

#### Geometry Update

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# **Geometry Update**

Let's hear about new capabilities within InRoads geometry. In addition, let's look at some capabilities within InRoads geometry that may be new or puzzling to you.



#### **Updated Interface**

Implement tree view and grids for various geometry view commands

🚳 View Stationing

General

Regular Stations

Cardinal Stations

Station Equations

Event Points

Transition Radii Vertical Stations

Radius + A

Object

Major Station

Submajor Ticks

Omit First and Last Poin

Major

-0.0050

Minor Station

Minor Ticks

Ticks

Left Offset:

Right Offsel

Interval

Major Ticks

- View Closed Areas
- View Stationing
- View Station &Offset
- View Curve Set
- View Vertical in Plan
- View Switch Height Plan
- View Turnouts
- ...
- Consistency
- Enables the next step!



Prefix Suffix Precision Format Name

Submaior

-0.0100

0.010

\$+\$\$\$.\$\$

\$+\$\$\$.55

ss[+sss.ss

Minor

-0.0040

#### A few more





#### And even some for rail users!

| Dhippt                | Drofin  | c     | Draginian | Earnat         | Mama  | 1.1 | Apply        |
|-----------------------|---------|-------|-----------|----------------|-------|-----|--------------|
| Turnout               | IT ICIN | Jouna | riccision | Tunac          | Induc |     | Close        |
| Recant Turnout        |         |       |           |                |       |     |              |
| In Vertical Curve     |         |       |           |                |       |     | Preferences. |
| 🛛 Orphan Turnout      |         |       |           |                |       |     | Help         |
| 🛛 Overlapping Turnout |         |       |           |                |       |     |              |
| Name & Description    |         |       |           |                |       |     |              |
| 🛛 .1 Station          |         |       | 0.123     | \$+\$\$\$.\$\$ | 1     |     |              |
| 🛛 .1 Point            |         |       |           |                |       |     |              |
| .0 Station            |         |       | 0.123     | \$+\$\$\$.\$\$ |       |     |              |
| .0 Point              |         |       |           |                |       |     |              |
| .2 Point              |         |       |           |                |       |     |              |
| .3 Point              |         |       |           |                |       |     |              |
| S&C Nose & Crossing   |         |       |           |                |       |     |              |
| 🛛 Shunt Point         |         |       |           |                |       |     |              |
| 🗌 Equivalent Radii    |         |       | 0.1       |                |       |     |              |

| Settings<br>Horizontals<br>Turnouts<br>Station Diagram<br>Boofle Diagram | Alignments<br>Reference:<br>Horizontal Alignmen<br>Selected: | ml1 *                                                                               |             |                                   | Filter |                    |                              |                |          |   |
|--------------------------------------------------------------------------|--------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------|-----------------------------------|--------|--------------------|------------------------------|----------------|----------|---|
| Protite Diagram<br>Chord Offset Diagram<br>Points<br>Subscripts          | Name<br>2<br>4<br>6<br>8<br>ml 1<br>ml 2<br>ml 3             | Description Style<br>Default<br>Default<br>Default<br>Default<br>Default<br>Default | Ki _        |                                   |        |                    |                              |                | Ē        |   |
|                                                                          |                                                              | non mengur eran                                                                     |             |                                   | _      | _                  |                              |                |          | 1 |
|                                                                          | 9                                                            | witch Height Plan                                                                   | Da          | a:<br>Object                      | Profix | Suffix             | Precision                    | Format         | Name     | i |
|                                                                          | 10000                                                        | Settings                                                                            | -           | Vertical Lines                    | TICHA  | Jouina             | Trocision                    | 11 onnac       | Indino   | - |
|                                                                          | Limits                                                       | Horizontals                                                                         |             | Subtangent Lines                  |        |                    |                              |                |          | - |
|                                                                          | Station                                                      | Turnouts                                                                            | · Constant  | Left Rail Lines                   |        |                    |                              |                |          |   |
|                                                                          | Start:                                                       | Station Diagram                                                                     | 1           | Right Rail Lines                  | 17     |                    |                              |                |          | _ |
|                                                                          | Store                                                        | Profile Diagram                                                                     |             | Grade                             | G=     |                    | 0.123                        | 50%            |          |   |
|                                                                          | -300p.                                                       | Chord Offset Diagram                                                                |             | Length                            | L =    | m                  | 0.123                        |                |          |   |
|                                                                          |                                                              | Points                                                                              |             | Elevation                         | EI.    |                    | 0.123                        |                |          |   |
|                                                                          | have                                                         | Subscripts                                                                          |             | Applied Cant                      | D=     | mm                 | 0                            |                |          |   |
|                                                                          |                                                              |                                                                                     |             | Cant Length                       | L=     | m                  | 0.123                        |                |          |   |
|                                                                          |                                                              |                                                                                     |             | Cant Gradient                     | 1:     |                    | 0                            |                |          |   |
|                                                                          |                                                              |                                                                                     | $\boxtimes$ | Horizontal Axis                   |        |                    | 0.1                          | \$+\$\$\$.\$\$ |          |   |
|                                                                          |                                                              |                                                                                     |             | Vertical Axis                     |        |                    | 0                            |                |          |   |
|                                                                          |                                                              |                                                                                     | A<br>H      | xis Interval<br>orizontat 100.000 | 0      | Plan to<br>Strokin | Profile Diagr<br>g Interval: | am Offset:     | 600.0000 |   |
|                                                                          |                                                              |                                                                                     | V           | ertical: 1.0000                   |        | Vertica            | l Evanneratio                |                | 00.0000  | _ |

