TPC Desktop Series

COGO Learning Guide

2/20

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Learning Center : COGO
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**Typography**

We will be using the following typography to distinguish items in the text:

- **[Enter]** Brackets indicate keys on the keyboard.
- **flexibility** Italics are used to highlight words for more emphasis.
- **Lot 2** Numbers or text that you enter.

**System Requirements**

This version of TPC Desktop requires Windows 10 / 8.1 / 8 or later. We recommend you have 2 GB of RAM (32-bit OS); 4 GB RAM (64-bit OS) and 60 MB of free hard disk space in which to install the program. **An internet connection is required for program validation.**

**Important Licensing Information**

Our License Agreement allows you to use TPC on only one computer at a time unless you purchase additional licenses. We do offer one courtesy installation for an additional home or field computer, but not for a second user and assuming that the two programs are not being used at the same time. To request a courtesy license contact Traverse PC.

**Overview**

This chapter describes just a few of the more common coordinate geometry (COGO) tools available in TPC Desktop. Most of the COGO tools have a dialog box that pops up, allowing you to enter the information you know, and computing the information you don’t know. Remember that you can press F1 from any dialog box to get on-line help about the tool and each of the fields in the dialog box.

TPC lets you select the COGO tools you want to use at the time you want to use them. Many of them, like horizontal curves, can be used right in the Traverse View as you are entering data (if you choose). Others are available as commands in the COGO menu. Let’s take a look at some of the ways you can use these tools.

Some of the COGO tools like extending the tangent coming out of a curve or spiral or inserting a mid-point happen without any special COGO commands, saving you lots of time and effort.

You’ll learn why you don’t need a pop-up calculator if you use the built in equations.

You’ll also learn how to use COGO from the Drawing View, where you can just select the points and lines you are interested in right from your drawing.

► **Getting started**

1) From the Tasks Manager choose **Sample Surveys**.
2) Double-click the **LEARN COGO.TRV** file.
3) Choose **File | Save Survey As** then enter the name **COGO** and choose **Save**.
4) If prompted to replace the existing file, choose **Yes**.
To learn more about formatting COGO tools
5) Choose Help | Search For Help On… and left-click the Index tab.
6) Scroll down to COGO, highlight it and choose Display.
7) Select the topic you are interested in and choose Display.
This chapter demonstrates:

- Setting the Default Direction
- Labeling COGO Points
- Inserting a Midpoint on a Line or Curve
- Recalling Data from the Previous Point
- Recalling Data Using Equations
- Rotating
- Translating
- Intersections
- Using COGO in Drawing View
- Corner Offsets
Using COGO

Setting the Default Direction

Many of the COGO tools ask for a bearing or azimuth. You can tell Traverse PC whether you prefer working in bearings or azimuths.

1) From the desktop menu choose Tools | Program Settings and clicking on the Units tab.
2) Choose Bearing, North Azimuth or South Azimuth in the Direction field.
3) You can choose DMS (Degrees, Minutes, Seconds), Grads, Mils or Rads in the Angles field.

The option you choose here does not affect the Traverse View. The direction you display in the Traverse View depends on the letters you include in the display sequence (A = North Azimuth, B = Bearing, U = South Azimuth) of the Traverse View Format dialog box.

The option you choose here does affect the COGO dialog boxes, Closure View, Drawing View and printouts other than the Traverse View.

Views and COGO Commands

When you open a COGO command from a view, TPC initiates that command using the selected items in the view. Choosing COGO | Random Inverse from this Points Manager will initiate the Random Inverse dialog with points 1 and 2.

Desktop COGO Commands

When you select a COGO command from the desktop COGO menu or toolbar, TPC just finds the last COGO dialog you had open for that command and displays it. If you have not yet opened that COGO dialog, the desktop opens it but doesn’t initiate it.
The What List

You determine what part of the survey a COGO command affects through the What list.

In the Rotate dialog shown here, the What list contains four options. The options change depending on the views that are visible and the data you have selected within those views. As you open and close views or select data within a view, the What list tracks with you, updating the available options in the list. You can also left-click the refresh button to the right of the list to manually update the list.

