touch-ups”.
- WYSIWYG template (static)
- Tight intervals may force quick changes
- No processing or point control usage

## Single Template Drop Caveats

- Use for fixing “challenging / unique areas” not handled by templates
- Culvert crossings
- Cross-overs
- Not intended for end condition overrides

# Syncing Templates – When & Where

The screenshot shows the 'Template Drops' window with the following configuration:

- Comidor: Route1
- Station: 12+34.00
- Interval: 10.0000
- Library Templates: Templates.itl (containing Backbones, End Conditions, Templates, 2Lane, and 4Lane)

The 'Current Template Drops' table is as follows:

Station	Interval	Template	Enable Transition	Revised In	Library
12+34.00	10.0000	2Lane		ITL	Templates.itl
25+00.00	10.0000	2Lane		ITL	Templates.itl
30+00.00	10.0000	4Lane	X	ITL	Templates.itl
55+00.00	10.0000	4Lane		ITL	Templates.itl
60+00.00	10.0000	2Lane	X	ITL	Templates.itl

Buttons: Add, Close, Change, Copy, Help, Synchronize with Library, Edit, Delete.

## Syncing Templates – When & Where

- ITL changes vs. IRD changes → Preliminary design vs. final design
- Bulk “batch” edits belong in the ITL file
- Long corridors may require many template drops
- ITL changes allow quick preliminary design changes

# Syncing Templates – When & Where

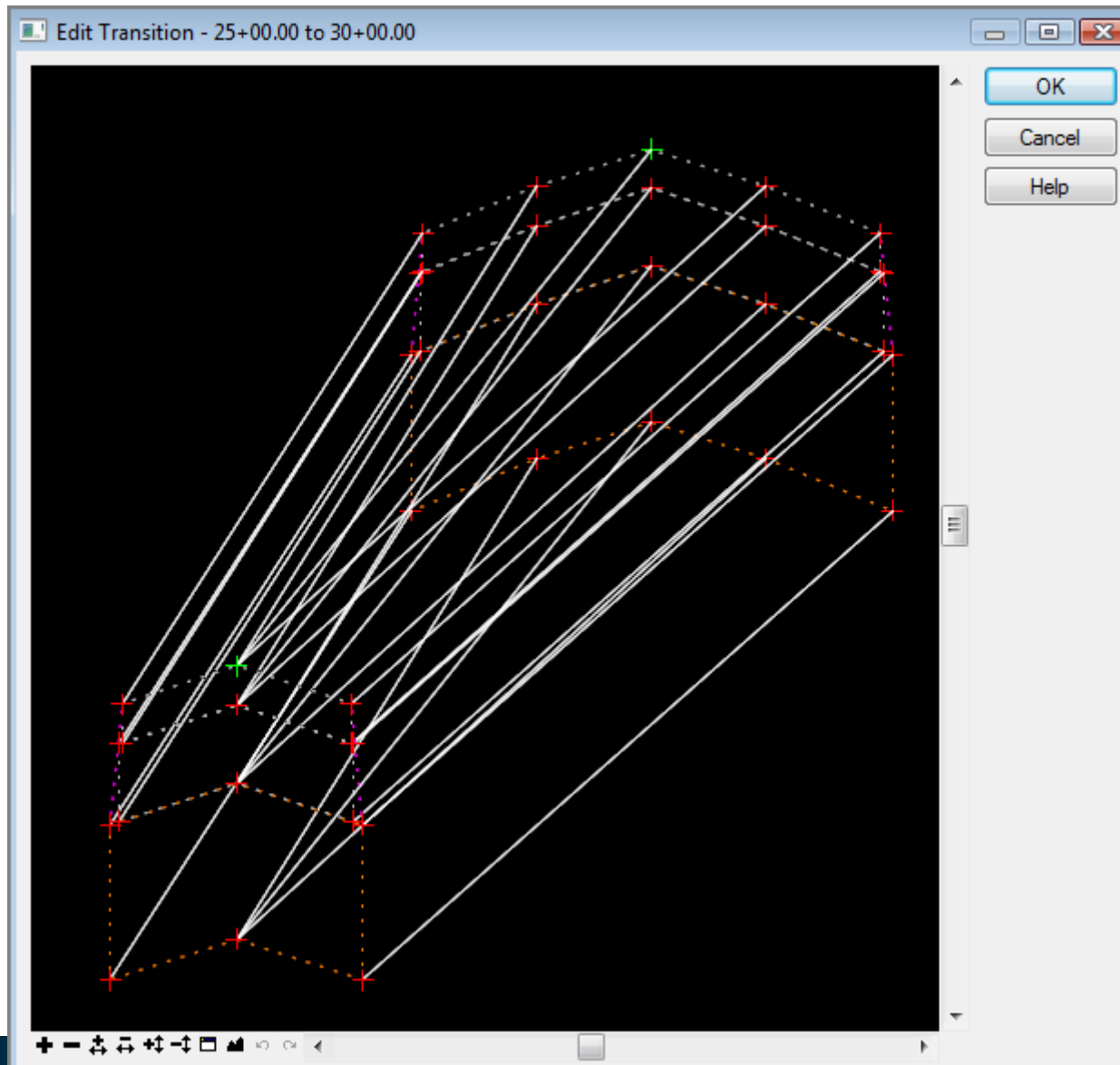
- ITL changes allow quick preliminary design changes
  - Pavement layer thicknesses
  - Curb types
  - End conditions
  - Etc.



# Syncing Templates – When & Where

- IRD Changes → Final design
  - Transitional widths for specific geometry
  - Specific station ranges
  - Corridors
  - Etc.