| F10         | file Set:                         |           |            |           | ✓ +            | Apply      |      |
|-------------|-----------------------------------|-----------|------------|-----------|----------------|------------|------|
| Bot         | tom Axis to W                     | itness Li | ne Offset: | 10.0000   |                | Close      |      |
| Lea         | der Line Leng                     | ith:      |            | 10.0000   |                |            |      |
| 'n.         | Drop Station F                    | austion   | Namas      |           | 1              | Fieleieric | 85.  |
| -           | biop station i                    | quadior   | rivalites  |           |                | Help       |      |
| Dat         | a                                 |           |            |           |                |            | 1.66 |
|             | Object                            | Prefix    | Suffix     | Precision | Format         | Name       |      |
| M           | Witness Line                      |           |            |           |                | turnout    | 1    |
| Sec. 1      | LondorLino                        |           |            |           |                | turnout    |      |
| $\boxtimes$ | Leader Line                       |           |            |           |                | turnout    |      |
| $\boxtimes$ | Name                              |           |            |           |                |            |      |
|             | Name<br>Description               |           |            |           |                | turnout    |      |
|             | Name<br>Description<br>.1 Station |           |            | 0.123     | \$+\$\$\$.\$\$ | turnout    |      |





![](_page_5_Picture_1.jpeg)

![](_page_5_Picture_2.jpeg)

# Explorer

- View All
  - Horizontal alignments
  - Turnouts (rail only)
  - Rails, Joints & Keepers (rail only)
- Hilite
- Fit & Hilite
- <Ctrl> Active
  - Set an alignment active by selecting the graphics
- <Ctrl> Delete
  - Delete an alignment by selecting the graphics

![](_page_6_Picture_11.jpeg)

![](_page_7_Figure_0.jpeg)

8 | WWW.BENTLEY.COM

#### **AREMA Transition Spiral**

- Chord definition
- Simple & compound
  - Available in **Bentley Rail Track**!

| Element: AREMA              |                              |            |            |
|-----------------------------|------------------------------|------------|------------|
| TS ( )<br>SPT ( )           | 3+37.1050<br>5±37.0953       | 10191.4712 | 10277.4501 |
| SC (                        | 6+37 1050                    | 10357 5103 | 10527 2682 |
| Entrance Radius:            | 0.0000                       | 10001.0100 | 10000.0000 |
| Exit Radius:                | 2864.9344                    |            |            |
| Length:                     | 300.0000                     |            |            |
| Angle:                      | 3^00'00.0"                   | Right      |            |
| Lonstant:                   | 927.0816                     |            |            |
| Short Tangent               | 100 0646                     |            |            |
| Long Chord                  | 299 9634                     |            |            |
| Xs:                         | 299.9177                     |            |            |
| Ys:                         | 5.2370                       |            |            |
| P:                          | 1.3107                       |            |            |
| K:                          | 149.9786<br>N EE^222124 1" E |            |            |
| Padial Direction:           | N 55 23 24.1 E               |            |            |
| Chord Direction:            | N 56^23'25 4" E              |            |            |
| Radial Direction:           | S 31^36'35.9" E              |            |            |
| Tangent Direction:          | N 58^23'24.1" E              |            |            |
| Element: Circular           |                              |            |            |
| SC ( )                      | 6+37.1050                    | 10357.5103 | 10527.2682 |
| PI ( )                      | 10+99.8233                   | 10600.0368 | 10921.3357 |
| <u> </u>                    | 15,54 5710                   | /91/.629/  | 12028.8778 |
| CS ( )<br>Radius:           | 2864 9344                    | 10/06.1/55 | 113/1./104 |
| Design Speed(mph);          | 70.0000                      |            |            |
| Cant(inches):               | 5                            |            |            |
| Delta:                      | 18^20'57.6"                  | Right      |            |
| Degree of Curvature(Chord): | 2^00'00.0"                   |            |            |
| Length:<br>Teneth(Chended)  | 917.5133                     |            |            |
| Tangent:                    | 462 7183                     |            |            |
| Chord:                      | 913.5973                     |            |            |
| Middle Ordinate:            | 36.6515                      |            |            |
| External:                   | 37.1265                      |            |            |
| Tangent Direction:          | N 58^23'24.1" E              |            |            |
| Radial Direction:           | 5 31 36'35.9" E              |            |            |
| Radial Direction:           | G 13^15'38 3" F              |            |            |
| Tangent Direction:          | N 76^44'21.7" E              |            |            |