Here are some examples of how the What list works with the Rotate command.

▶ Rotating the Survey
1) Choose COGO | Rotate from any view.
2) Enter the Rotate Point.
3) Enter the Degrees of rotation (positive is clockwise, negative is counterclockwise) or enter the bearing or azimuth you want to rotate From and To.
4) From the What list, choose Entire Survey.
5) Choose Compute.

Every point in the survey will be rotated around the specified point of rotation. Protected points will not be rotated unless you choose Protected Points.

▶ Rotating Selected Data
1) In the Traverses Manager, select four traverses.

Notice that the What list now displays 4 Selected items in Traverses Manager. These are the four traverses you just selected.

2) In the Points Manager select five points.

Notice that the What list now displays 5 Selected items in Points Manager. These are the five points you just selected.

You get the picture. You always select the data to work with from the What list.
Using COGO

Labeling COGO Points

Many of the COGO routines create COGO points based on existing survey points. The Right-Of-Way Offset is an example. It creates offset points at some distance from the original point and automatically labels them.

These dialogs usually provide a Point or Label field, giving the user the option to specify how the created COGO points will be labeled.

Here are the general rules for COGO point labels:

- To add a prefix or suffix to the original point label, use an “*”. TPC replaces the ‘*’ with the original point label. So if you enter *L, the COGO point created from the original point 200 will be labeled 200L. If you enter L*, the COGO point will be labeled L20.
- TPC replaces the ‘%’ character with a value. So if you enter *L% for the left label in the Right-Of-Way Offset dialog, the 40’ left offset from point 200 will be labeled 200L40.
- To add or subtract a number, use + number or – number, as in +1000.
  - To start a new sequence of numbers, just enter the number. If you enter 1000, the created COGO points will be labeled 1000, 1001, 1002, etc. If you enter OFS-1, the created COGO points will be labeled OFS-1, OFS-2, OFS-3, etc. You might use INT1 as the starting label for all intersections, AREA1 for predetermined area points, etc.

If a COGO routine deviates from these general rules, it will tell you so in the dialog help.

The Undo Button

Most COGO dialogs include an Undo button. It is not displayed in the dialog until you have computed something. After that, you can press Undo to completely undo the last action of the dialog.

Note: The Undo button does a complete undo. If the COGO command created a traverse, that traverse is removed from the survey. If the COGO command created some points, those points are removed from the survey.
Recalling Data Using Equations

To recall data that can be defined by any currently existing points, use an equation. For instance, to recall the bearing between points 11 and 12, type 11..12 in the bearing field and press Enter. To recall the elevation of point BM14, type BM14 in the elevation field and press Enter.

Enter 1..101 in the Bearing field of point 25 in the Curves traverse.

- Traverse PC recalls the bearing N26°02'59"W as the bearing from point 24 to 25. This is the same bearing you would get if you did a COGO | Random Inverse from 1 to 101. If you had entered 101..1, TPC would have recalled S26°02'59"E, the bearing from 101 to 1.

Enter 1..201..-500 in the Horiz Dist field of point 25.

- Traverse PC recalls the distance 446.093 as the distance from point 24 to 25. This is the same distance you would get if you did a COGO | Random Inverse from 1 to 201 (996.093) minus 500 feet.

Note – The points you use in your equation do not need to be in the same traverse you are working in. They do not need to be consecutive points in the traverse they are in. They do not need to be in the same traverse with each other. They do not even need to be in a traverse. Equations recall the bearing, distance or elevation the same way a Random Inverse would.

You can also add, subtract, multiply and divide using recalled data.

- For instance, to recall half the distance between points 11 and 12, type 11..12/2 or 11..12*.5 in the distance field and press Enter.

You can use an equation anywhere you would normally enter a distance, bearing or elevation. Here’s how they work:

- If you are in a direction field, the equation returns a direction. If you are in a distance field, the equation returns a distance. If you are in an elevation field, the equation returns an elevation.

- The following symbols are valid: (+ = add, - = subtract, * = multiply, both / and \ = divide, F and f and ' = feet, I and i and “ = inches.

- Use two periods .. or a comma to separate point labels.

