

Introduction to COGO Editing

ISTC Topic:

7.14

In this Chapter you will learn

- How to edit parcels and boundaries based on commonly used direction-distance legal descriptions

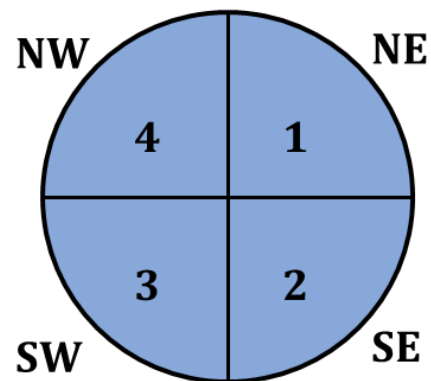
1. COGO Editing

COGO is short for Coordinate Geometry and it is method where you can create lines and polygons by typing in distances and directions from the legal descriptions of parcels, annexation subdivisions and other boundaries, as opposed to creating lines and polygons by click on the map to add vertices.

Legal descriptions contain directions and distances to describe lines that together form a parcel or other land unit. In Idaho distances are nearly always given in feet and directions as quadrant bearings. For example, the bearing S 25° 45' 36" W denotes a south-westerly direction. For those of you unfamiliar with this format picture yourself in the center of a circle looking towards the south. Then move your gaze 25 degrees, 45 minutes and 36 seconds to the west and you are looking in the direction of this line.

When entering COGO coordinates we use the quadrant shown on the right to denote the major direction of a line. In the example above you were looking in a south-westerly direction, which corresponds to quadrant 3.

In what quadrant does the direction N 89° 45' 25" E fall? The answer is quadrant number 1. Instead of type "N" and "E" we will simply include the quadrant number in the COGO description.



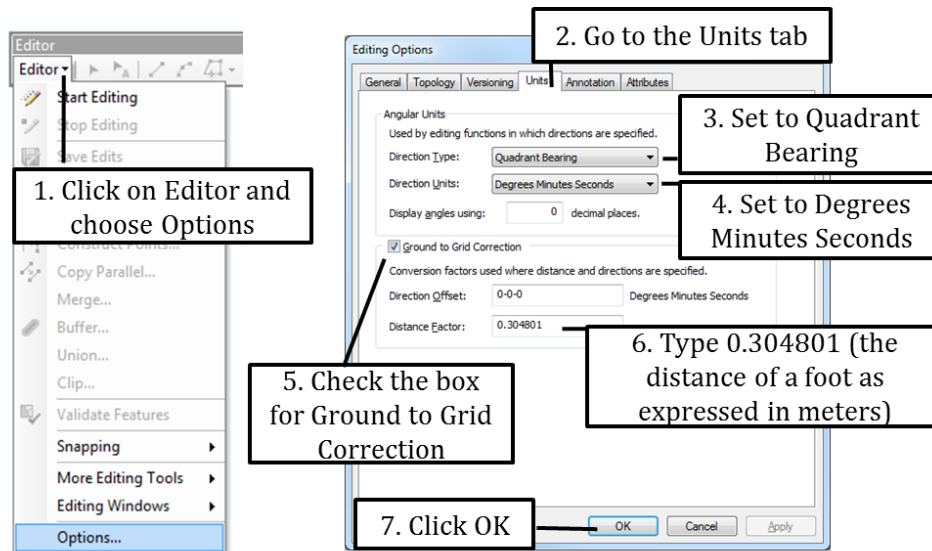
Exercise 1: Using COGO to create parcels

1. Start ArcMap and open a new map document. Add the T01NR01E shapefile from the Topic7_15 folder. Also add the Lines and Polygons shapefiles.
2. Add the COGO toolbar to your map (Hint: click on Customize > Toolbars)



7.14 Using COGO to create parcels

- Before you start editing you need to set up the format for the directions (are those in angles or in bearings) and the units used for your distances. Use the directions below to set the editing options that we will use for the legal descriptions in this tutorial.



Note: the directions above recalculate the units we will be entering in feet to meters. The Distance Factor of 0.304801 is necessary in our map because the units of the coordinate system we use in our map are in meters. When you do work in your own office you may not need to perform this conversion. This is what you should do: try to COGO a parcel in your office with a Distance Factor of 1.0. After you create the new parcel you can use your measurement tool to verify that the new parcel is the right size. If you find that your parcel is much larger than it should be then go ahead and implement the Distance Factor of 0.304801.

- Click on Editor (on the Editor Toolbar) > Start Editing
- We will start with “COGO-ing” Parcel 1 whose legal description is shown below.

Parcel 1:

A parcel of land in township T01N R01E, Boise Meridian, more particularly described as follows. Commencing at NE corner of section 22, S25° 45' 36" W for a distance of 327.21 feet, thence S 90° 00' 00" W 401.64 feet to the point of beginning.

