Editing parcels using a "construction database"

In this Chapter you will learn

- How to set up a "construction database" for your county
- How to use the construction database as a scratch layer
- How to break multipart lines into smaller segments and computing bearings and distances
- How to process a parcel split using a construction database

1. Using construction databases

Processing geometry changes to a parcel layers usually involves a number of steps. Typically, one of the first steps is to draw the outside of a new parcel using its legal description found in a deed or other recorded document using the COGO tools in ArcGIS or using programs such as Autodesk, PC Traverse or Greenbriers' Net Deed Plotter. Then, the parcel GIS layer is edited to reflect this change. This chapter proposes the following three steps in this workflow:

1. Draw out the legal description into a **construction database** using ArcGIS COGO tools. If your county uses Autodesk, PC Traverse, Greenbrier or another deed mapping program then you would create this boundary in that particular program and export those lines into the construction database.
2. Prepare the new parcel boundary lines in the construction database. This means editing those lines so that the lines close to form a closed shape, removing any gaps and – if needed – rotate, move and adjust the new parcel to fit into the existing parcel GIS layer
3. Edit your parcel layer by tracing lines in the construction database

A construction database can be thought of as a "scratch layer" where you create and clean up a new parcel before using this scratch layer to edit the actual parcel layer. Hence, one of the main differences between a construction database and a parcel layer is that a parcel layer contains *all* the parcels in a county, while the construction database only has parcels that have been recently edited. Also the parcels layer consists out of polygons, while the construction database consists of lines.

For any county that has an ArcGIS Standard or ArcGIS Advanced license it is recommended to use a file geodatabase to store the construction lines. The advantage of using a geodatabase it that it will automatically compute and populate bearing and distance attribute fields as well as allow you to use COGO tools to split multi-part lines into straight line segments.

Counties that have an ArcGIS Basic license should still use a construction database. In their case this database would be stored as a shapefile.

Exercises 1 and 2 show how to use a construction file geodatabase, and then exercise 3 shows how you can use a shapefile construction database.


7.5 Using a Construction Database

Exercise 1: Setting up a construction geodatabase

In this exercise we will first create a new file geodatabase with a feature dataset and then set up a construction geodatabase. By creating it from scratch you can set it up with the projection (i.e. Idaho State Plane Coordinate Zone) you use in your county as well as customize the attributes you would like to use.