- If a point label contains a valid equation symbol, follow it with two periods. For example, 10+00..12+45..+50 recalls the distance between points 10+00 and 12+45 and adds 50 to it. You can also use parenthesis to do the same thing, as in 10+00..(12+45)+50. To recall the elevation of 12+45 use the equation 12+45.. or (12+45).
Using COGO

**Picking COGO Points, Lines and Bearings**

The pick buttons [>] circled here in the *Rotate* dialog let you pick COGO points, lines and bearings from the current drawing.

Instead of entering a *Rotate Point* to recall, click the [>] pick button then left-click the point you want in the current drawing.

**► Picking Points**

To pick a point in the current drawing, left-click the point’s symbol, label or any survey line that connects to the point.

If you pick a survey line, be sure to click the end of the line nearest the point you want, like the blue section for point 1 or the red section for point 2 as shown here.

**► Picking Bearings**

To pick a bearing, click the [>] pick button next to the bearing you want then click a line near the starting end of the bearing. In the example shown here, click the blue section to recall the bearing from 1 to 2. To recall the bearing from 2 to 1, click the red section.

**► Picking Lines**

Some dialogs, like Intersection and Offset Interval, have a pick button [>] for recalling a line. Picking a line is the same as picking a bearing. Click near the end of the line you want to use as the starting end of the line in the COGO dialog.

**► Picking Distances and Offsets**

Some dialogs, like Distance Offsets, have a pick button [>] for recalling a distance. You can pick any line that has the distance you want. You can also pick any text in the drawing. TPC parses the distance out of the drawing text.

**► Picking Elevations**

If a dialog includes a pick button [>] for an elevation value, you can select any drawing object and recall its elevation. Point symbols and survey lines all include elevations directly from your survey data.
From the rotation dialog box you can rotate the entire survey or any part of it. You will select what to rotate with the What list.

**Rotating**

1) Choose COGO | Rotate from any view.
2) Enter the Rotation Point.
3) Enter the Degrees of rotation (positive is clockwise, negative is counterclockwise) or enter the bearing or azimuth you want to rotate From and To.
4) Select what you want to rotate from the What list.
5) Choose Compute.

Every point in the survey will be rotated around the specified point of rotation. Protected points will not be rotated unless you choose Protected Points.

**Using Equations for From and To**

The most common way to specify the amount of rotation is to enter the From and To directions (bearing or azimuth). TPC computes the difference between the two and displays it in the Degrees field. TPC also determines whether the rotation will be clockwise (positive Degrees) or counter-clockwise (negative Degrees).

You can specify the From and To directions using existing points. Just enter a point label followed by .. then the second point label. This is what TPC calls an Equation and can be used anytime you enter a bearing or azimuth.

**Distance and Direction in Title Bar**

The title bar of the Rotate dialog shown here includes (Grid Bearing, Grid Dist, Feet). This is to remind you that that directions are Grid Bearings. Regardless of whether or enter a bearing, use an equation and pick a bearing from a drawing as the next section describes, you always know what direction type is being displayed in a COGO dialog.

Some dialogs let you select the distance and direction types to use. Others, like the Rotate dialog, display the distance and direction type selected for the survey or some other context within your survey.

The Learning Guides do not include distance and direction types in all the dialogs shown.
Translating

The translation dialog box can be accessed both from any view or the desktop menu and COGO toolbar.

► Specifying the Translation
There are four ways to specify a translation using this dialog box.

➢ Enter the amount to move in each direction using Coordinates: Y, X and Z.
➢ Enter the amount to move by specifying a bearing/azimuth and distance in Direction: Bearing and Distance. This is especially useful if you use equations for the values.
➢ Translate so that a particular point ends up at another known point that is at the correct position. In the Points section, enter a To point that the From point will be translated to. TPC will display the equivalent Coordinates and Direction.
➢ Translate so that a particular point ends up at a specified coordinate. In the Points section, enter the From point, then enter the To: Y, X and Z that the From point will be translated to. TPC will display the equivalent Coordinates and Direction.