Thence S 0° 00' 00" W 213.42 feet, thence S 01° 45' 30" E 305.75 feet. Thence N 89° 45' 25" E 405.56 feet, then N 01° 28' 21" W 517.48 feet, then N 90° 00' 00" W 401.64 to point of beginning.

- First we need to COGO a temporary line from the NE corner of section 22 to the point of beginning. Then we can use the remainder of the legal description to COGO the actual parcel.

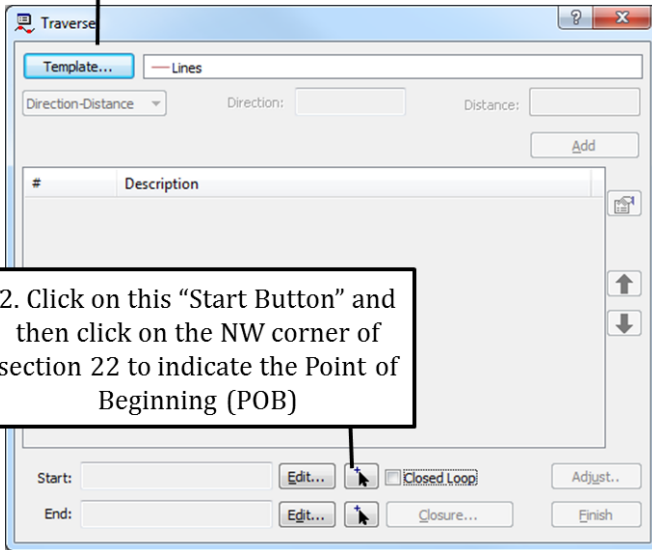
- Click on the Traverse Tool on the COGO Toolbar.
- Use the directions below to COGO a line from the NW corner of Section 22 to the point of beginning.



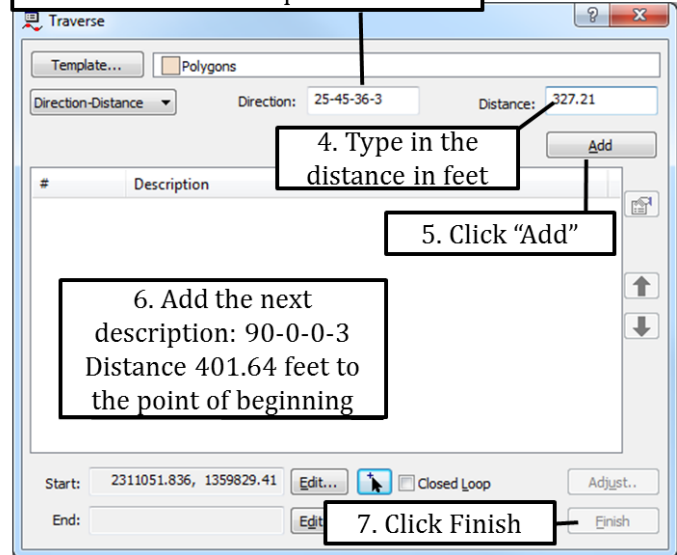
Traverse

1. Click on "Template" and then choose the template for the Lines layer

3. Type 25-45-36 to denote 25° 45' and 36". Then add "-3" because SW is in the third quadrant



2. Click on this "Start Button" and then click on the NW corner of section 22 to indicate the Point of Beginning (POB)



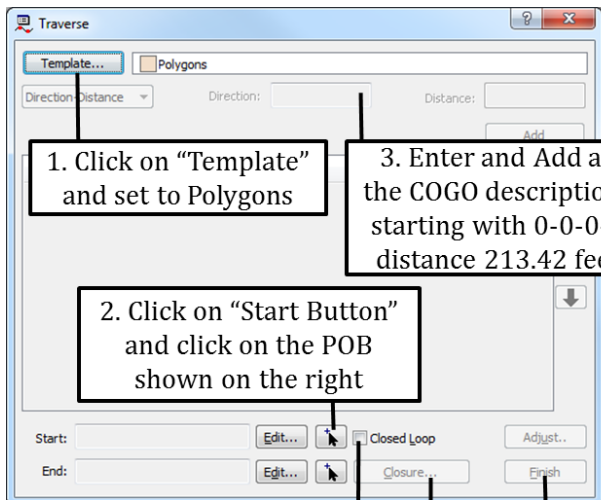
4. Type in the distance in feet

5. Click "Add"

6. Add the next description: 90-0-0-3
Distance 401.64 feet to the point of beginning

7. Click Finish

- Now that we have identified the point of beginning we can COGO the actual parcel. Use the directions below along with the legal description for parcel 1 on the previous page to create the parcel and check the closing error.



