



Vertical Alignments - Objectives

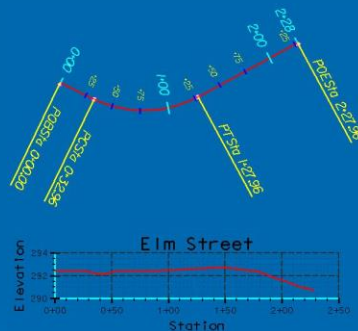
- Vertical Geometry Prerequisites
- The Vertical Curve Set tools
- Vertical Curve types
- Intro to the Vertical Element tools
- Vertical Curve Set layout snaps
- Vertical Precision Key-ins
- The Vertical Curve layout tool
- Vertical Alignment Annotation

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Vertical Geometry Intro

- Vertical Prerequisites:
 - Need to have a parent Horizontal alignment
 - Must have a Profile displayed in CAD
 - Must create a Vertical Slot in which to store the new vertical geometry



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Vertical Alignments

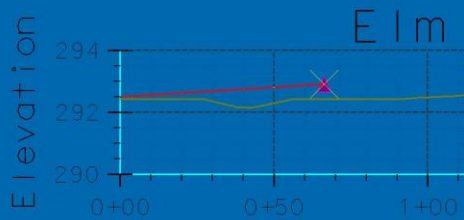
- Create the 'slot' in the Geometry Project
- Layout the Vertical Alignment via
 - ♣ Vertical Curve Set method (PI's)
 - ♣ Vertical Element method (Elements)
 - ♣ Simplified Vertical Element method
 - ♣ Direction Traverse Command (H & V)
 - ♣ Regression Analysis
 - ♣ Import from Graphics
 - ♣ Import Vertical from Surface (3D plan data)
 - ♣ Import from an ASCII file

Vertical Curve Set Tools



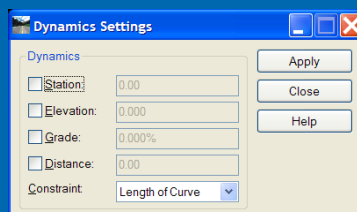
- **Vertical Curve Set** is a common method of laying out a Vertical Alignment (layout by points)
 - ♣ Similar to the H. Curve Set tools, VPI's can be Added, Inserted, Moved and Deleted
- Can also use *Vertical Element* (layout by element)

Add Vertical PI's



- Vertical Points of Intersection (VPIs) are placed & manipulated within an InRoads Profile window

The Dynamics Settings Dialog



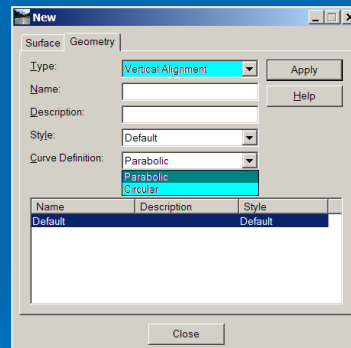
- Vertical **Dynamics Settings** can be used to assist in layout of Vertical PI's
- These settings can be used to control the increment position of the cursor in the profile window
 - Certain combination restrictions exist

Key-ins to Place VPI's

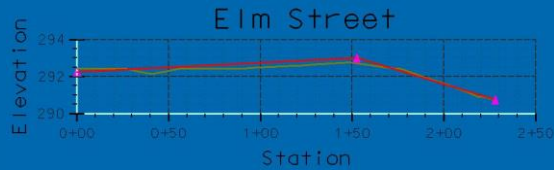
- Vertical Curve Set VPI placement options
 - ⤴ Data Points within the profile window
 - ⤴ Use the *Dynamics* toggles for more control
 - ⤴ SE=Station, Elevation
 - ⤴ DG=Distance, Grade
 - $DG=100, 3.5\%$, (or $DG=100, .035$) places a VPI 100 ft over, with a 3.5% grade from the previously placed VPI
- Use the SE key-in to place the first VPI
 - ⤴ SE=alignment beginning station,elevation
- Use any method to continue placing VPI's