► Translating
1) Choose COGO | Translate from any view or from the desktop menu.
2) In the Translate dialog, specify the translation.
3) Select what you want to translate from the What list.
4) Choose OK.

Every point in the survey will be translated by the amounts shown in the Coordinates: Y, X and Z fields. Protected points will not be translated unless you choose Protected points.
Intersections

There are four basic types of intersections needed in surveying. They are bearing-bearing, distance-distance, bearing-distance and bearing-line.

► Bearing-Bearing
Two lines, starting at different points and with different bearings, intersect at a single point. No intersection is computed if the lines are parallel.

► Distance-Distance
Two circles, having different center or radius points, intersect at none, one (tangent circles) or two points. The circles may have different radii and may not intersect at all if one circle is inside the other or the distance between radius points is greater than the sum of their radii.

Each circle is defined by a center point and a distance for the radius.

► Bearing-Distance
A line and a circle intersect at none, one (tangent) or two points.

A center point (either Pt1 or Pt2) and a distance for the radius define the circle.

► Bearing-Line
A line defined by a starting point and bearing/azimuth intersects the line defined by two end points. The line defined by the two end points can be a tangent or curve.

When computing a Bearing-Line intersect, you can also tell TPC to allow intersections beyond the end points of the line. Be default, TPC only considers intersections between the end points of the line.

► One Dialog
TPC does all of these intersection computations from a single COGO dialog.
Intersections

 ► Using the intersection dialog box

1) Choose COGO | Intersect to display the Intersect dialog.

2) Enter the information you have for the intersection. If your intersection involves a line that is already defined in the survey, enter the endpoints of the line in the Point 2 and Point 3 fields. You can also use equations to enter a distance or bearing/azimuth based on any points in the survey. For example, to recall the azimuth between points 12 and 24, enter "12..24" in a Bearing field.

3) Enter any offset to create intersections parallel to the bearing you enter using negative for offset left and positive for offset right.

4) Choose Save to save the computed points to the survey. They are not added to the survey when they are computed, only when you save them.

5) To do another intersection, choose Clear.

6) When you are finished creating intersection points, choose Close.

The Intersection dialog box will display only one intersection for a bearing-bearing intersection. It will display two intersections for a bearing-distance or distance-distance intersection.

7) To see how the intersected points are related to the survey, choose View. TPC will display the Point 1 line, the Point 2 line, and any computed intersection points. Use this information to decide which intersection point to save.

► Creating an Intersection Using Offsets

In the example shown here, the actual intersection point is offset to the left of the line from 1 to 2 and offset left of the line from 2 to 3.

The two offset distances specified in this intersection do not have to be the same.

The intersection dialog box for this example would look like this.

Notice that left offsets are negative while right offsets are positive.

The bearing N90°00'00"E was derived from the equation 1..2 entered for this field. The bearing S23°27'00"W was derived from the equation 2..3 entered for its field. Equations make it very easy to recall an azimuth, bearing or distance.
**Bearing-Line Intersection**

In the example to the right, we want to find out where a line 50 units right of the property line from 2 to 1 intersects the curve from 5 to 1.

The intersection routine does not care if the curve is a tangent curve or not.

Now let’s look at the dialog box for this example. The rule for intersecting a bearing and a line is that we enter the bearing information for **Point 1** and use **Beginning of Line** and **End of Line** to define the line.

1) Enter the starting point and bearing of the line in **Point 1**.
2) Left-click **Or select a line** [>] then left-click the arc near point 5 as shown by the blue circle in the diagram above.

Notice also that TPC displays the arc length of the curve as the distance between points 2 and 3.

**Creating Notes**

Use the **Summary** button to add information about this intersection to the current Report View. TPC reports the coordinates of the intersection and the distance and direction from **Point 1** and **Point 2** to the intersection.

If you have not labeled the **Computed Intersections** points, TPC uses Int1 and Int2.
Using COGO in Drawing View

In addition to the common COGO routines like Rotate and Translate, you can select points in Drawing View and execute COGO routines on them. TPC places the selected points into the appropriate fields in the COGO dialog and computes all the dialog values.