# Managing Transitions

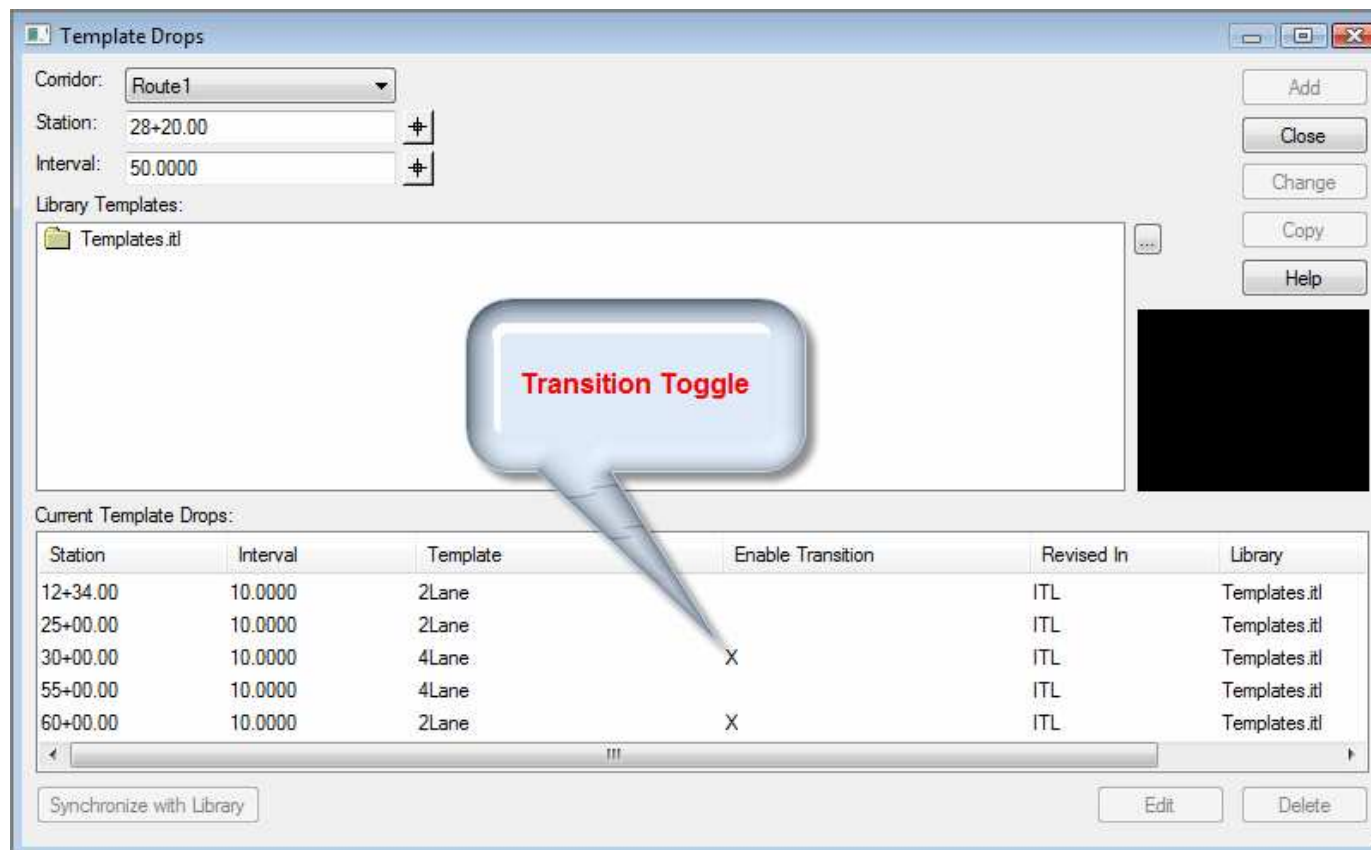


# Managing Transitions

- MicroStation XM → Re-syncing templates to the ITL file resets transitions
- MicroStation V8i → Transitions remain intact “if possible”
  - No need to “re-do” transitions assuming point names are the same

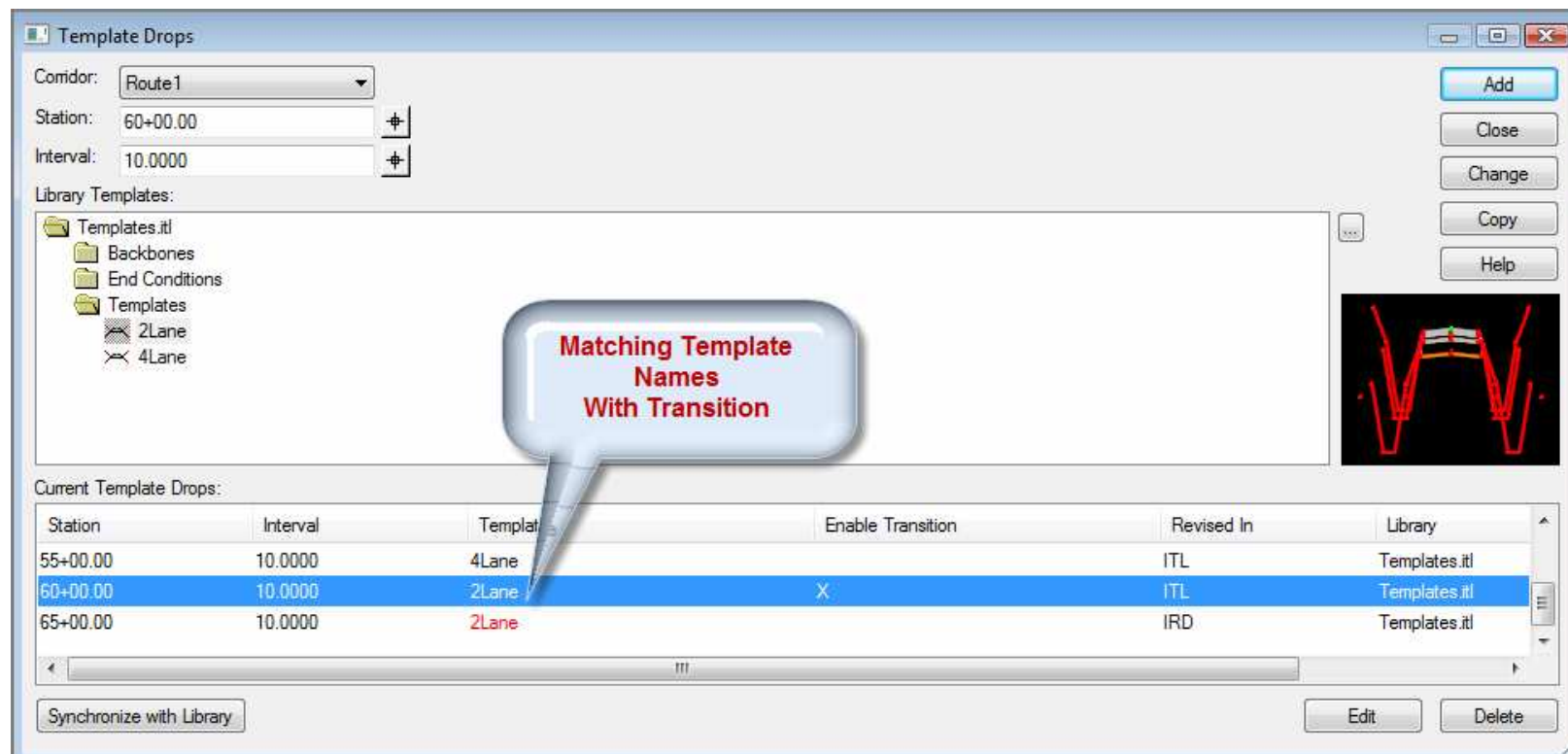
# Managing Transitions

- MicroStation V8i → Added ability to enable or disable transitions directly in the template drop dialog.