![](_page_8_Picture_5.jpeg)

#### **Table Editors**

#### • Simpler editing

- No discontinuities, no compound curve sets
- We now honor the Tools > Options > Geometry
  - Define Transitions By Length or Constant
  - Spiral Definition Clothoid, AREMA, Bloss, etc.
  - Undocumented Tip <*Ctrl* > *right click*

| Northina     | Easting             | Leading Transition | Radius    | Trailing | Transition     |           |           |        |
|--------------|---------------------|--------------------|-----------|----------|----------------|-----------|-----------|--------|
| 6775751.0840 | 1543594.4920        | -                  |           |          |                | Close     |           |        |
| 6774150.4603 | 1549691.4024        | 0.0000             | 5000.0000 | 0.0000   | e P            |           |           |        |
| 6777638.0489 | 1556519.4831        | 200.0000           | 2000.0000 | 200.00   | 👫 Vertical Tab | le Editor |           |        |
| 6781109.5656 | 1552165.5775        | 200.0000           | 2000.0000 | 200.00   |                |           |           |        |
| 6786798.9959 | 1551796.0579        |                    |           |          | Curve Sets:    | ũ.        | i .       | , Undo |
|              | 1 ALTONY CONTRACTOR |                    |           |          | Station        | Elevation | Length    |        |
|              |                     |                    |           |          | 10+000.0000    | 20.0000   |           | Close  |
|              |                     |                    |           |          | 12+000.0000    | 40.0000   | 1000.0000 | Hala   |
|              |                     |                    |           |          | 18+000.0000    | 5.0000    | 1000.0000 |        |
|              |                     |                    |           |          | 24+000.0000    | 10.0000   | 1000.0000 |        |
|              |                     |                    |           |          | 30+000.0000    | 70.0000   | 1000.0000 |        |
|              |                     |                    |           |          | 32+000.0000    | 50.0000   | 4         |        |
|              |                     |                    |           |          |                |           |           |        |
|              |                     |                    |           |          |                |           |           |        |
|              |                     |                    |           |          |                |           |           |        |

![](_page_9_Picture_8.jpeg)

#### **Vertical Alignment Healing**

- An attempt to synchronize / update the vertical alignment when the horizontal alignment has changed.
  - The coordinate position of vertical PI's will be held!
  - New in 'Athens'

![](_page_10_Picture_4.jpeg)

#### **Edit Horizontal Element**

- Component Editor type of functionality
- Maintain Element Connectivity with Minimum
   Movement
  - Previous element is freed
  - Current element is fixed
  - Next element is freed

| Define From: | 💿 Start 🔵 Stop   | 🔘 Both   | Apply       |
|--------------|------------------|----------|-------------|
| Туре:        | Linear           | *        | Close       |
| Transition:  | Clothoid         | ~        | Transpose   |
| Station:     | 4+557.9401       |          | Delete      |
| Point Name:  |                  |          | Undo        |
| Northing:    | 1828866.601620   | +        | Design Calc |
| Easting:     | 522249.291075    |          | Curve Calc  |
| Direction:   | N 20^00'00.0'' E | +        | Benort      |
| Radius:      | 0.0000           | -#-      | Help        |
| Stop         |                  |          |             |
| Station:     | 7+057.9401       |          |             |
| Point Name:  |                  |          |             |
| Northing:    | 1831215.833172   | +        | Select      |
| Easting:     | 523104.341433    |          | First       |
| Direction:   | N 20^00'00.0'' E | <b>.</b> | < Previous  |
| Radius:      | 0.0000           | +        | Nevt        |
|              |                  |          |             |
|              |                  |          |             |