Selecting a Common Object

The trick to using the COGO tools in Drawing View is to first select the common object (typically a line or a point). Then you can right-click any other object, select the appropriate COGO tool and TPC will populate the dialog box and compute the values automatically.

For example, if you want to check the offset distance of several points to a line, that line becomes the common object. Select the line by double-clicking it or choose Tools | Select Objects and left-click the object. Either way, the line will be redrawn in a grayed out color.

Random Inverse Between 2 Points

1) Select two points in Drawing View, then right-click either of them and choose COGO | Random Inverse.

Random Inverses to a Common Point

1) To check the inverses of several points to one common point, select the common point then right-click any other point and choose COGO | Random Inverse. When you have reviewed the inverse, Close the dialog.

2) Repeat step 2 for the other points you are interested in. TPC continues to inverse between the selected point and the points you right-click.

Offset to Line

1) Select the line, then right-click any point and choose COGO | Offset to Line. TPC displays the offset of the point you right-clicked to the selected line.

2) Return to Drawing View and right-click any other point to get its offset to the selected line.

Compute Coordinates

1) Right-click any point and it becomes the Compute Point in the dialog. You will need to provide a From point. If you have selected a common point, it becomes the From point.
Offset to Alignment
1) Right-click any point and choose COGO | Offset to Alignment. You can select the alignment traverse from the list in the dialog, but if you have already selected any traverse object, TPC will use its traverse as the alignment traverse.

Distance-Offset
1) Right-click any point and choose COGO | Distance Offset. The right-clicked point becomes the computed point. You can now specify a line, distance and offset and update the position of the point.

Corner Offsets
Traverse PC has a special command to compute corner offsets for a foundation. You enter the foundation as a traverse, then choose the corner offset to command to create two offsets at each corner, some specified distance from the corner. Now you have offsets you can stake in the field for the contractor.

1) Right-click any object that was drawn by the Foundation 2 traverse and choose COGO | Corner Offsets. TPC displays the Corner Offsets dialog.
2) Enter 5.0 in the Distance field.
3) Choose Compute. The offsets are inserted into the traverse as side shots from each corner.

To label the new offset points, TPC uses the corner label, adds the letter A or B, then adds the offset distance. The two 5 ft. offsets for corner 2-2 would be 2-2A5 and 2-2B5.
When you use COGO in the Traverse View, many COGO operations happen automatically.

You can do things like
1) insert a midpoint
2) extend a line
3) recall a bearing or distance
4) recall the last bearing or distance
5) start a tangent curve or spiral
6) recall the outgoing tangent bearing from a curve or spiral

Inserting a Midpoint on a Line or Curve
Many COGO functions happen automatically, almost without you thinking about them. Midpoints work this way.

1) Double-click the Cul-de-Sac traverse in the Traverses Manager.
2) From its Traverse View choose Tools | Draw This Traverse Only.
3) Right-click point 6 and Insert New Point | Above Selected Item or just press [Ins].
   Traverse PC inserts a point halfway between point 6 and point 4 and labels it 4:1.
4) Right-click point 7 and choose Insert New Point | Above Selected Item or just press [Ins].
   Traverse PC inserts a point at the midpoint of the curve between points 6 and 7 and labels
   the new point 6:1.

TPC also computed the average elevation for the inserted point.

Once a point is inserted along a straight line or a curve you can always change its position
using the COGO | Compute Coordinates and other commands. The halfway feature gives you
a place to start.

Note – If you insert a midpoint in a traverse that contains raw data and then choose Tools |
Recompute, the midpoint will remain in its original location while the next point’s coordinates
are recomputed based on the raw data for that point. If you wish to prevent this from
happening, you will need to protect all the points in the traverse by choosing Edit | Select All
followed by Edit | Modify Points | Protect On. Another option would be to create raw data for
the current point configuration by choosing Tools | Update Raw.

5) Close this Traverse View by left-clicking the [X] in the upper right corner of the view.
Recalling Data from the Previous Point

As you enter field data in the Traverse View, TPC Desktop automatically creates traverse points as needed, assigning an initial point label and initial coordinates to the created points.