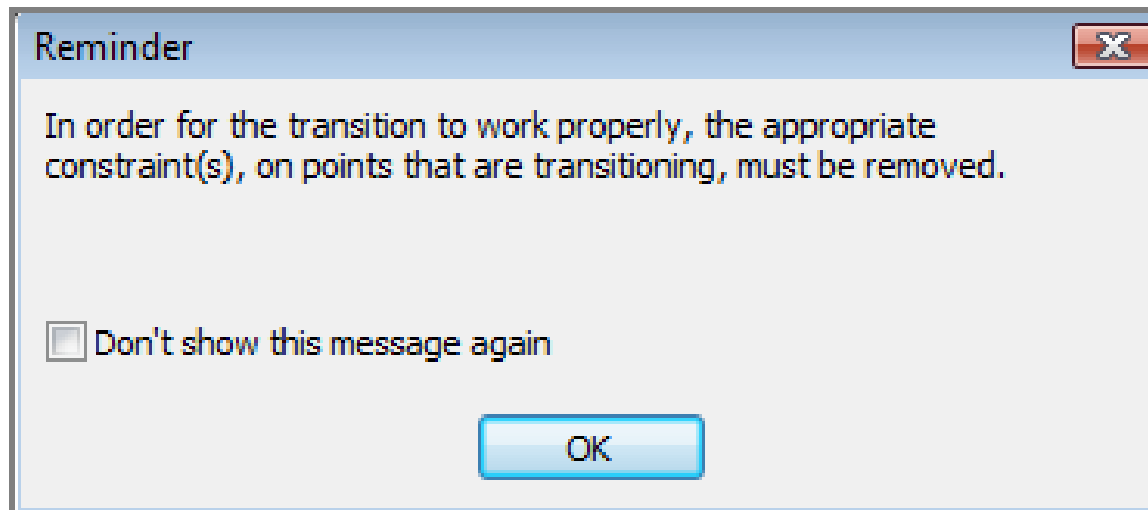
# Managing Transitions

- MicroStation V8i → Added ability to transition between two templates of the same name



# Managing Transitions

- MicroStation V8i → Added reminder prompt for releasing of constraints



# End Condition Exceptions – Final Design

Corridor: WS1

Station Range  
Start: 122+98.20  
Stop: 126+50.00

Backbone Only

Apply To  
 Left Override  
 Right Override  
 Left Transition  
 Right Transition

Description: Retaining Wall

End Condition Exceptions:

Start Station	Stop Station	Type	Description
122+98.20	126+50.00	Left Override	Retaining Wall

Buttons: Add, Close, Change, Help, Edit..., Delete

## End Condition Exceptions – Final Design

- Too many End Condition Exceptions may indicate the need for a template “re-design”

Corridor: WS1

Station Range  
Start: 122+20.00  
Stop: 122+25.00

Apply To  
 Left Override  
 Right Override  
 Left Transition  
 Right Transition

Backbone Only

Description: 4:1 Fill Slope

End Condition Exceptions:

Start Station	Stop Station	Type	Description
122+00.00	122+05.00	Left Override	2:1 Fill Slope
122+05.00	122+10.00	Left Override	3:1 Fill Slope
122+10.00	122+15.00	Left Override	3:1 Fill Slope
122+15.00	122+20.00	Left Override	4:1 Fill Slope
122+20.00	122+25.00	Left Override	5:1 Fill Slope