1. Click on "Template" and set to Polygons

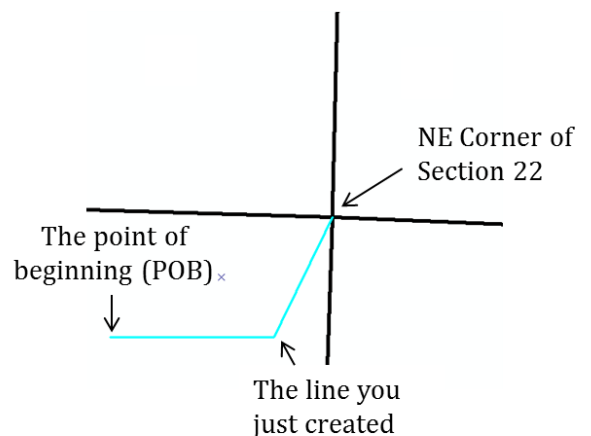
3. Enter and Add all the COGO descriptions starting with 0-0-0-3 distance 213.42 feet

2. Click on "Start Button" and click on the POB shown on the right

4. Check box for Closed Loop.

6. Click Finish

5. Click Closure to View Closure errors. Then click OK to close Closure dialog box

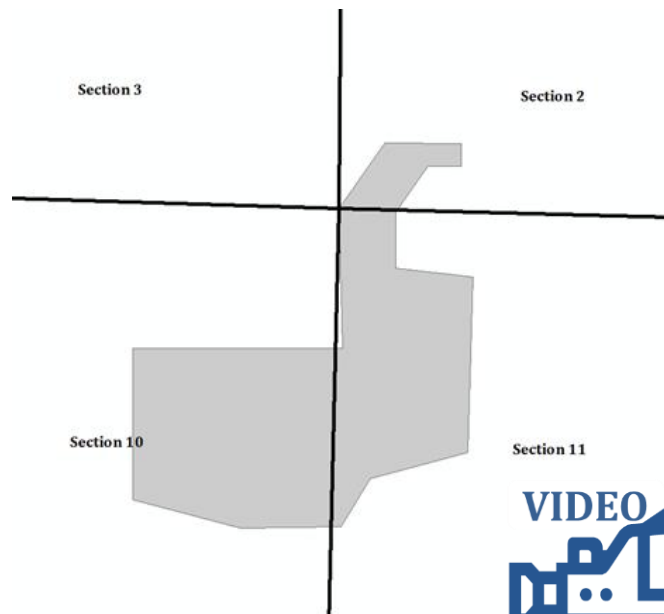


10. If you wanted to, you can reduce your closing error by clicking on “Adjust” just above the finish button. Choose the compass method and click Accept.
11. For practice (and a challenge) COGO Parcel 2 which has its point of beginning at the NE corner of Section 10. Note that the point of beginning is at the section corner, so this time you can edit the parcel right away without having to COGO a line to determine the point of beginning.

Parcel 2:

A parcel of land in township T01N R01E, Boise Meridian, more particularly described as follows: Beginning at the NE corner of Section 10. Thence S 01° 25' 39" E 500.00 feet, then N 90° 00' 00" W 750 feet, then S 00° 00' 00" E 542.02 feet, thence S 75° 30' 20" E 400 feet, thence N 89° 05' 10" E 360 feet, thence N 30° 45' 20" E 200 feet, thence N 75° 00' 50" E 360.75 feet, thence N 01° 43' 37" E 627.29 feet, thence N 83° 25' 42" W 278.36 feet, thence N 00° 00' 05" E 200 feet, thence N 35° 00' 15" E 501.55 feet, thence S 89° 30' 36" E 120.27 feet, thence N 00° 26' 27" E 80.45 feet, thence N 89° 30' 36" W 275 feet, thence S 35° 00' 15" W 286.46 feet to the point of beginning.

12. When you are done your parcel should look like the figure on the right.
13. Save your edits and stop editing.



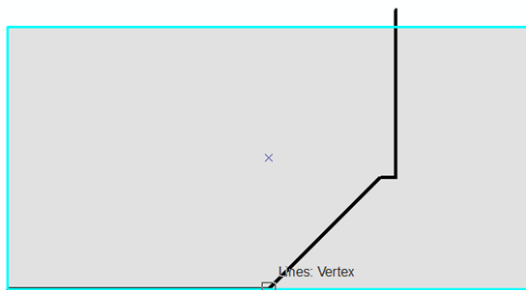
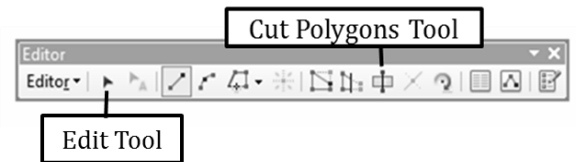
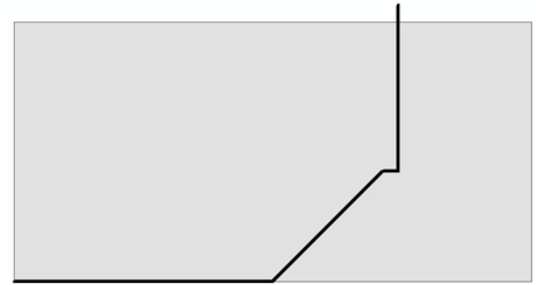
7.14 Using COGO to split a parcel