1. Start ArcMap and open the ArcCatalog Window inside ArcMap.

2. Right-click on the Topic7_5 folder and choose New > File Geodatabase

3. Name your new file geodatabase "ConstructionDatabase"

4. Right-click on your new ConstructionDatabase and create a new Feature Dataset as shown below
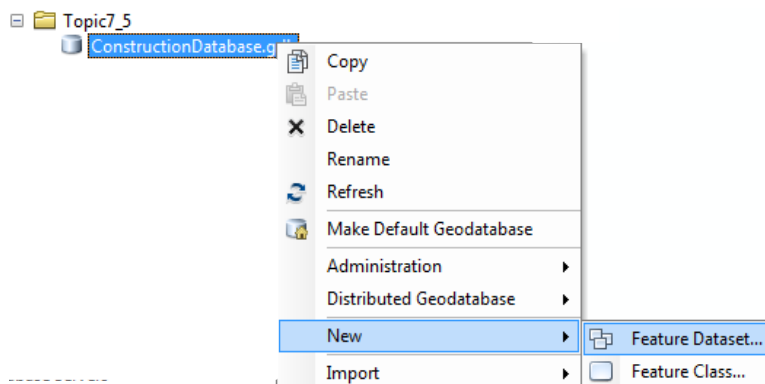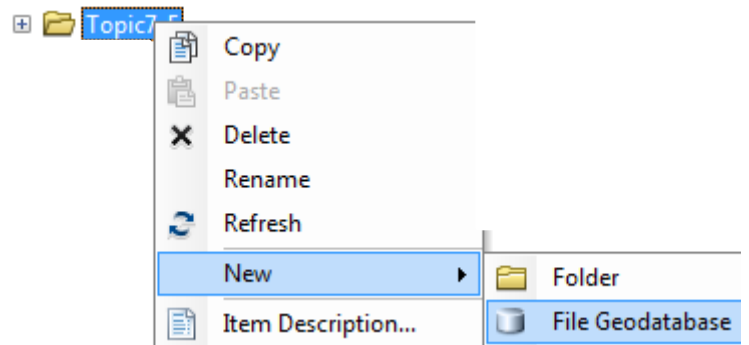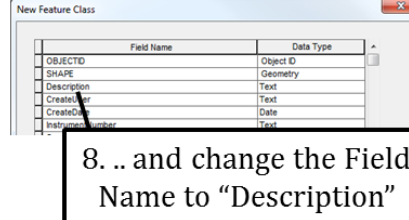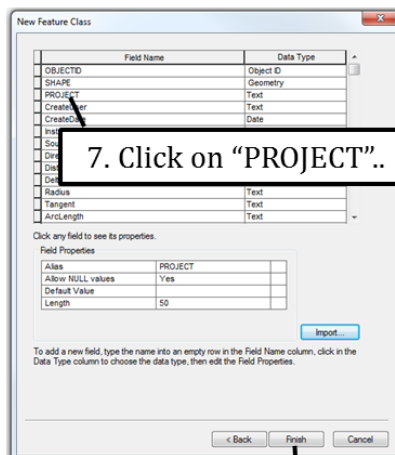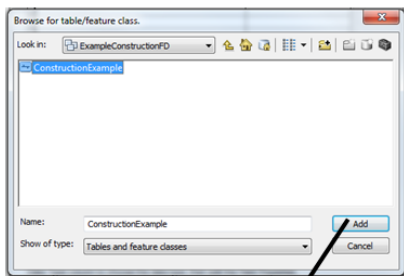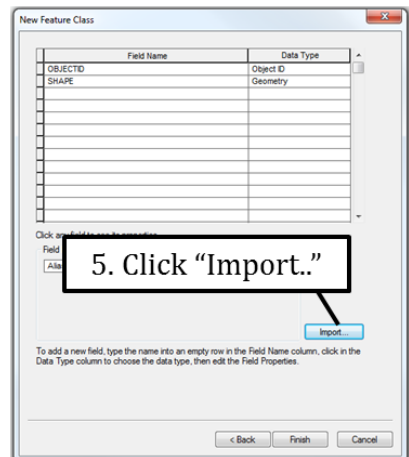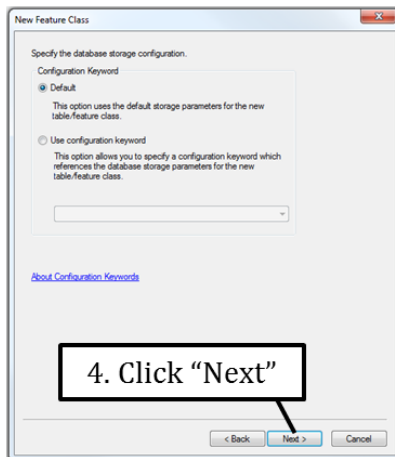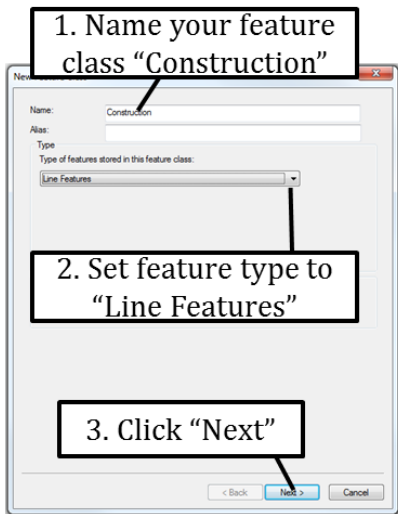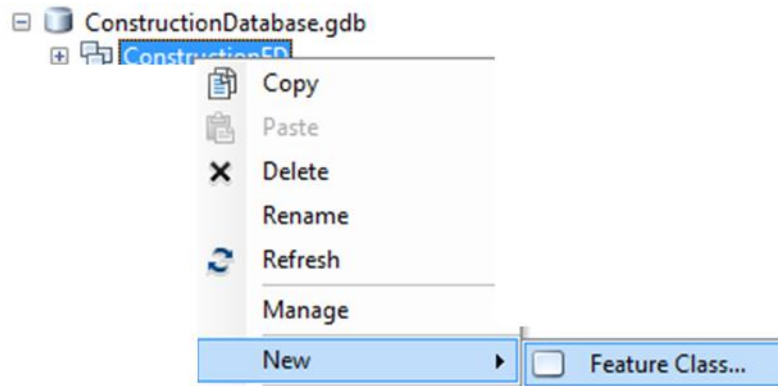

5. Name your feature dataset "ConstructionFD"

6. Click Next.

7. Double-click on "Projected Coordinate Systems" and then double-click to open the "State Plane" folder as shown on the right.