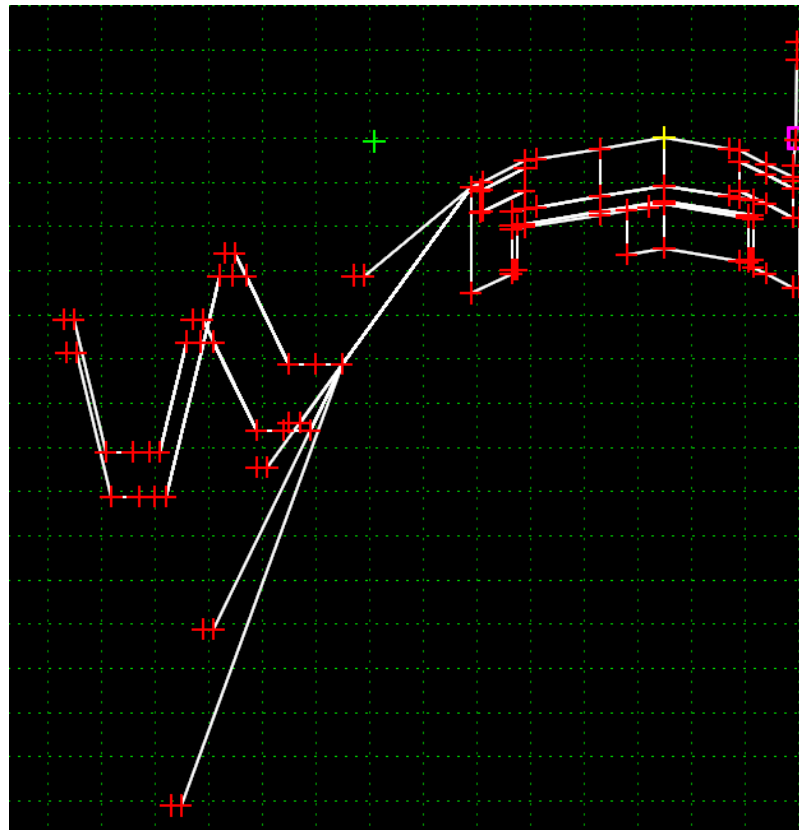
Edit... Delete



# The Super Template

# End Condition Exceptions – Final Design

Be careful to avoid the “super template” approach



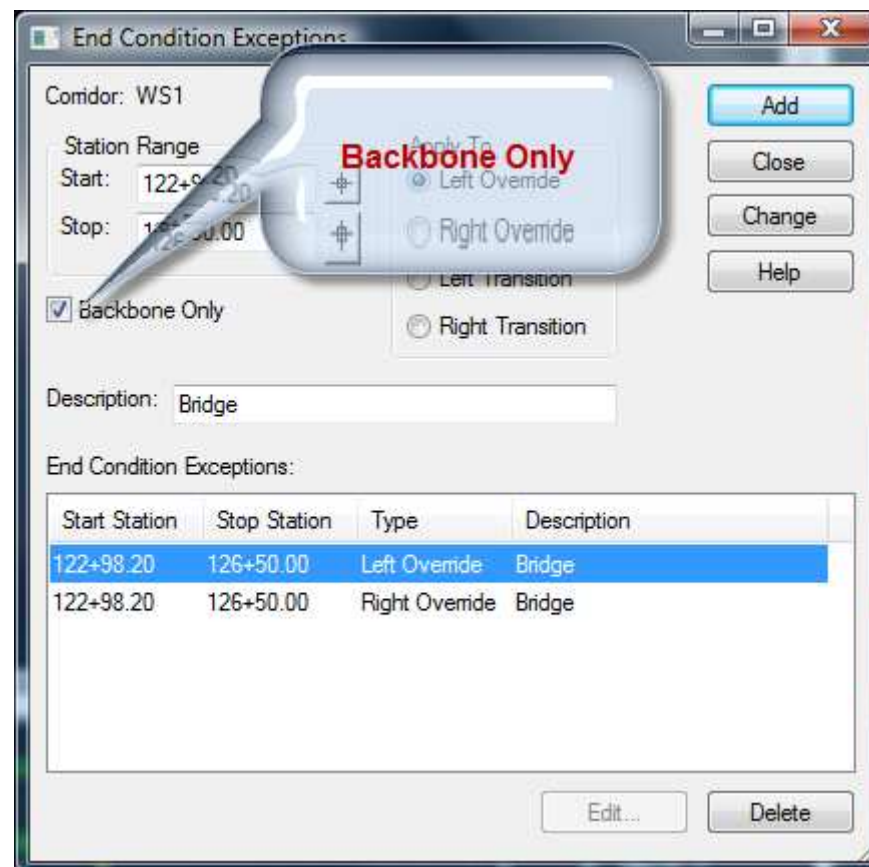
# End Condition Exceptions – Final Design

Be careful to avoid the “super template” approach

- A “happy medium” should be considered between too few and too many options
- Too few options results in a lot of End Condition Exceptions
- Too many options results in an unmanageable template
- Just because “You Can” doesn’t mean “You Should”

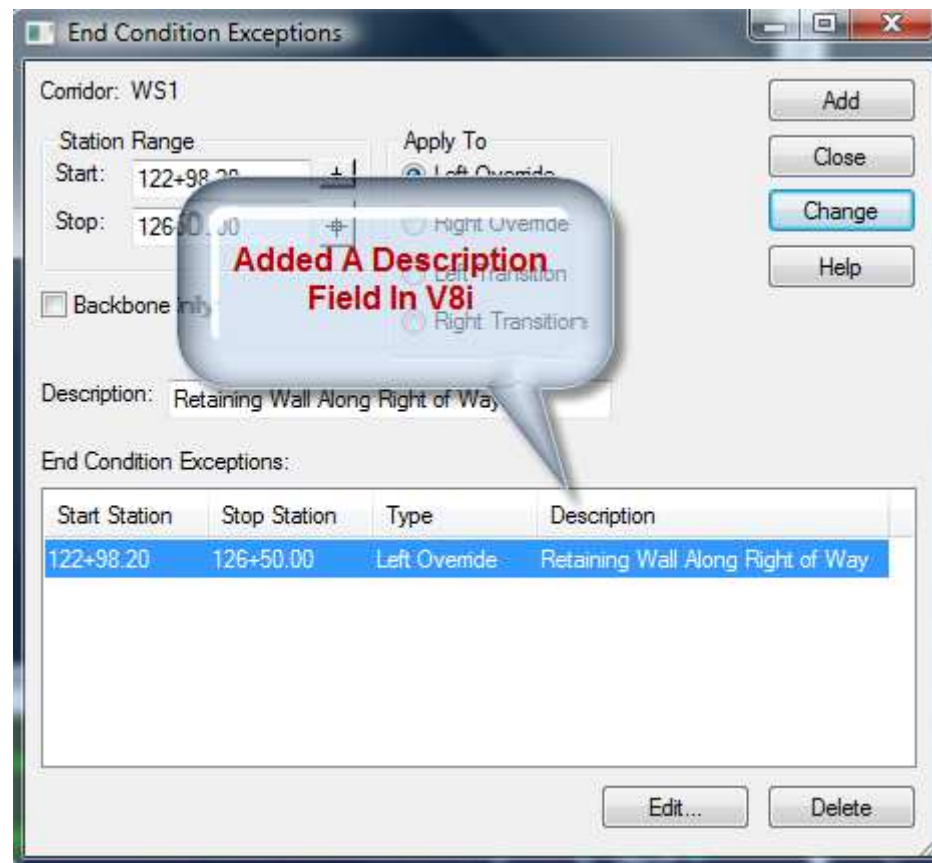
# End Condition Exceptions – Final Design

Use the Backbone Only option for bridges and intersections



# End Condition Exceptions – Final Design

Added a “Description” field in V8i to assist with Change tracking



# Hierarchy of Constraints

- There are several ways to “constrain” a template point
  - Conventional point constraints in a template
  - Parametric constraints
  - Style constraints
  - Point controls

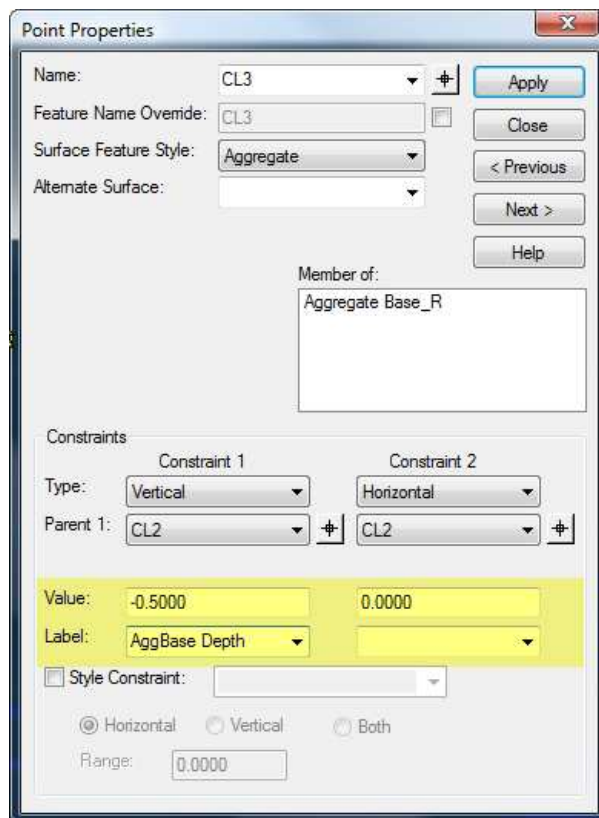
# Hierarchy of Constraints

The least priority is the template point Constraint.  
The Constraints establish the “Starting Point”.