![](_page_11_Picture_7.jpeg)

# **Multiple Element Connection Editors**

- Edit beginning and ending elements
  - Change radii / direction
- Inclusion of cant (rail only)

| Beginning            | Eleme  | nt                   | 14-00-00           | -                    |          | Undo          |
|----------------------|--------|----------------------|--------------------|----------------------|----------|---------------|
| l yp<br>Circular     | )e     | Free                 | Length             | Hadius               |          | Benort        |
| Circular             |        |                      | Applied Cant (mm): | 70.0000              |          | Help          |
| Connecting           | Elemer | nt:                  |                    |                      |          |               |
| Туре                 | Free   | Length               | Free Pa            | rameter 1            | T Applie | Add Before.   |
| Viennese<br>Circular |        | 300.0000             | 547.               | 7226 <u> </u>        | 140.0000 | Add After     |
| Viennese             |        | 300.0000             | 387.               | 2983                 | ]        | Conversioners |
| Linear<br>Viennese   |        | 991.4106<br>300.0000 | N 9<br>387.        | 1042.9°E Ц<br>2983 П |          | E dit         |
|                      |        |                      |                    | L                    | 1        | Delete        |
|                      |        |                      |                    |                      |          | Import        |
| Ending El            | ement  |                      |                    |                      |          |               |
| Тур                  | e      | Free                 | Length             | Radius               |          |               |
| Circular             |        |                      | 492.5664           | 500.0000             | Select   |               |
|                      |        |                      | Applied Cant (mm): | 140.0000             |          |               |
|                      |        |                      |                    |                      |          |               |
| - NA A COLORADO      | Conne  | chian                |                    |                      |          |               |

![](_page_12_Picture_5.jpeg)

# **Edit / Review Extended Descriptions**

- Adding non-graphical data to the design data
  - Extending the data with long textual descriptions
    - Persisted with the .alg
  - Extending the data with an external file / digital images

![](_page_13_Picture_5.jpeg)

![](_page_13_Picture_6.jpeg)

#### **Cogo Audit Trail Lock**

- Similar to the *Report Lock* for cogo commands, but independent!
  - Writes a .atf file to the same folder as the active

geometry file.

| 🖡 scratch.atf - Notepad                        |                   |                                        |                    |           |
|------------------------------------------------|-------------------|----------------------------------------|--------------------|-----------|
| File Edit Format View Help                     |                   |                                        |                    |           |
| W## Modified by Richard.Brad                   | shaw on 10/29/200 | 08 9:04:26 AM                          |                    |           |
| Inverse Direction                              |                   |                                        | 1010 0010          |           |
| N 50456'10.4" W                                | 161.1038          | 11318.4795                             | 5839.8050          | 0.0000    |
| Inverse Direction                              |                   | 11420.0045                             | 5714.7774          | 0.0000    |
| N 14^59'34.5" E                                | 96.8628           | 11420.0045                             | 5714.7774          | 0.0000    |
| Inverse Direction                              |                   | 11513.5699                             | 5739.8358          | 0.0000    |
| N 11^51'42.6" W                                | 70,5753           | 11513.5699                             | 5739.8358          | 0.0000    |
| Towerse Direction                              |                   | 11582.6381                             | 5725.3289          | 0.0000    |
| 11/VELSE DITECTION                             | 08 7800           | 11582.6381                             | 5725.3289          | 0.0000    |
| N 04423 17.5 E                                 | 96.7600           | 11640.1568                             | 5805.6351          | 0.0000    |
| Inverse prrection                              |                   | 11640.1568                             | 5805.6351          | 0.0000    |
| N 89432 11.5 E                                 | 113.3143          | 11641.0734                             | 5918.9456          | 0.0000    |
| Inverse Direction                              |                   | 11641.0734                             | 5918.9456          | 0.0000    |
| 5 10^03'10.2" W                                | 128.4967          | 11514.5495                             | 5896.5158          | 0.0000    |
| Inverse Direction                              |                   | 11514.5495                             | 5896.5158          | 0.0000    |
| 5 75440'03.7" W                                | 124.6252          | 11483.6991                             | 5775, 7694         | 0.0000    |
| Direction Traverse                             |                   | 11.00.0001                             |                    |           |
| N 25400'00 0" F                                | 100,0000          | 11289.4194                             | 5808.5186          | 0.0000    |
| 59 v coloo'oo o" =                             | 100.0000          | 11371.3346                             | 5865.8763          | 0.0000    |
| 60                                             | 100.0000          | 11421.3346                             | 5952.4788          | 0.0000    |
| Direction Traverse<br>Mode: Radial             |                   | 1000000000000 000000000000000000000000 | 100101000 00010000 | an ananan |
| 60<br>N 75400'00.0" E                          | 99.0000           | 11421.3346                             | 5952.4788          | 0.0000    |
| 61<br>Direction Traverse                       |                   | 11446.9577                             | 6048.1055          | 0.0000    |
| Mode: Radial<br>60                             |                   | 11421.3346                             | 5952.4788          | 0.0000    |
| N 80400'00.0" E                                | 45.0000           | 11429 1488                             | 5996, 7951         | 0.0000    |
| Direction Traverse                             |                   | 11767.1700                             |                    | v. vvvv   |
| 60 C 11100'00 0" C                             | 17 0000           | 11421.3346                             | 5952.4788          | 0.0000    |
| 63 OU OU.U E                                   | 47.0000           | 11387.5256                             | 5985.1277          | 0.0000    |
| Direction Traverse<br>Mode: Add to Cogo Buffer |                   |                                        |                    |           |
| 60<br>5 80400'00.0" E                          | 300.0000          | 11421.3346                             | 5952.4788          | 0.0000    |
| 64                                             |                   | 11369.2401                             | 6247.9211          | 0.0000    |
| <u>×</u>                                       |                   |                                        |                    |           |