8. Inside the State Plane folder open the "NAD 1983 (US
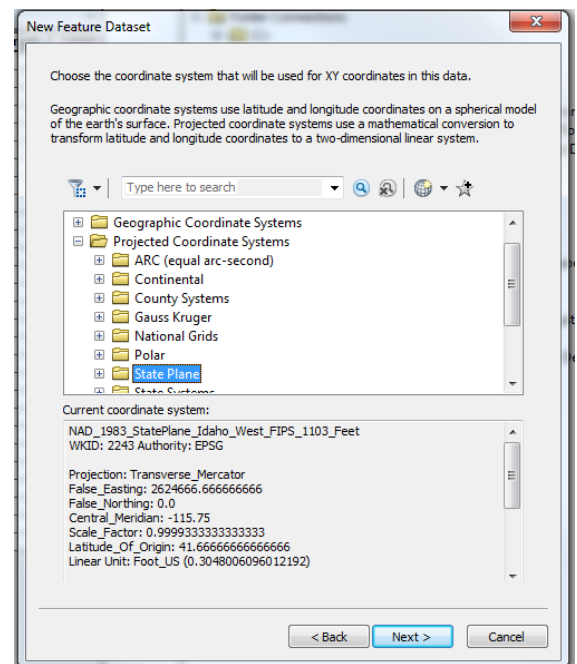
Feet)" and then scroll down to the three "NAD 1983 StatePlane Idaho.." projections. Depending on where your county is located in Idaho click once on the Idaho West, Idaho Central or Idaho East State Plane coordinate system.

9. Click Next

10. Click Next

11. Click Finish

12. Next we need to create the actual Construction feature class that will function as our construction layer in GIS. Instead of setting up the attributes in this feature class manually, we will import them from an existing feature class.

13. Right-click on the ConstructionFD feature dataset you just created and choose New > Feature Class

14. Follow the direction s below:

1. Name your feature class "Construction"

2. Set feature type to "Line Features"

3. Click "Next"

4. Click "Next"

5. Click "Import.."

6. Browse to Topic7_5 > ExampleDatabase.gdb > ExampleConstructionFD. Click once on "ConstructionExample" and then click "Add"

7. Click on "PROJECT"..

8. .. and change the Field Name to "Description"

9. Click "Finish"

15. Note how you changed one of the field names ("PROJECT") in step 7 above. This shows you that, after you import the schema from another GIS layer, you can change the attribute fields in any way you like. You can also add new fields you like, or delete ones you do not need.

16. Note that the new Construction layer has been added to your map.

17. Add the Parcels shapefile from the Topic7_5 folder to your map and then zoom to those parcels (hint: right-click on Parcels and choose "Zoom to Layer"). Label the parcels with their PIN number.

18. Change the symbology for the Construction layer as shown below:

19. Experience has shown that this symbology makes it easier to spot any potential gaps and overlaps in your data. Leave your map open for the next exercise.

Exercise 2: Processing a split using a construction geodatabase

1. This exercise continues from the previous exercise. So, make sure ArcMap is open an Construction and parcels layers are added to your map.

2. Right-click on the construction layer and choose Edit Features > Start Editing to start an edit session.

3. Add the COGO tools to your map

4. Click on the Traverse tool. In this exercise we will split parcel B101 as shown on the right. Our beginning point is the NE corner of parcel B101. Make sure your template is set to "Construction".

5. Enter the following calls to create parcel B102 that needs to be split off from parcel B101:

   a. Call 1: Bearing S 0° E for 2,000 feet

   b. Call 2: Bearing N 90° W for 500 feet

   c. Call 3: A tangent curve with a radius of 1,000 feet and an angle of 45° turning to the left

   d. Call 4: A tangent curve with a radius of 1,000 feet and an angle of 45° turning to the right

   e. Call 5: Bearing N 90° W for 592.5 feet

   f. Call 6: Bearing N 0° E for 2,585.8 feet

   g. Call 7: Bearing N 90° E for 2506.7

   h. Click "Closed Loop" and "Finish" to finish parcel B102.

6. Save your edits

7. Open the attribute table for the Construction lines and note that you have added 7 line segments. Scroll to the right to view the "COGO Parameters" and note that those have been automatically populated with the bearings and directions you entered in step 5 above.