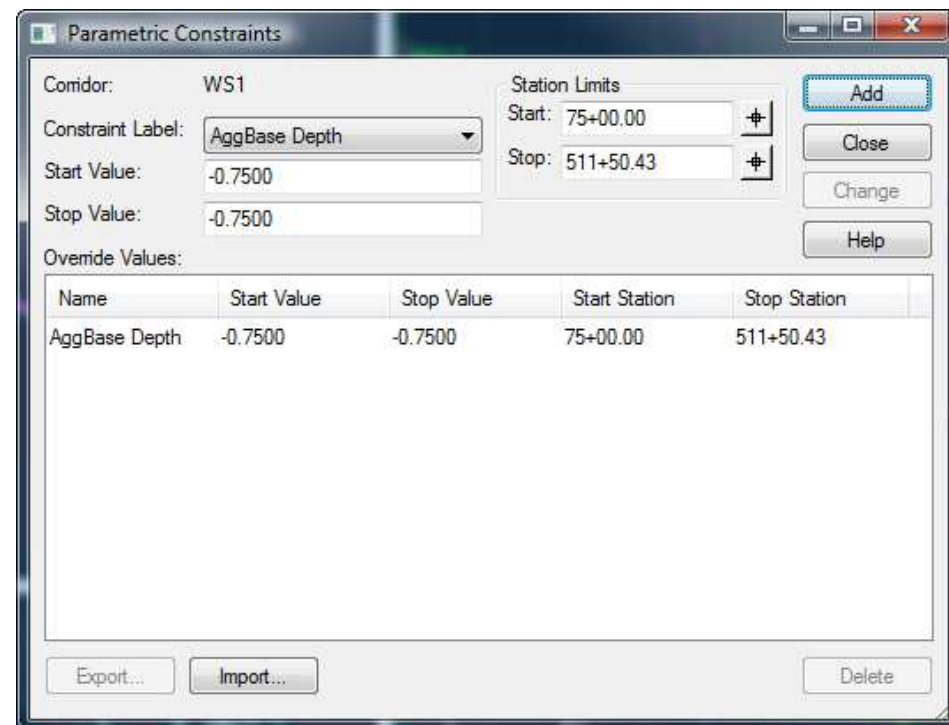
The screenshot shows the 'Point Properties' dialog box. The 'Name' field is set to 'TC\_L'. The 'Feature Name Override' is 'TC\_L'. The 'Surface Feature Style' is 'Curb'. The 'Alternate Surface' is empty. The 'Member of' field contains 'Curb and Gutter\_L'. The 'Constraints' section is highlighted in yellow and contains two columns: 'Constraint 1' and 'Constraint 2'. 'Constraint 1' has a 'Type' of 'Horizontal' and a 'Parent 1' of 'Gutter\_L'. 'Constraint 2' has a 'Type' of 'Vertical' and a 'Parent 1' of 'Gutter\_L'. The 'Value' for 'Constraint 1' is '-0.1667' and for 'Constraint 2' is '0.5000'. The 'Label' field is empty. The 'Style Constraint' checkbox is unchecked. The 'Horizontal' radio button is selected. The 'Flange' field is '0.0000'. Buttons for 'Apply', 'Close', '< Previous', 'Next >', and 'Help' are visible on the right side.

# Hierarchy of Constraints

The second highest priority is the Parametric Constraint



Point Properties dialog box showing configuration for point CL3. The Name is CL3, Feature Name Override is CL3, Surface Feature Style is Aggregate, and Alternate Surface is empty. The Member of list contains Aggregate Base\_R. The Constraints section shows two constraints: Constraint 1 (Type: Vertical, Parent: CL2, Value: -0.5000, Label: AggBase Depth) and Constraint 2 (Type: Horizontal, Parent: CL2, Value: 0.0000, Label: ). The Style Constraint is unchecked, and the Range is 0.0000.



Parametric Constraints dialog box showing configuration for Comidor WS1. The Constraint Label is AggBase Depth, Start Value is -0.7500, and Stop Value is -0.7500. The Station Limits are Start: 75+00.00 and Stop: 511+50.43. The Override Values table is as follows:

Name	Start Value	Stop Value	Start Station	Stop Station
AggBase Depth	-0.7500	-0.7500	75+00.00	511+50.43

Buttons: Add, Close, Change, Help, Export..., Import..., Delete.



# Hierarchy of Constraints

The third priority is the template point Style Constraint. This constraint overrides the “starting point” searching for alignments.

The screenshot shows the 'Point Properties' dialog box with the following settings:

- Name: TC\_L
- Feature Name Override: TC\_L
- Surface Feature Style: Curb
- Alternate Surface: (empty)
- Member of: Curb and Gutter\_L
- Constraints:
  - Constraint 1: Type: Horizontal, Parent 1: Gutter\_L, Value: -0.1667
  - Constraint 2: Type: Vertical, Parent 1: Gutter\_L, Value: 0.5000
- Style Constraint:  Style Constraint: Curb
  - Horizontal  Vertical  Both
  - Range: 0.0000

# Hierarchy of Constraints

The fourth and highest priority is the Point Control

Corridor: WS1

Point: EP\_R

Mode:  Horizontal  Vertical  Both

Control Type: Alignment

Horizontal Alignment: Right\_EOP

Use as Secondary Alignment

Priority: 1

Station Limits: Start: 75+00.00, Stop: 511+50.42

Horizontal Offsets: Start: 0.0000, Stop: 0.0000

Vertical Offsets: Start: 0.0000, Stop: 0.0000

Horizontal and Vertical Controls:

Enabled	Priority	Name	Start Station	Stop Station	Mode	Type	Control
X	1	EP_L	75+00.00	511+50.42	Vertical	Superelevation	Super from shapes CL-E.
X	1	EP_R	75+00.00	511+50.42	Vertical	Superelevation	Super from shapes CL-E.
X	1	EP_L	75+00.00	511+50.42	Horizontal	Alignment	Left_EOP
X	1	EP_R	75+00.00	511+50.42	Horizontal	Alignment	Right_EOP

# Template Drops Versus Point Controls

- Creating a new template for every little change is cumbersome and difficult to manage
  - Bulk changes for many templates takes time
  - Transitions will be numerous
  - Difficult to pass the project to another designer
  - Consider driveways for example...

