
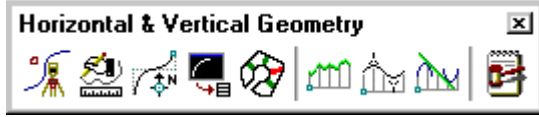


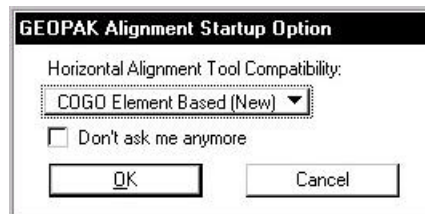
# Horizontal Alignment Tools

## 5.1 Introduction

<b>Objectives</b>	Create and store horizontal chains using MicroStation elements.
<b>Project Manager</b>	Horizontal Alignment
<b>Tool</b> 	
<b>Menu Bar Application</b>	GEOPAK Road > Geometry > Layout Alignments Horizontal

The Horizontal Layout Tools enable the user to create or modify horizontal geometry (using numerous tools) including placing spirals, curves, tapers, specified bearings and curves, complex ramp loops and connectors, and all to user-defined parameters.

When selected, a dialog box is invoked that gives the user a chance to utilize either GEOPAK 98 (Graphic Element Based) or GEOPAK 2000 (COGO Element Based) design tools as depicted below.

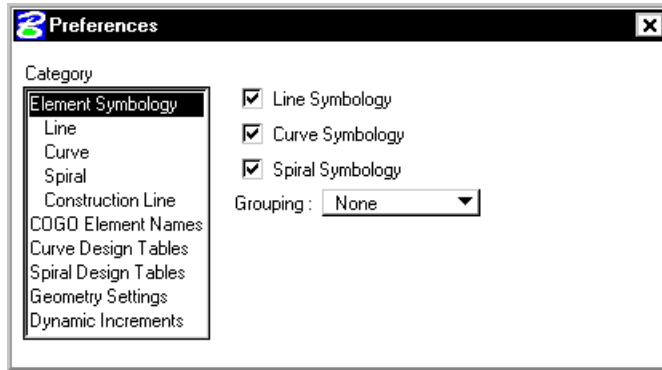


**NOTE:** When set to COGO Element Based (New), an active session of COGO must be active.

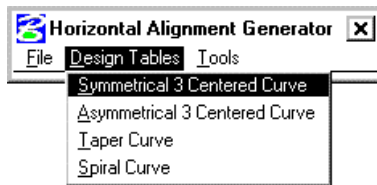
Once **Horizontal Alignment Generator** is selected, the dialog box below appears.



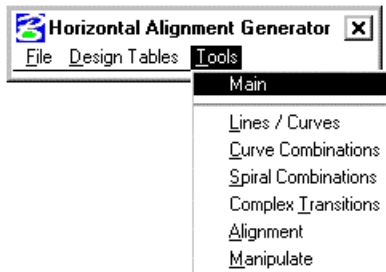
When **User > Preferences** is selected the **User Preferences** dialog box below appears and allows the user to set certain preferences.



The Design Tables option allows the user to set up Design Tables for Symmetrical 3 Centered Curves, Asymmetrical 3 Centered Curves, Taper Curves, and Spiral Curves. These files are stores in an ASCII format.




The **Tools** option allows the user to open the **Main** dialog box or any of the dialog boxes needed do store a Horizontal Alignment.



Values within the dialog boxes dynamically change simultaneously with dynamic graphic modifications.

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 Spiral and compound curve commands do not support dynamic manipulation.

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## 5.2 Lines / Curves Tools



The Place **Line / Curves** Commands are detailed in the table below.



### Store Line By 2 Points

The store line by two points command requires two new points and a new line. The command draws the line and the new points.



### Store Tangent Line

The Store Tangent Line tool stores a line and its two endpoints in the coordinate geometry database.



### Store Curve By 3 Points

The Store Circular Curve by Three Points tool stores a circular curve (using chord definition).



### Store Curve By Center

This tool enables the user to store a circular curve by defining the center point, radius, and sweep angle.



### Store Tangent Curve Unconstrained

The Store an Unconstrained Tangent Curve tool places a curve through a specified point tangent to the specified curve or line.