![](_page_14_Picture_5.jpeg)

#### **Design Checks**

#### Not just warnings!

🚟 Design Checks

#### - Now it indicates that the geometry is *acceptable!*

Checking stopping sight distances for alignment 'Default'

10+550.0000 Classification: GS-1M Freeway Terrain: Rolling Speed: 60 Warning: Desirable minimum stopping sight distance exceeded! Desirable minimum stopping sight distance: 205.0000 Desirable minimum length should be: 499.1020 Actual length: 300.0000

11+050.0000 Classification: GS-1M Freeway Terrain: Rolling Speed: 60 Acceptable: Actual length is greater than desirable minimum stopping sight distance. Desirable minimum stopping sight distance: 205.0000 Actual length: 300.0000

| General Roads                                                                                                                   | CEN Standards                                                                                               | ;                                | Austrian Rail       |
|---------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|----------------------------------|---------------------|
| Туре:                                                                                                                           | Horizontal Alignment                                                                                        | •                                | Apply               |
| Geometry Project:                                                                                                               | Default                                                                                                     | ~                                | Browse.             |
| Horizontal Alignmen                                                                                                             | t: Country Road 1534                                                                                        | <b>→</b> +                       | C Ala               |
| Vertical Alignment:                                                                                                             |                                                                                                             | ✓ +                              |                     |
|                                                                                                                                 | 3 <sup>9</sup>                                                                                              | 202                              | - Help              |
|                                                                                                                                 |                                                                                                             |                                  |                     |
| V Include Children                                                                                                              |                                                                                                             |                                  |                     |
| linclude Children<br>Definition:                                                                                                | Single Classification                                                                                       | Multip                           | ple Classifications |
| ✓ Include Children<br>Definition:<br>Classification:                                                                            | Single Classification                                                                                       | Multip                           | ple Classifications |
| ✓ Include Children<br>Definition:<br>Classification:<br>Terrain:                                                                | O Single Classification<br>GS-1M Freeway<br>Level                                                           | Multip                           | ple Classifications |
| ✓ Include Children<br>Definition:<br>Classification:<br>Terrain:<br>Design Speed:                                               | Single Classification<br>GS-1M Freeway<br>Level                                                             | Multip                           | ple Classifications |
| ✓Include Children<br>Definition:<br>Classification:<br>Terrain:<br>Design Speed:<br>Classification File:                        | Single Classification<br>GS-1M Freeway<br>Level<br>50<br>d \data\design checking                            | ⊙ Multij                         | ole Classifications |
| Include Children<br>Definition:<br>Classification:<br>Terrain:<br>Design Speed<br>Classification File:<br>Design Criteria File: | Single Classification<br>GS-1M Freeway<br>Level<br>50<br>dt\data\design checking<br>bentley\inroad~1.11\dat | Multip<br>Multip<br>stat         | ple Classifications |
| Include Children<br>Definition:<br>Classification:<br>Terrain:<br>Design Speed<br>Classification File:<br>Design Criteria File: | Single Classification<br>GS-1M Freeway<br>Level<br>50<br>d:\data\design checking<br>bentley\inroad~1.11\dat | ⊙ Multij<br>. txt<br>a\imperial\ | ple Classifications |