# Template Drops Versus Point Controls

- Point Controls easily transform a “static” template into a “dynamic” template
  - Easily manage varying width pavements and shoulders
  - Used in conjunction with Component Display Rules to automate routine changes like driveways and side roads

# Display Reference Usages

The screenshot shows the 'Display References' dialog box for Corridor: WS1. The dialog is configured with the following settings:

- Corridor: WS1
- Display Reference: Alignment: Left\_EOP
- Surface: fm314-dtm
- Feature: LandXML
- Filter: <Unnamed>
- Display as Right of Way
- Limits:  Station, Start: 0+00.00, Stop: 0+00.00

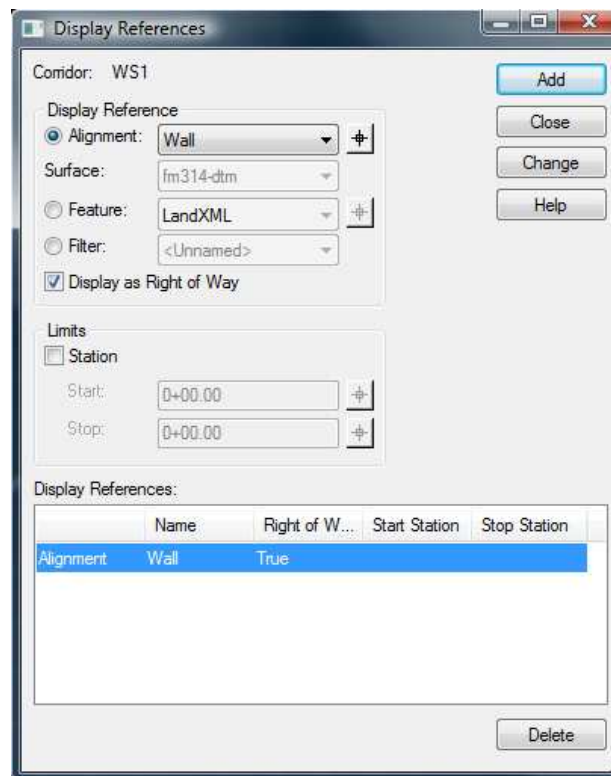
The 'Display References' table is as follows:

	Name	Right of W...	Start Station	Stop Station
Alignment	Left_EOP	True		
Alignment	Right_EOP	True		

The right side of the image shows a 2D plan view of the corridor. A yellow line represents the alignment, and a vertical purple line represents the Right of Way Left\_EOP. A callout box points to this line with the text 'Right of Way Left\_EOP'. The background is a grid of dashed lines.

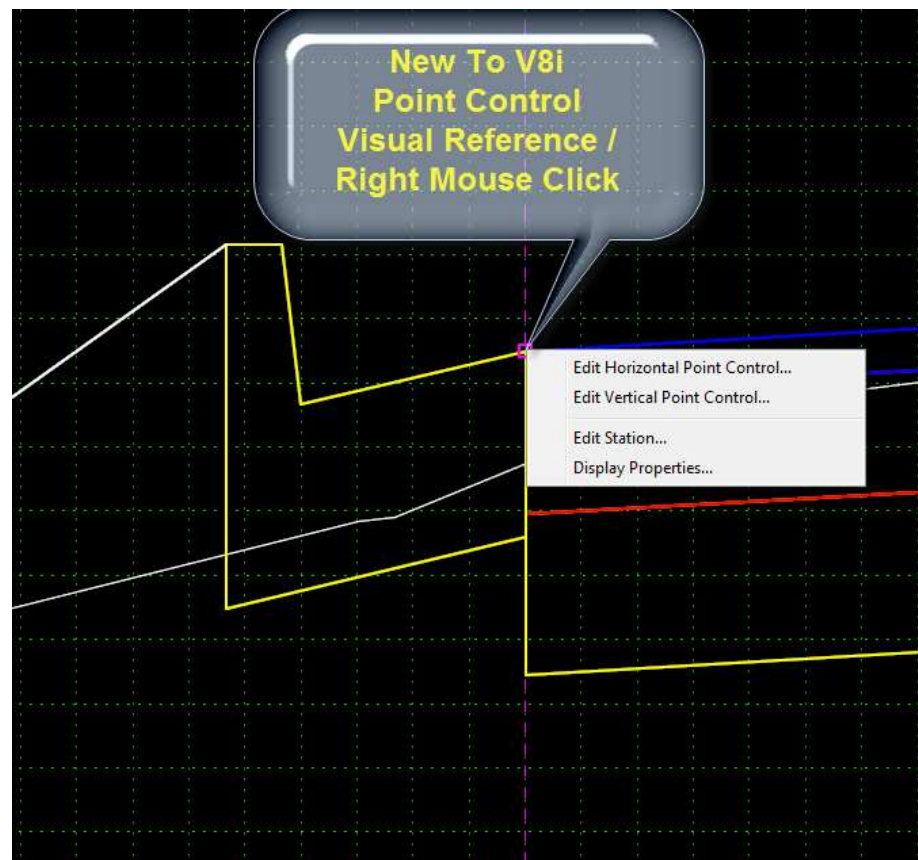
# Display Reference Usages

A good “rule of thumb” is to use Display References for items the designer is trying to avoid.



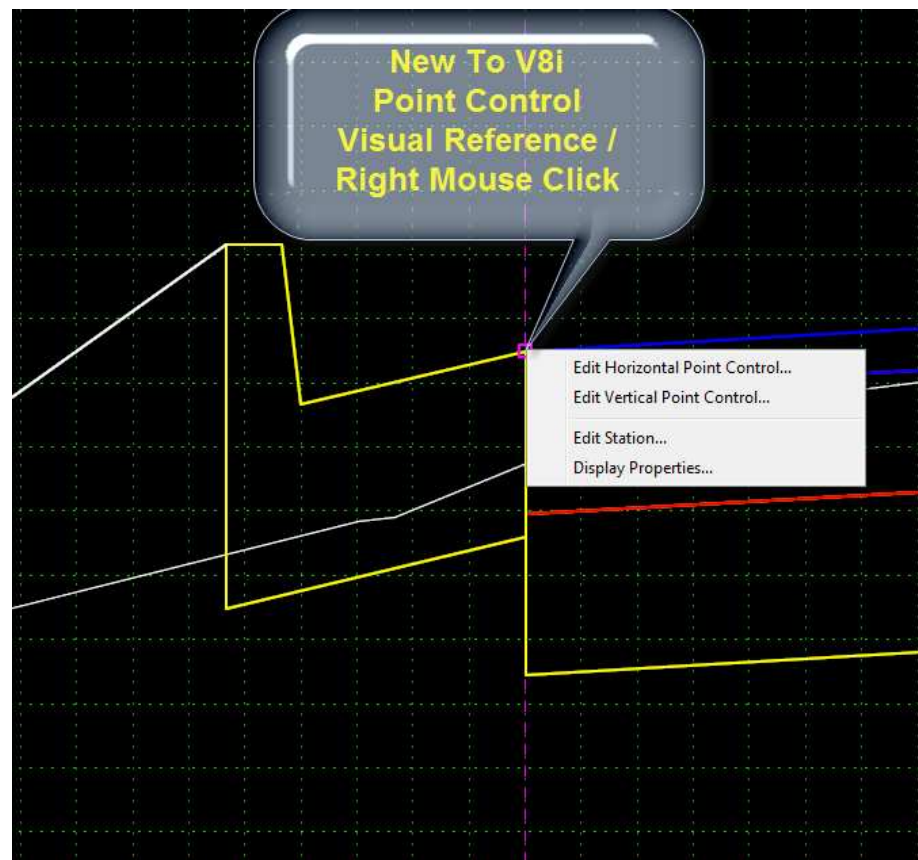
# Display Reference Usages

New to V8i, Point Control visual reference reduces the need for enabling as many Display References