### Place Curve Between Two Elements

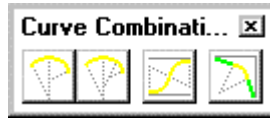
This tool enables the user to store a circular curve between two elements. Options include offsets, truncate, and the ability to modify once the first curve is displayed.



### Place Simple Transition Element

This tool enables the user to draw a transition element between two arcs. Options for the Transition element include: Tangent, Curve, or Spiral. As the Transition option is changed, the dialog box dynamically changes to reflect the selection.

## 5.3 Curve Combinations Tools



The **Curve Combinations** Commands are detailed in the table below.



### Place Compound Curves

This tool enables the user to draw a compound curve between two elements.



### Place Three Centered Curves

This tool enables the user to draw a three-centered curve between two elements. The Design Vehicles group enables the user to select the desired vehicle, based on the data from files stored in the User Preferences.



### Place Reverse Curves

This tool enables the user to store reverse curves between two elements. An option is supported for an intermediate user-defined Tangent Length.



### Place Taper Curves

This tool enables the user to draw taper curves between two elements. The Design Vehicles group enables the user to select the desired vehicle, based on the data from files stored in the User Preferences.

## 5.4 Spiral Combinations Tools



The **Curve Combinations** Commands are detailed in the table below.



### Place SC Tangent To Line

This tool enables the user to store a spiral / curve combination tangent to a line.



### Place ST Tangent To Curve

This tool enables the user to store a spiral / tangent combination tangent to a curve.



### Place SC Tangent To Curve

This tool enables the user to store a compound spiral / curve combination tangent to a curve.



### Place SCS (Intersecting Elements)

This tool enables the user to store a spiral / curve combination tangent to a line. The Design Table enables the user to select the desired Design Speed / Lanes and Degree based on the data from files stored in the User Preferences.



### Place STS (Disjoint Curves)

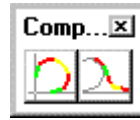
This tool enables the user to store a spiral tangent spiral combination tangent between two elements.



### Place SCS (Disjoint Curves)

This tool stores a spiral curve spiral combination between two curves. Note the tool also works with overlapping curves. The Design Table enables the user to select the desired Design Speed / Lanes and Degree or Radius based on the data from files stored in the User Preferences.

## 5.5 Complex Transitions Tools



The **Complex Transitions** Commands are detailed in the table below.



### Place Complex Ramp

This versatile tool enables the user to draw simple to complex ramp geometry.



### Place Ramp Connector

This versatile tool enables the user to draw simple to complex ramp connectors, with a variety of options.

## 5.6 Alignment Tools



The **Alignment** Commands are detailed in the table below.



### Place Dynamic Alignment

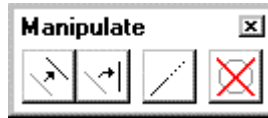
The first Alignment tool is placing a dynamic alignment. You initially select and accept a beginning element. By moving the cursor, the length of curve and dynamic ahead element change. Continue placing data points to create curves and intermediate tangents. At any time during the process, the Entry Radius may be changed. Any subsequent curves are placed with the revised Radius.



### Store Chain

The second Alignment tool is storing a chain comprised of graphical elements. This works similar to Automatic Create Complex Chain, while the chains are automatically being stored into the COGO database file.

## 5.7 Manipulate Tools



The **Manipulate** Commands are detailed in the table below.



### **Move Plan View Element**

The Move a Plan View Element enables the user to move / translate an element or to make copies.



### **Rotate Plan View Element**

The Rotate Plan View Element rotates the selected element about a user-defined point. The Angle may be manually entered and locked, or dynamically changing.



### **Extend Plan View Element**

The Extend Plan View Element tool can extend or shorten any element.



### **Delete Element**

When using the Delete Element tool, no tool settings dialog box opens.