👫 Edit Classification File Alignment: Default -+ OK Start Station: + 127+00.0000 Cancel Stop Station: 186+19.1564 + Add Classification: GS-3M 1500 < ADT < 2000 \* Update Terrain: Rollina × Delete Design Speed: 50 × Help Start St., Stop St., Classification T., S., Alignment 100+00.00... 127+00.00... GS-3M 1500 < ... Rollin...35 Default Default +00.00 186+1915 GS-3M 1500 < Bollin 50 Country Roa... 10+00.000... 26+86.823... GS-4M 50 < AD... Rollin...30 Country Roa... 10+00.000... 37+65.007... GS-4M 50 < AD... Rollin... 30

![](_page_15_Picture_9.jpeg)

# **Rail Related Geometry Enhancements**

- Quick Regression
- Integrated Horizontal & Cant / Superelevation
- Turnouts
  - Inclusion of railway standards
  - Creation / editing enhancements
- Field to Design / Design to Field
  - Machine to design / Design to machine
- See <u>Bentley Rail Design Update</u> for complete details!

![](_page_16_Picture_9.jpeg)

# Tips

Useful things that you may not be aware of!

![](_page_17_Picture_2.jpeg)

#### Tip #1: How to clone list view settings?

| 📕 Му С    | omputer                                       |
|-----------|-----------------------------------------------|
| 🕀 🧰 F     | KEY_CLASSES_ROOT                              |
| 🕀 🧰 F     | KEY_CURRENT_USER                              |
| 🕀 🧰 F     | KEY_LOCAL_MACHINE                             |
| 🖨 🧰 H     | IKEY_USERS                                    |
| E C       | DEFAULT                                       |
| ± (       | J 5-1-5-18                                    |
| œ C       | S-1-5-19                                      |
| E C       | S-1-5-19_Classes                              |
| E (       | S-1-5-20                                      |
| <b>E</b>  | S-1-5-20_Classes                              |
| E (       | 5-1-5-21-953463015-1924512962-2519238931-3888 |
|           | 🗄 🧰 (null)                                    |
|           | AppEvents                                     |
|           | Console                                       |
|           | Control Panel                                 |
|           |                                               |
|           | H Identities                                  |
|           | E Contraction Contraction                     |
|           | English Televisitien                          |
|           |                                               |
|           |                                               |
|           |                                               |
|           |                                               |
|           |                                               |
|           | Autodesk                                      |
|           |                                               |
|           | InRoadsGroup                                  |
|           | 🖃 🦳 Applications                              |
|           | - Version 8.11                                |
|           | 😟 🧰 DefaultPaths                              |
|           | 😟 🦲 DialogPos                                 |
|           | 🕀 🧰 inrapp.dll                                |
|           | 🚊 🧰 ListViewColumnSettings                    |
|           | CheckIntegrityColumns                         |
|           | 🔤 ReviewHorizontalRegressionColumns           |
|           | 🕀 🧰 railapp.dll                               |
|           | 📄 ReloadOnPreferenceChange                    |
|           | 🕀 🧰 TextScaleAlert                            |
|           | Annotate Cross Sections                       |
|           | 🔄 🦲 Annotate Profile                          |
|           | 😥 🕀 🤐 Toolbars                                |
|           | 🕀 🛄 CNAPI                                     |
|           | CurApp                                        |
|           |                                               |
|           | Inkoads Survey                                |
|           |                                               |
|           | DoadwayDecignerSettings                       |
| 11 II - E | KoduwayDesigner Decungs                       |