TPC also remembers the data from the previous point in the traverse. If you want to extend a line, press the space bar with the cursor in the bearing column. TPC will enter the previous bearing/azimuth for you and then just enter the next distance. Traverse PC will keep the bearing/azimuth and extend the traverse by the distance you specify. If the previous point is the PT of a curve, TPC will recall the outgoing tangent bearing of the curve.

1) Double-click the Curves traverse in the Traverses Manager.
2) In its Traverse View choose Tools | Draw This Traverse Only.
3) Press the down arrow key on your keyboard until Traverse PC inserts point 24 after point 13 at the end of the traverse.
4) Click in the Bearing field of point 24 to make it the active field.
5) Press the spacebar to recall the outgoing tangent bearing of the curve from point 12 to point 13 and press Enter.
6) Press the spacebar in the Horiz Dist field for point 24 to recall the Horiz Dist from point 12 to 13 and press Enter.

TPC creates point 25 after point 24. The line from point 13 to point 24 is on the outgoing tangent bearing of the curve. Point 24 is the same distance from point 13 as point 13 is from point 12.

You can recall data in this manner in any field where data is available for the previous point. (You could not recall a radius if the previous point was not the PT of a curve for example.)
This chapter demonstrates:

- Specifying Lot Traverses
- Editing Traverse Lot Setback Values
- Drawing Automatic Lot Setbacks
- Specifying Lot Setback Line Types
- Automatic Lot Setbacks vs COGO Setbacks

**Overview**

This chapter introduces you to Automatic Lot Setbacks.

*To learn about Automatic Lot Setbacks*

For information on Automatic Lot Setbacks, choose **Help | Content**, go to the **Index** tab, type **lot setback** in the keyword field, select the **Lot Setbacks** help topic and choose **Display**.

**Getting Started**

1. From the Tasks View choose **Sample Surveys**.
2. Double-click the **LEARN SETBACKS.TRV** file.
3. Choose **File | Save Survey As** then enter the name **Automatic Setbacks** and choose **Save**.
   
   If prompted to replace the existing file, choose **Yes**.
Specifying Lot Traverses
Lot setbacks only apply to Lot/Parcel traverses. These are traverses that you have placed in either the Lots or Parcels traverse group. Once a traverse has been placed in this group, TPC allows you to edit setback, location and LandXML parcel data for that traverse.

To add a traverse to the Lots traverse group
1. In the Traverses Manager, select the Lot 2, Lot 3 and Lot 4 traverses.
2. Choose Tools | Traverse Groups | Move Selected Items to Group.... TPC opens the Traverse Groups dialog.
3. From the list of groups, select Lots and choose OK.

TPC moves these three traverses into the Lots group. If the Traverses Manager was not already showing groups, TPC turns groups on.

Editing Traverse Lot Setback Values
Each traverse can have its own setback distances for Front, Side an Rear lot lines. These distances determine how far TPC will draw the automatic lot setback lines from the traverse lot lines.

Initially, each traverse gets its lot setbacks from the survey.

To edit the survey’s lot setbacks
1. From the TPC Desktop, choose Tools | Survey Information and select the Setbacks tab.
2. Change the setbacks in this tab to Front=15.00, Side=10.00, Rear=5.00 and choose OK.

Any new traverses created in this survey will start with these setbacks.

Not let’s edit the setbacks for the existing lot traverses
3. In the Traverses Manager, select the Lot 2, Lot 3 and Lot 4 traverses.
4. Choose Tools | Traverse Properties....
5. Change the setbacks in this tab to Front=15.00, Side=10.00, Rear=5.00 and choose OK.
Automatic Lot Setbacks

You could have entered any setback values you wanted for these three traverses. We choose to set them to match the lot setbacks for the survey.

**Drawing Automatic Lot Setbacks**

1. In the Traverses Manager, select the Lot 2, Lot 3 and Lot 4 traverses.
2. Choose **Tools | Traverse Drawing Settings**… and left-click the **Setbacks** tab.
3. Expand the **Line** pulldown list and select **Dashed_2**.
4. Choose **Apply**. TPC draws the lot setback lines for these three traverses.
5. Change the line type, thickness and color to whatever you prefer and choose **Apply**.