Select and accept the element to be deleted. The element is removed from the coordinate geometry database. This tool works with a MicroStation selection set if present. **Warning: there is no undo for this command.**

# LAB 5: Horizontal Alignment Tools

## 5.1 Accessing Horizontal Alignment Tools

**Step 1.** Execute **C:\data\geo\VDOT\road1\LAB5.EXE**.

**Step 2.** Open the MicroStation file **c:\data\geo\VDOT\road1\d17682des.dgn**.

Access **Project Manager**. It should automatically access the Road workflow dialog box since we “remembered” the options in Exercise 2.

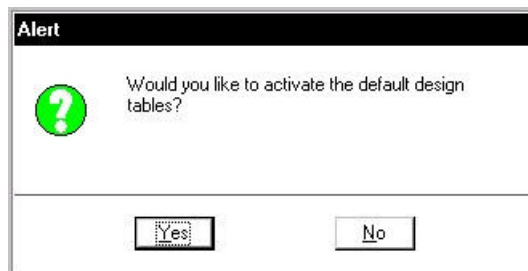
**Step 3.** Select the Horizontal Alignment icon from the Road Project: 17682.prj workflow dialog box.

**Step 4.** You will see the following dialog box:

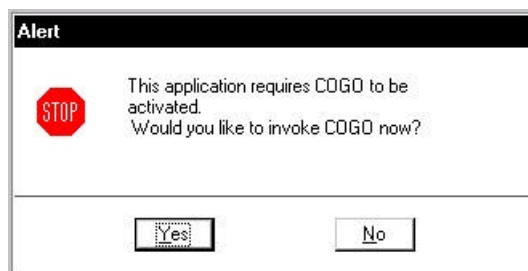


Set the option to **COGO Element Based (NEW)** as shown and press **OK**.

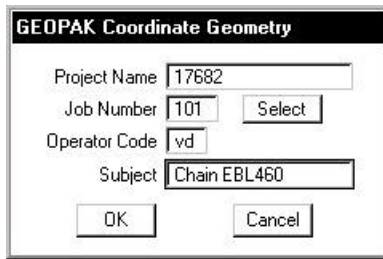
**Step 5.** You will see the following dialog box. Click **YES**.



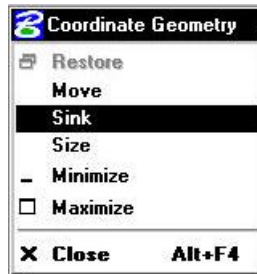
**Step 6.** You will see the following dialog box. Click **YES**.



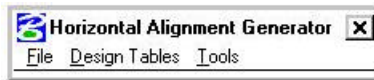
**Step 7.** Activate COGO by pressing **OK** on the next dialog box.



**Step 8.** Enable **Permanent Visualization**, then you can either move the COGO window out of the way or “sink” it using the Bentley icon.

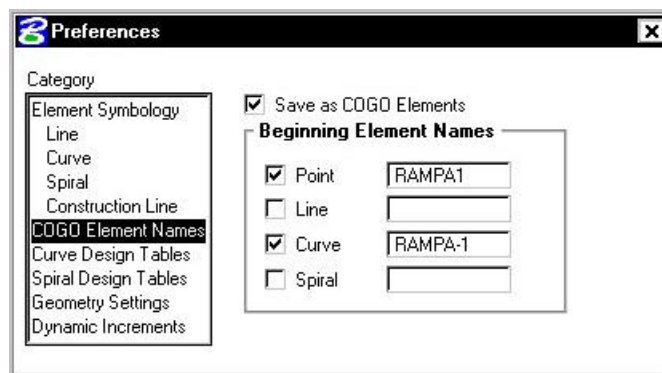


**Step 9.** You should now see the Horizontal Alignment Generator menu bar.



## 5.2 Preferences

**Step 1.** Use the **File > Preferences** pulldown to access the Preferences dialog box. Select the option for COGO Element Names and complete the dialog box as shown.