Exercise 2: Using COGO to split a parcel

1. Start ArcMap and open a new map document (if not already left open from the previous exercise). Make sure your map contains the Lines.shp and Parcel.shp shapefiles.
2. In this exercise we will COGO a line along which a parcel needs to be split, and then use this line to split the actual parcel.
3. Start an Edit session and click on the Traverse tool. Set your template to Lines. Set the starting point to the SW corner of the parcel and COGO the following line:

- a. N 90° 00' 00" E, Distance 250 feet
- b. N 45° 00' 00" E Distance 150 feet
- c. N 90° 00' 00" E Distance 15 feet
- d. N 00° 00' 00" E Distance 160 feet

4. Click Finish. Save your edits. Click Edit > Stop Editing.
5. The line you just created will now be used to split the parcel.
6. Right-click on the Parcel layer and click Edit Features > Start Editing. Click the Edit Tool on your Editor Toolbar and click on the parcel.
7. Click on the Cut Polygons tool and follow the directions below to split the parcel while tracing the line you created earlier in this exercise.



1. Click here



2. Click here to snap to the beginning point of your COGO line

3. Click on the Trace button

6. Click on the Straight Segment button and double-click above the parcel to finish the cut.

5. Click here to stop the trace

4. Drag your mouse along the COGO line and trace northward



7. Note that your parcel is not cut along the COGO line

8. Save your edits and stop editing.

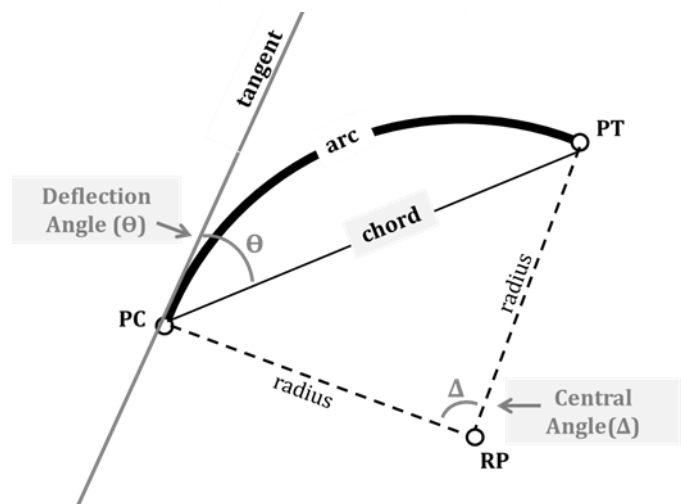


7.14 COGO Curves

Exercise 3: Entering curves using ArcGIS COGO Tools

You can enter curves in ArcGIS Standard or Advanced using the same COGO tools you used in the previous exercises.

The figure on the right shows you the main parameters used to describe a curve. We will use the chord distance and direction, as well as the radius length and the central angle to enter curves. Also note that we also need to specify whether a curve curves to the left or the right.



1. Start ArcMap and open COGO_Exercise3.mxd.
2. Start an edit session to edit the Lines layer
3. Open the Traverse tool from your COGO toolbar
4. Here is the information for the 3 calls that you will enter, starting at the NE corner of section 20.

Call 1:

Type: Bearing-Distance
Bearing: S 45° 47' 01" W
Distance: 100 Feet

Call 2:

Type: Curve
Chord: 114.81 Feet
Chord Direction: S 57° 17' 01" W
Angle: 45 degrees
Turn Direction: Left

Call 3:

Type: Tangent Curve
Radius: 200 feet
Angle: 67 degrees
Turn Direction: Right

Call 4:

Type: Bearing-distance
Bearing: S 45° 47' 01" W
Distance: 200 Feet

5. Use the instructions on the following page to COGO the parcel described by the calls above.

1. Set the Template to "Lines"

2. Click here ..

3. ... and then click in NE corner of section 20 to set the starting point

4. Enter bearing and distance for the first call

5. Click "Add"

6. Click here and then choose "Curve"

7. Click on the dropdown button and set to "Angle"

8. Enter all the parameters for Call 2

9. Click "Add"

10. Click here and then choose "Tangent Curve"

11. Enter all the parameters for Call 3

12. Click "Add"

13. Click here and then choose "Bearing-Distance"

14. Enter all the parameters for Call 4

15. Click "Add"

15. Click "Finish"

6. Save your edits and close your map