If you have a certain line type, thickness and color you like, you can left-click the **Save Settings** button to save the settings for later use.

**Specifying Lot Setback Line Types in the Drawing View**

Now that you have specified the lot setback distances and told TPC to draw the setbacks for these three traverses, you are ready to tell TPC which lot lines are Front, Side and Rear.

1. In the Drawing View, right-click the lot line between points 2 and 3 (east side of the bottom lot) and choose **Specify Setback Type | Rear**. TPC redraws the setback for this line at 5’.
   
   You can select multiple lot lines as follows

2. In the Drawing View, choose **Edit | Select Objects**.
3. Left-click the lot line between points 3 and 8. TPC redraws it in a light gray, indicating it has been selected.
4. Left-click the lot line between points 8 and 9. TPC draws it in a light gray also.
5. Right-click to tell TPC you are done selecting objects.
6. Right-click either lot line (3 to 8 or 8 to 9) and choose **Setback Type | Rear**. TPC redraws the setback for this line at 5’.
Specifying Lot Setback Line Types in the Traverse View

You can also specify Front, Side and Rear lot setbacks in the Traverse View.

1. In the Traverse Manager, double-click the Lot 2 traverse. TPC opens the Traverse View for this traverse.
2. Choose View | View Format and left-click the Format tab.
3. Insert the letter I (lower case L) before the letter B in the Display Sequence and choose OK. TPC includes the Setback column in the Traverse View.
4. Notice that the Setback type for point 3 is already set to Rear, reflecting the change you made in the Drawing View.
5. Left-click the Setback column for point 5, hold down the [Ctrl] key and left-click the Setback column for point 1:1. You just selected two setback lines to update.
6. Type the letter F for Front (see the status bar for your options) and press [Enter]. TPC changes the setback type of these two lines to Front.

7. Regenerate the drawing in the Drawing View and watch the front setbacks for this lot change from 10' to 15'.

Automatic Lot Setbacks vs COGO Setbacks

In the next chapter, you see how to create setbacks with the R-O-W Offset tool. Unlike the automatic lot setbacks, this COGO tool creates new survey points and lines for the setbacks, allowing you to edit and re-use the lot setbacks themselves for other computations.
Creating COGO Setbacks

This chapter demonstrates:

- Creating setback lines
- Drawing the setbacks
- Creating unequal setback lines

Overview

This chapter uses construction setbacks to demonstrate how to use the COGO tools in TPC. You'll create 15' construction setbacks for each lot, and then you'll tell Drawing View how to draw the setbacks.

Getting Started

1. From the Tasks View choose Sample Surveys.
2. Double-click the LEARN SETBACKS.TRV file.
3. Choose File | Save Survey As then enter the name Setbacks and choose Save. If prompted to replace the existing file, choose Yes.
Creating Setback Lines

To create setback lines, we will use the COGO tool Right-Of-Way Offsets.

1. In the Traverses Manager, select the Lot 2, Lot 3 and Lot 4 traverses.

2. In the Traverses Manager, choose COGO | Right of Way Offsets.
   Choosing this COGO command from the Traverses Manager initializes the What list in the dialog to the items selected in the manager. You could start this dialog from any view and manually select this same option from the What list.

3. Turn on Inside and enter 15 feet.

4. Turn on the Options shown here.

5. Choose Compute.
   TPC creates the setbacks and updates the Traverses Manager, Points Manager and Drawing View to show the new data.

In the next task, you'll tell TPC how to display this new traverse in the drawing.

6. Close the dialog box.
Creating COCO Setbacks

**Drawing the Setbacks**

Traverse PC has automatically tagged the new setback traverses to display them in the Drawing View. Now we need to tell TPC how to draw them.

1. Click the **Left 15.00 Feet - Lot 2** traverse in the Traverses Manager to select it.

2. Hold down the [Ctrl] key while you click on the **Right 15.00 Feet - Lot 3** and **Left 15.00 Feet - Lot 4** traverse to add them to the selection.

3. Right-click on any of the three selected traverses and choose **Traverse Settings**.

4. Left-click the **Control Points** tab and choose **Recall Settings**, select **Setback Lines** from the list and choose **OK**.