**Step 2.** Select the **Curve Design Tables** option. Using the **Files** button, select the appropriate file for each option. The files are located in the following directory:

**C:\data\geo\vdot\road1\standards\geopak\**

<b>Symmetrical 3 Centered Curve Design Table</b>	HA_3CenteredCurve_Symmetrical_2001English.tbl
<b>Asymmetrical 3 Centered Curve Design Table</b>	HA_3CenteredCurve_Asymmetrical_2001English.tbl
<b>Tapered Curve Table</b>	HA_TaperCurve_2001English.tbl

**Step 3.** Select the **Spiral Design Tables** option. Using the **Files** button, select the appropriate file. The file is located in the following directory:

**C:\data\geo\vdot\road1\standards\geopak\**

<b>Spiral Design Table</b>	HA_Spiral_Rural_VDOTEnglish.tbl
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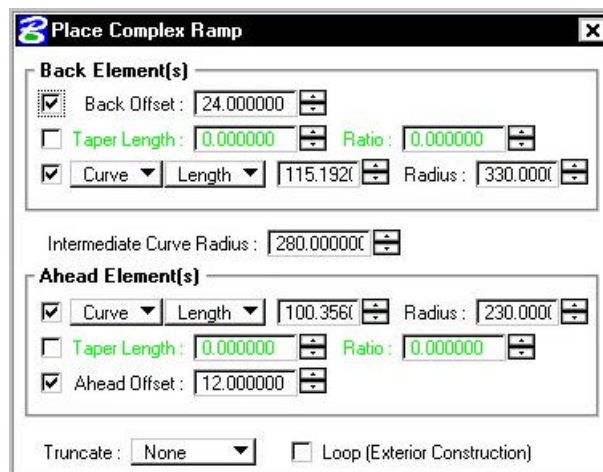
When complete, dismiss the dialog box by pressing the “X” in the upper corner.

### 5.3 Store a Complex Ramp

**Step 1.** Use the **Tools > Complex Transitions** pulldown to access the following menu bar:



**Step 2.** Select the first of the two icons to access the **Place Complex Ramp** dialog box and fill out the dialog box as shown below:



**Step 3.** Chains MAINLINE and EBL460 should be visualized in the design file from our previous exercise. Use your cursor to **ID** chain **MAINLINE** with a datapoint, then issue another datapoint to accept it.

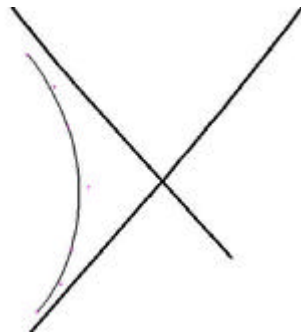
Next, use your cursor again to **ID** chain **EBL460** with a datapoint.

The ramp will now dynamically visualize.



**NOTE:** As you move the cursor into any of the 4 quadrants of the intersection of the two alignments, the ramp will re-calculate and re-visualize in that quadrant.

**Step 4.** Issue a datapoint in the westernmost quadrant to store the ramp as shown in the diagram below:



**Step 5.** Dismiss the Complex Ramp dialog box and review the COGO output window. Notice that the 3 curves were automatically stored into the COGO database.

Coordinate Geometry Job: 101 Operator: VD

File Edit Element View Tools User

Disable Visualization OFF (Feature) Browse << < > >>

COGO Key-in

```

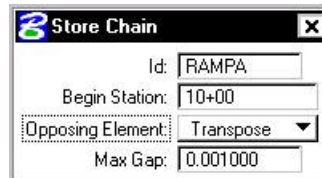
<* 1 PRINT CURVE RAMP A-3

Curve Data
*-----*
Curve RAMP A-3
Feature: DEFAULT_CHAIN
P.I. Station      13+38.62  N      337,913.8559  E      2,718,952.3970
Delta            =      24^ 59' 59.61" (RT)
Degree           =      24^ 54' 40.35"
Tangent          =           50.9895
Length           =          100.3560
Radius           =          230.0000
External         =           5.5842
Long Chord       =           99.5618
Mid. Ord.        =           5.4519
P.C. Station     12+87.63  N      337,962.8591  E      2,718,966.4905
P.T. Station     13+87.98  N      337,875.4001  E      2,718,918.9144
C.C.             N      338,026.4310  E      2,718,745.4507
Back             = S 16^ 02' 43.58" W
Ahead            = S 41^ 02' 43.20" W
Chord Bear       = S 28^ 32' 43.39" W
    
```