# Isitviews.reg - Notepad File Edit Format View Help Windows Registry Editor Version 5.00 [HKEY\_USERS\S-1-5-21-953463015-1924512962-2519238931-3888\Software\Bentley\InRoadsGroup\App CheckIntegrity0"="Type:Type:1;0;38" "CheckIntegrity2"="Station @ Start;Station @ Start;1;2;51" "CheckIntegrity2"="Station @ Start;Easting @ Start;1;2;51" "CheckIntegrity3"="Easting @ End;Start;Bentley\InRoadsGroup\App "CheckIntegrity5"="Northing @ End;Northing @ End;0;-1;62" "CheckIntegrity5"="Northing @ End;Northing @ End;0;-1;62" "CheckIntegrity6"="Leagting @ End;Start;1;1;44" "CheckIntegrity6"="Leagting @ End;Start;1;1;44" "CheckIntegrity6"="Leagting @ End;Start;1;1;44" "CheckIntegrity7"="Direction @ End;Oi-1;55" "CheckIntegrity10"="Integrity @ Start;1:figure=Integrity@ Start;1;1;44" "CheckIntegrity11"="Integrity @ Start;1:figure=Integrity@ Start;1;2;44" "CheckIntegrity11"="Integrity @ Start;1:figure=Integrity:Eigure=Integrity:Eigure=Integrity:Eigure=Integrity:Eigure=Integrity:Eigure=Integrity:Eigure=Integrity:Eigure=Integrity:Eigure=Integrity:Eigure=Integrity:Eigure=Integrity:Eigure=Integrity:Eigure=Integrity:Eigure=Integrity:Eigure=Integrity:Eigure=Integrity:Eigure=Integrity:Eigure=Integrity:Eigure=Integrity:Eigure=Integrity:Eigure=Integrity:Eigure=Integrity:Eigure=Integrity:Eigure=Integrity:Eigure=Integrity:Eigure=Integrity:Eigure=Integrity:Eigure=Integrity:Eigure=Integrity:Eigure=Integrity:Eigure=Integrity:Eigure=Integrity:Eigure=Integrity:Eigure=Integrity:Eigure=Integrity:Eigure=Integrity:Eigure=Integrity:Eigure=Integrity:Eigure=Integrity:Eigure=Integrity:Eigure=Integrity:Eigure=Integrity:Eigure=Integrity:Eigure=Integrity:Eigure=Integrity:Eigure=Integrity:Eigure=Integrity:Eigure=Integrity:Eigure=Integrity:Eigure=Integrity:Eigure=Integrity:Eigure=Integrity:Eigure=Integrity:Eigure=Integrity:Eigure=Integrity:Eigure=Integrity:Eigure=Integrity:Eigure=Integrity:Eigure=Integrity:Eigure=Integrity:Eigure=Integrity:Eigure=Integrity:Eigure=Integrity:Eigure=Integrity:Eigure=Integrity:Eigure=Integrity:Eigure=Integrity:Eigure=Integrity

![](_page_18_Picture_3.jpeg)

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#### **Tip #2: Multi-Center Curve**

 Creates horizontal & optionally vertical geometry for 1, 2 & 3 center curves

| Multicent              | ter Curve                 |                                                              |             | 👬 Multicenter Curve         |               |       |
|------------------------|---------------------------|--------------------------------------------------------------|-------------|-----------------------------|---------------|-------|
| Main Adva              | anced                     |                                                              |             | Main Advanced               |               |       |
| Curve Type:            | Three Center              | ~                                                            | Help        | Alignment<br>Name: Return 1 |               | Help  |
| Radius 1:<br>Radius 2: | 40.0000                   | +         Widths           +         Width 1:         12.000 |             | Style: Default              | <u>×</u>      |       |
| Hadius 3:              | 120.0000                  | Width 2: 12.000                                              | 00 <u>+</u> | Create Vertical Alignment   | ment          |       |
| Define By              |                           | 2000 0000000000                                              |             | - First Selected Alignme    | nt            |       |
| Offsets                | at Shifted PC/PT (        | ) Offsets at PCC/PCC (                                       | 🔾 Length    | O Vertical Distance:        | 0.0000        |       |
| Use Se                 | cond Set of Values        |                                                              |             | Gradient:                   | -2.0000%      |       |
| Offset 1:              | 2.0000                    | + Length 1: 0.0000                                           | ) 🔶         | O Surface:                  | exist 👻       |       |
| Offset 2:              | 2.0000                    | Length 2: 0 0000                                             | <u>.</u>    | Second Selected Alig        | nment         |       |
| Example                |                           |                                                              |             | Vertical Distance:          | 0.0000        |       |
| el anotas              |                           | 1                                                            |             | 💿 Gradient:                 | -2.0000%      |       |
|                        | Al                        | ignment 1                                                    |             | O Surface:                  | exist         |       |
|                        | ف تو                      |                                                              |             | Length to Extend Ends:      | 10.0000       |       |
|                        | A Contraction Contraction | Radius 2<br>Radius 3<br>Offset 2                             |             |                             |               |       |
|                        | Apply F                   | Preferences) Close                                           |             | Appl                        | y Preferences | Close |

![](_page_19_Picture_3.jpeg)

# **Multi-Center Curve: Horizontal Geometry**

• Horizontal

![](_page_20_Picture_2.jpeg)

![](_page_20_Picture_3.jpeg)

![](_page_20_Picture_4.jpeg)

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![](_page_21_Figure_0.jpeg)

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#### **But what if in a transition?**