# Display Reference Usages

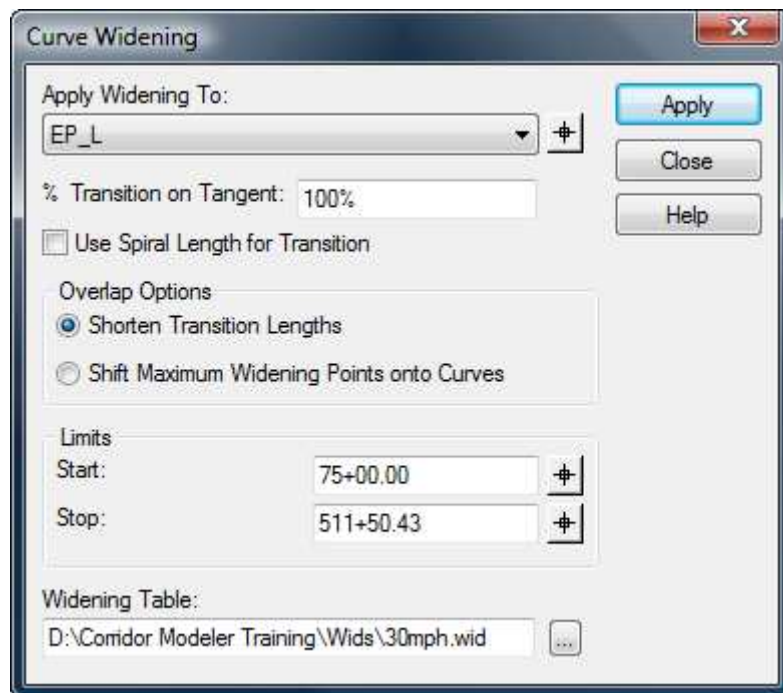
The more display references used...  
the **slower** the processing.





# Automated Curve Widening

Curve widening tables allow for insertion of point controls through curves and transitions.



```
; Cross section Type 1,3 & 4
; Lane width = 3.50 m
; Rad  Wi   Li   Wo   Lo
;   0   3.50  2.5  3.50  2.5
;  100  1.75  25   0     0
;   500  1.50  25   0     0
;  1000  1.25  25   0     0
;  2000  0.75  25   0     0
;  5000  0.50  25   0     0
```

Where:

Rad = Radius

Wi = Widening inside of curve

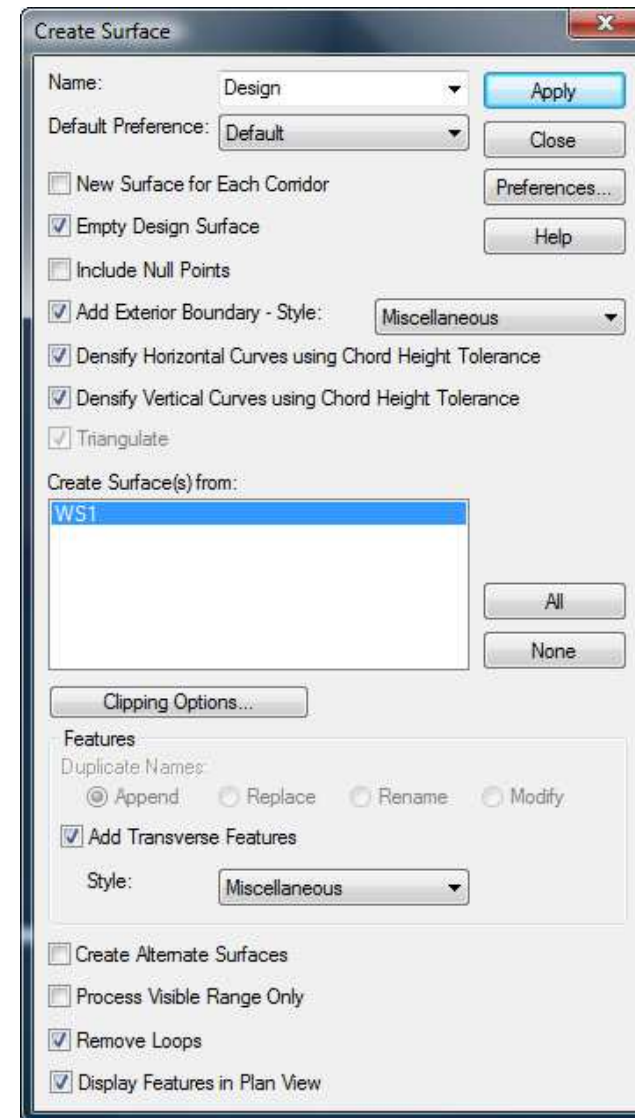
Li = Length of transition inside of curve

Wo = Widening outside of curve

Lo = Length of transition outside of curve

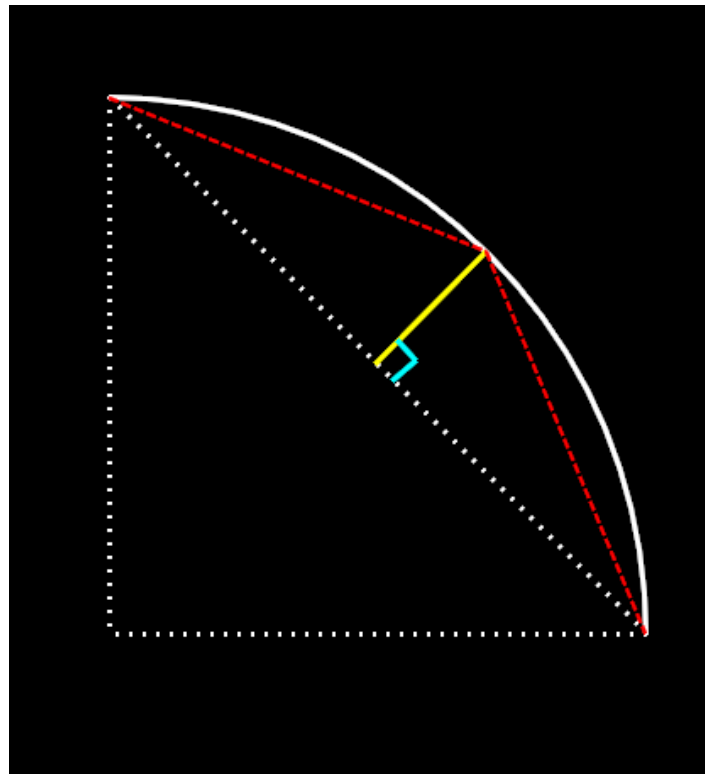
# Creating Surfaces

There are some important options that are sometimes overlooked...