Vertical Curve Definition

- 2 possible **Curve Definitions** when creating vertical 'slots'
 - ⤴ **Parabolic** (typically used for road work)
 - ⤴ **Circular** (typically used for utility work)
- Ensure the Vertical 'slot' is correct
 - ⤴ *File > Project Options > Geometry tab > Curve Definition > Vertical* defines the default definition



Defining Vertical Curves



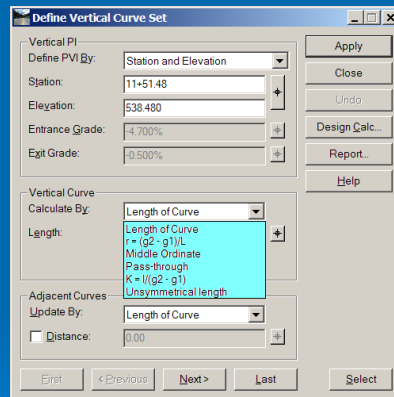
- Once VPI's are placed the curves can be defined where 2 tangents intersect
- The curves are defined one at a time walking along the vertical tangents legs

Vertical Curve Dialog

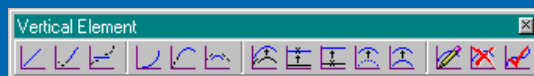
- The upper **Vertical PI** portion is an editor
- The middle area, **Vertical Curve**, sets the curve info
- The lower area, **Adjacent Curves**, also relates to curve editing
 - Undo

Curve - Calculate By

- Parabolic Vertical Curves can be **Calculated By:**
 - ♣ Length of Curve
 - ♣ Rate of Change 'r'
 - ♣ Middle Ordinate
 - ♣ Pass Through
 - ♣ Vertical 'K' value
 - ♣ Unsymmetrical Length
 - ♣ PVC / PVT Station
- Circular Curves are by:
 - ♣ Radius only

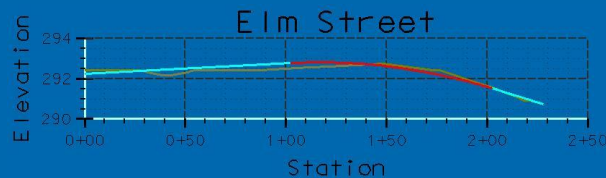


Vertical Element Tools



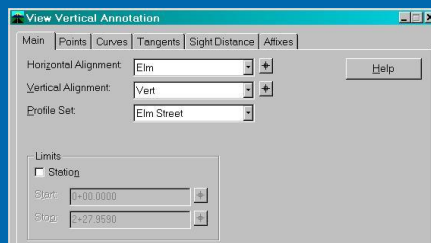
- **Vertical Element** tools are another method for creating & editing a Vertical alignments
- These tools construct components versus VPIs
- Remember about '*Discontinuities*' in design
- Layout the lab tangents using these tools if you feel like expanding your vertical layout skills.

Vertical Annotation



- Once the vertical alignment is complete the *annotation* of its geometry can be displayed in the profile window
 - Annotation* is the textual CAD information that describes either the alignment or some other item stored in an InRoads data file

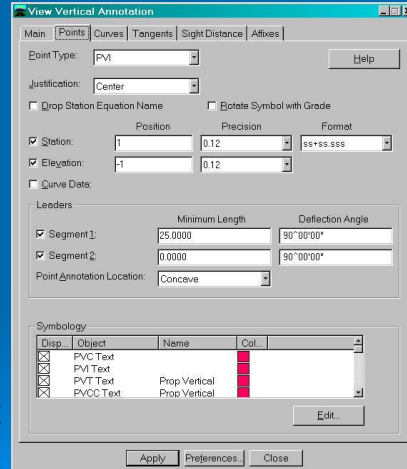
View Vertical Annotation



- Geometry > View Geometry > Vertical Annotation*
- Main** tab: defines what geometry to annotate
 - Horizontal & Vertical Alignment
 - On which Profile Set
 - Optional Station Limiting