**Step 6.** Use the **Tools > Alignment** pulldown to access the following menu bar:



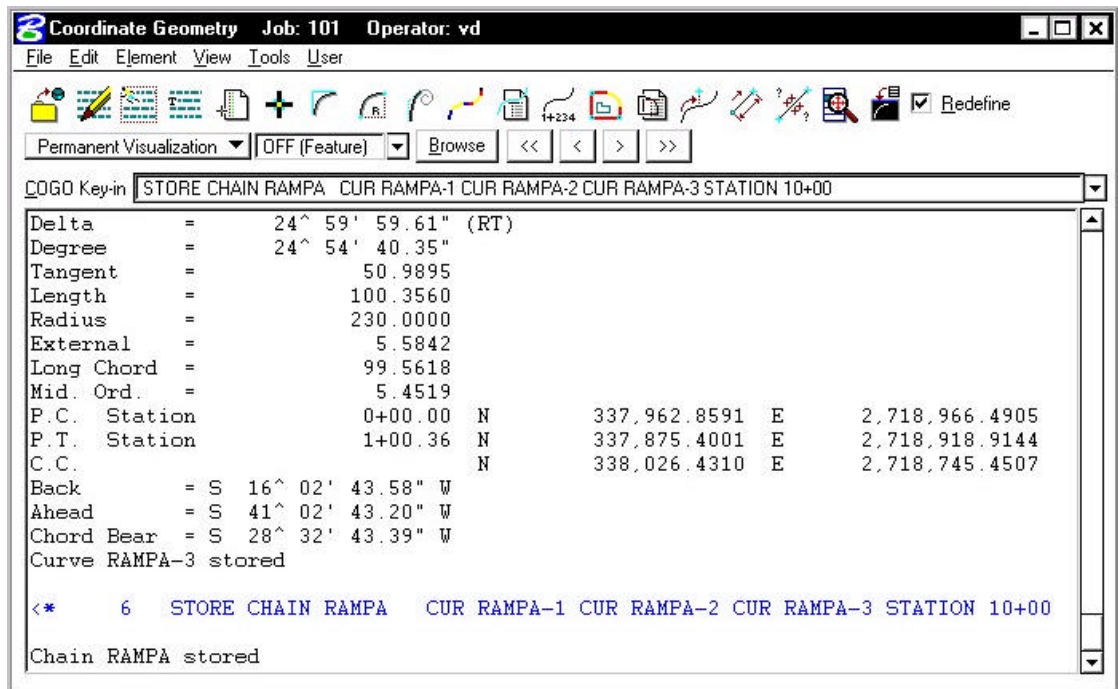
**Step 7.** Select the second of the two icons to access the **Store Chain** dialog box. Fill out the dialog box as shown below:



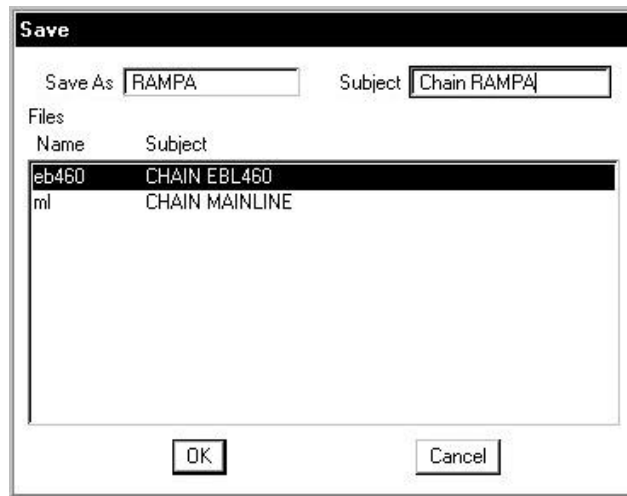
**Step 8.** With your cursor, issue an initial datapoint to **ID** the northernmost curve of the ramp. Issue a second datapoint to accept it.

**Step 9.** The entire chain will highlight and you'll see some directional arrows. Issue another datapoint to accept the direction of the chain.

**Step 10.** Dismiss the Store Chain dialog box. Review the output in COGO and notice the chain **RAMPA** has been stored into COGO.



**Step 11.** Save your input file.



**Step 12.** Exit **COGO**.

**Step 13.** Exit MicroStation.