# Creating Surfaces

Densify Horizontal / Vertical Curves



# Creating Surfaces

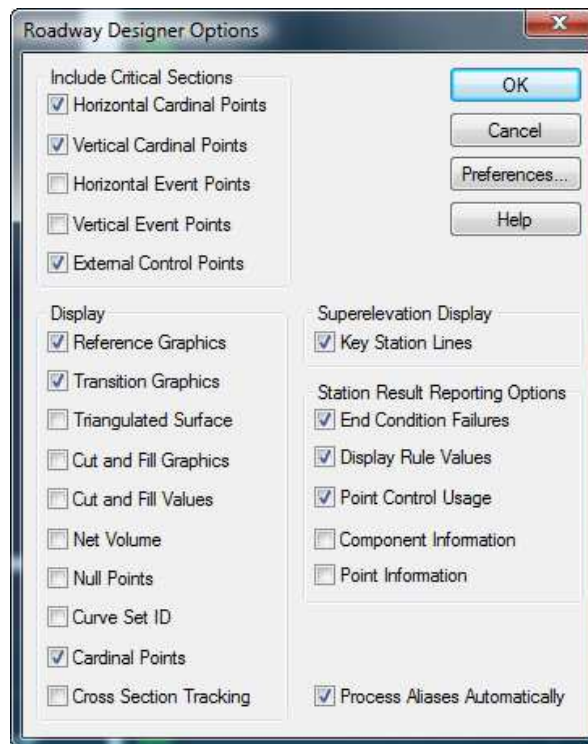
## Densify Horizontal / Vertical Curves

- Using horizontal and vertical chord height tolerances, more triangles will be introduced creating a “smoothing” effect.

# Creating Surfaces

## Using Cardinal and External Control Points

- These additional template drop locations assure a much more accurate surface



# Secondary Alignments

Comidor: WS1

Secondary Alignment: Right\_EOP

Start Station: 75+20.00

Stop Station: 503+31.50

Start Offset: 0.0000

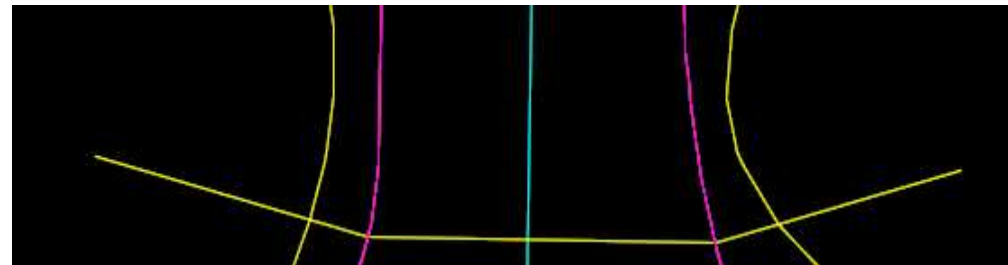
Stop Offset: 0.0000

Alignments:

Name	Start Sta...	Stop Sta...	Start Off...	Stop Offset
Left_EOP	75+20.00	503+31.50	0.0000	0.0000
Right_EOP	75+20.00	503+31.50	0.0000	0.0000

Buttons: Add, Close, Change, Help, Delete

- Modifies cross section direction. The cross section will be radial to each secondary alignment.



## Secondary Alignments

- Mimics construction
- More accurate DTM
- Minimizes “looping” in tight radii

# Managing Corridors

- The Corridor Management tool provides the means to evaluate several design alternatives.

Manage Corridors

Name: 242E - Alternate 1

Type: Alignment

Horizontal Alignment: 242E

Vertical Alignment: 242E

PI Rounding Tangent: 0.0000

Limits

Station

Start: 217+10.00

Stop: 255+40.00

Buttons: Add, Close, Change, Copy, Copy From..., Help, Delete

Corridors:

Name	Type	Source Name	Start Station	Stop Station
242E - Alternate 1	Alignment	242E	217+10.00	255+40.00
242E - Alternate 2	Alignment	242E	217+10.00	255+40.00
242E - Alternate 3	Alignment	242E	217+10.00	255+40.00



# Managing Corridors

- Using the Copy command, a user can copy a complete design to an alternate Corridor name within the same design IRD file.

Manage Corridors

Name: 242E - Alternate 1

Type: Alignment

Horizontal Alignment: 242E

Vertical Alignment: 242E

PI Rounding Tangent: 0.0000

Limits

Station

Start: 217+10.00

Stop: 255+40.00

Buttons: Add, Close, Change, Copy, Copy From..., Help, Delete

Corridors:

Name	Type	Source Name	Start Station	Stop Station
242E - Alternate 1	Alignment	242E	217+10.00	255+40.00
242E - Alternate 2	Alignment	242E	217+10.00	255+40.00
242E - Alternate 3	Alignment	242E	217+10.00	255+40.00

# Managing Corridors

- Likewise using the Copy From command, a user can copy a complete design to an alternate Corridor name from within another design IRD file.

The screenshot shows the 'Manage Corridors' dialog box. The 'Name' field is '242E - Alternate 1'. The 'Type' is 'Alignment'. The 'Horizontal Alignment' and 'Vertical Alignment' are both '242E'. The 'PI Rounding Tangent' is '0.0000'. The 'Limits' section has 'Station' checked, 'Start' at '217+10.00', and 'Stop' at '255+40.00'. The 'Corridors' table lists three entries: '242E - Alternate 1', '242E - Alternate 2', and '242E - Alternate 3', all of type 'Alignment' and source '242E'. The 'Copy From...' button is highlighted in yellow.

Name	Type	Source Name	Start Station	Stop Station
242E - Alternate 1	Alignment	242E	217+10.00	255+40.00
242E - Alternate 2	Alignment	242E	217+10.00	255+40.00
242E - Alternate 3	Alignment	242E	217+10.00	255+40.00

# Managing Corridors

- By copying a design corridor to a different alternate name a user can easily evaluate design changes such as:
  - Profile alternates
  - Design speed changes
  - Super elevation changes
  - Etc.

Questions?