5. Turn on **Point** on the **Control Points** tab.

6. Back in the Traverse Settings choose **OK**.

TPC includes the traverses in the drawing, using a gray dashed line to draw the setbacks and labels the points for us.
Creating Unequal Setback Lines

Now that we have seen how to use the Right-of-Way Offset tool to create setback lines, let’s take a look at how to create unequal setback lines.

We’ll update the west setback of Lot 2 from 15’ to 25’. From the drawing shown here, we see that we want to reposition point 4L15 so that it is 25’ away from the west property line. Then we want to do the same with point 5L15 and 1L15.

1. From the desktop menu choose COGO | Intersect....
   You can move the dialog on screen so that you can see points 4, 5 and 4L15.

► Reposition Point 4L15

1. Enter 3 in Point 1 From and highlight the Bearing field under Point 1 and enter 3..4 to recall the bearing from point 3 to point 4. Highlight the Offset field and enter -15 (we want to update the position of our offset point 15 feet inside or left of the original line from 3 to 4 – use negative numbers for left offsets and positive numbers for right offsets).

2. Enter 4 in the From box under Point 2 or Beginning of Line, highlight the Bearing field under Point 2, enter 4..5 to recall the bearing from point 4 to point 5 and then highlight the Offset field and enter -25.

3. Enter 4L15 in the Computed Intersection field (we want to update point 4L15 with new coordinates) and press your [Tab] key.

4. TPC will inform you that “4L15” already exists! Choose OK because the option Update existing point with computed coordinates is the default in this situation and is already selected.

   You will see point 4L15 move in the drawing.

5. Choose Clear to reset the dialog box and prepare it for the next step.
Reposition Point 1L15

1. Enter 2 in Point 1 From and highlight the Bearing field under Point 1 and enter 2.1 to recall the bearing from point 2 to point 1. Highlight the Offset field and enter 15 (we want to update the position our offset point 15 feet inside, or right, of the original line from 2 to 1).

2. Enter 1:1 (1:1 is the unique point TPC created to close Lot 2.) in the From box under Point 2 or Beginning of Line, highlight the Offset field and enter 25.

3. Enter 5 in the End of Line To field. The End of Line To field in the Intersection dialog and is used only for defining an existing curve or line. (You can access the Help topic for the Intersection dialog by hitting the [F1] key on your keyboard.)

4. Enter 1L15 in the Computed Intersection 1 field (we want to update point 1L15 with new coordinates) and press your [Tab] key.

5. TPC will inform you that “1L15” already exists! Choose OK.

6. Choose Close.

Reposition Point 5L15

Point 5L15 is at the end of a curve, so we can just extend it further away from the west property line.

1. Right-click the west setback line near point 5 on the drawing and choose COGO | Compute Coordinates.

2. Enter point 5 for From and 5.5L15 for the Bearing.

7. Enter the desired offset distance of 25 for the Slope Distance and choose Save.

8. Choose Close to close the dialog box.

TPC re-computed point 5L15 and updated the drawing. So there you have it. The setback line is now 25’ away from the west property line. Note that you will need to subtract 10’ from the radius of the curve to point 1L15 in the traverse. (The Right-of-Way Offset COGO tool subtracted the initial 15’ from the radius of the curve.)

Hints

There are many different ways to do what we just did. Depending on the data you have available, the point configuration and your preferences, you will likely come up with your own way of modifying offsets.
Testing Your Skills

In this task, you'll test your skill at creating offsets in TPC Desktop.

1. Open the SKILL1.TRV file in the Samples folder and save it as TEST3.TRV.

2. Create a 10’ setback inside lot 103. Be sure to turn on the Force Closure option in the Right-of-Way Offset dialog and use the Save As Traverse button.

3. Create a 10’ setback inside lot 104. Be sure to turn on the Force Closure option in the Right-of-Way dialog and use the Save As Traverse button.

4. Print the Traverses Manager, showing the 103 and 104 traverses and the two offset traverses you just created.

5. Print the Traverse Views for the 103 offset traverse and the 104 offset traverse.

6. Print the drawing.