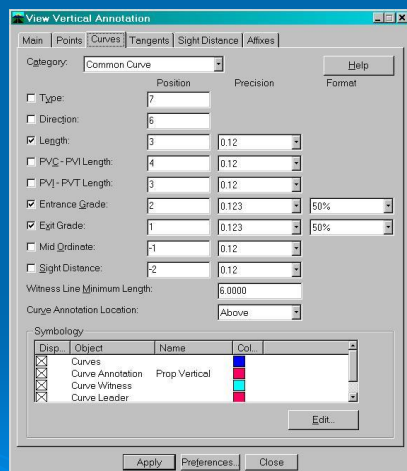
Vertical Point Annotation

- The **Points** tab formats all the *Point Types* that can be annotated
 - ♣ PVI
 - ♣ PVC / PVT
 - ♣ PVCC / PVRC
 - ♣ Events / High / Low
- Each *Point Type* can be formatted uniquely
- *Display* will show it or not



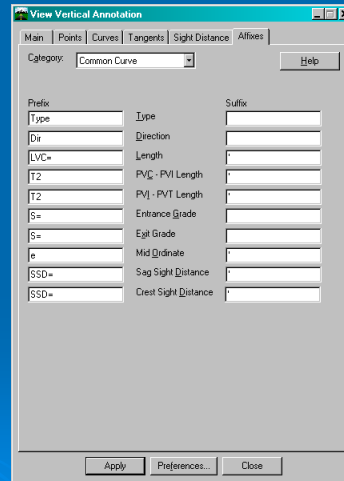
Vertical Curve Annotation

- This tab formats **Curves**
 - ♣ Toggle on the annotation
 - ♣ Set its Position
 - ♣ Define its Precision
 - ♣ Format if applicable
 - ♣ Locate the text positioning
- **Tangents** are similar
- **Sight Distance** tab sets:
 - ♣ Eye Height
 - ♣ Target Height

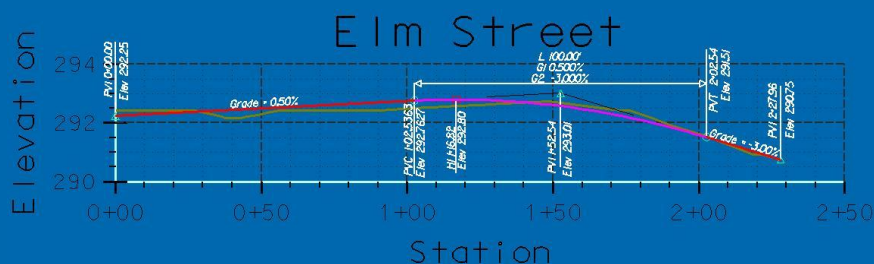


Vertical Annotation Affixes

- Remember that **Affixes** are Prefixes & Suffixes
- Most of InRoads uses the affixes under *InRoads > Tools > Options > Affixes* tab, ... unless there are local settings like here
- When ready save all the settings as a *Preference*
- Then **Apply**



Annotated Vertical Alignment



- Get the Vertical Annotation as close as possible to your department standards and it will be a good time saver

Vertical Alignments – Summary

- Geometry Project has **Parent-Child relationships**
 - The Geometry Project owns the **Horizontal**
 - The Horizontal Alignment owns the **Vertical**
- Vertical Alignment layout has 3 prerequisites:
 - A Horizontal Alignment
 - A Profile window to work within
 - A **Vertical 'slot'** (*File>New*) prior to setting VPI's.
- New vertical geometry is constructed using techniques similar to the horizontal methods
- Vertical design is done inside a Profile window
- Vertical annotation **display** is stored in the XIN
- Set up, store and reuse as many settings as possible via the saved Preferences