- Create a surface with *Roadway Designer* and use it in *Multi-Center Curve* for the vertical geometry.
  - Almost the same computations, except
    - Elevation at PC and PT are from the surface
    - Tangential slopes at PC and PT are from the surface
      - Compute an elevation slightly before the PC and slightly after the PC
      - Likewise for the PT

![](_page_22_Picture_7.jpeg)

#### **Tip #3: How to annotate features?**

- File > Import > Geometry from Graphics
  - Import features as a horizontal & vertical alignment
- Geometry > View > Station Offset Annotation
  - Set method to Station Offset
  - Set from as *baseline*
  - Set to imported feature
  - Set stationing
  - Set interval

![](_page_23_Figure_9.jpeg)

![](_page_23_Picture_10.jpeg)

+

+

+

Help

Filter.

Include

Interval:

Limits

Station

Stop:

On-Alignment Points Event Points

50.0000

Start: 10000.0000

13375.0000

Close

#### Tip #4: How to import textual data?

#### • Text Import Wizard

- Horizontal as curve-sets
- Vertical as curve-sets
- Horizontal & vertical events
  - More in a moment!
- Cogo
- Regression points
  - Data must be in order
  - Bypasses data checking available in *Regression* > *Add Regression Points*
- Wizards are persisted to the XIN

![](_page_24_Picture_11.jpeg)

#### S+E & N+E Events from a Single .txt

![](_page_25_Figure_1.jpeg)

![](_page_25_Picture_2.jpeg)

![](_page_26_Figure_0.jpeg)

![](_page_26_Picture_1.jpeg)

Help

\*

Close

# **Tip #6: Annotating MicroStation Graphics**

• Utilizes geometry "styles" to annotate MicroStation lines, linestrings & circular arcs

![](_page_27_Figure_2.jpeg)

![](_page_27_Picture_3.jpeg)

# **Tip#7: Chord definition settings**

- Arc / chord definition is persisted with the alignment
  - No you can not mix arc and chord in the same alignment!
  - We persist the radius not the degree of curve
- Other system settings are in the preference file, accessible from *Tools* > *Options* > *Geometry*

![](_page_28_Picture_5.jpeg)

# **Tip #8: Alpha-numeric cogo points**

- Graphical commands have always supported alpha-numeric points names.
  - Cogo Classic / Import ICS have never supported alphanumeric point or alignment naming!
- What about Geometry > Utilities > Create / Edit Alignment by Cogo Points?
  - Emulates ICS, so the answer should be no, but it is yes!

![](_page_29_Picture_5.jpeg)

#### **Alpha-numeric cogo points**

Variable Manager
 Lots of other options!

| Command Behavior:                                                                               |        | Applu       |
|-------------------------------------------------------------------------------------------------|--------|-------------|
| File - Persist Project Default Paths                                                            | 0040   | COPPO       |
| File - Omit Project Options Full Path                                                           |        | Close       |
| Surface - Disable Highlight for Random Features                                                 |        |             |
| Geometry - Disable Cogo Points in Explorer                                                      |        | Help        |
| Geometry - Allow saving disconnected solutions                                                  |        |             |
| Geometry - Omit Sight Distance from Vertical Review                                             | 1000   |             |
| 🗙 Geometry - Alphanumeric Names in Create/Edit Alignment by Cogo Points                         |        |             |
| Survey - Disable Survey Points in Explorer                                                      |        |             |
| Survey - Use Spaces in Surface and Geometry Description                                         |        |             |
| Survey - Exclude Generated Points from the Cogo Buffer                                          |        |             |
| Survey - Create a Duplicate Point for Out-of-Order Points                                       |        |             |
| Survey - Honor Surface Vertical Scale for Display                                               |        |             |
| Evaluation - Enable Left and Right Shoulder Slope Staking                                       |        |             |
| Evaluation - Slope Stake Report in Cross Section Annotation                                     |        |             |
| Tools - Simultaneous Tracking                                                                   |        |             |
| Customer-specific:                                                                              | ~      |             |
| Respiration                                                                                     |        |             |
| Enables alphanumeric point names in the Geometry > Utilities > Create/Edit .<br>Points command. | Alignm | ent by Cogo |
|                                                                                                 |        |             |
|                                                                                                 |        |             |
|                                                                                                 |        |             |

![](_page_30_Picture_3.jpeg)

![](_page_30_Picture_4.jpeg)

#### And while we are on Tools!

 Application Add-ins now only show the available add-ins for the running product

![](_page_31_Picture_2.jpeg)

![](_page_31_Picture_3.jpeg)

![](_page_32_Figure_0.jpeg)