COGO Direction	COGO Distance	COGO Delta	COGO Radius	COGO Tangent	COGO ArcLength	COGO Side
S 0-0-0 W	2000	<Null>	<Null>	<Null>	<Null>	<Null>
S 90-0-0 W	500	<Null>	<Null>	<Null>	<Null>	<Null>
S 67-30-0 W	765.367	45-0-0	1000	414.214	785.398	L
S 67-30-0 W	765.367	45-0-0	1000	414.214	785.398	R
S 90-0-0 W	592.5	<Null>	<Null>	<Null>	<Null>	<Null>
N 0-0-0 E	2585.8	<Null>	<Null>	<Null>	<Null>	<Null>
N 90-0-0 E	2506.7	<Null>	<Null>	<Null>	<Null>	<Null>

(7 out of 7 Selected)

Construction

8. With only those 7 new line segments selection right-click on "CreateUser" and then choose "Field Calculator"

9. Calculate CreateUser to "Your Name" (obviously, this is where you would type your actual name) as shown below.
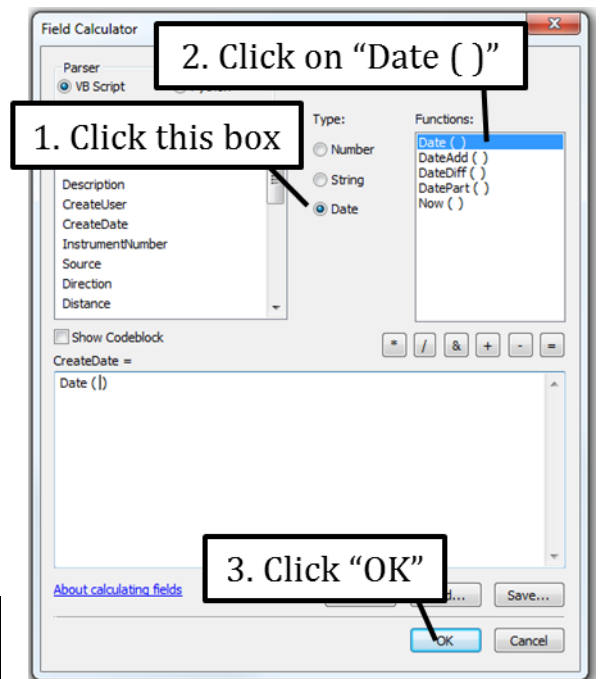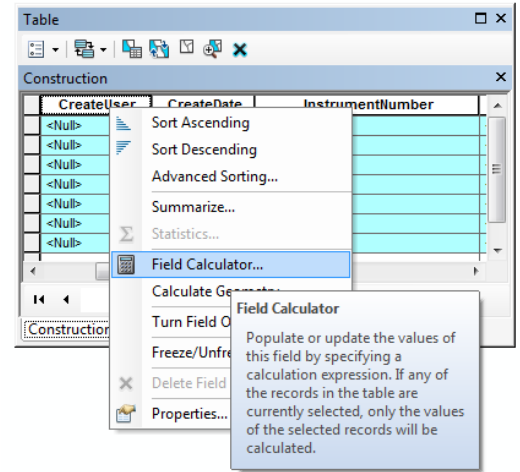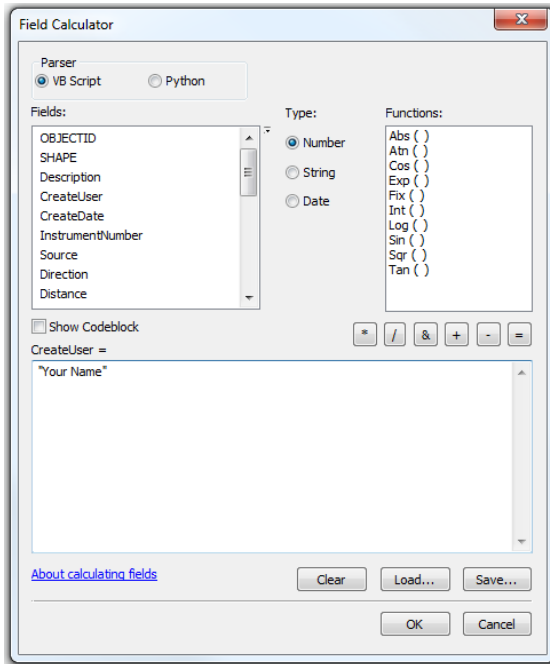
10. Right-click on "CreateDate" and open the field calculator. Populate as shown on the right to add the current date.

11. Also field calculate the following fields:

Attribute Field Name	Compute as...
InstrumentNumber	"123456"
Source	"B102"
PERM_DIRECTION	[Direction] (note: do not type this in, but rather double-click on this field near the top-left corner of the Field Calculator dialog box)
PERM_Distance	[Distance]
PERM_Delta	[Delta]
PERM_Radius	[Radius]
PERM_Tangent	[Tangent]
PERM_Side	[Side]

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12. Turn off the parcels layer

13. Zoom to the NW corner of parcel B102 and note the appearance of the Construction lines in this corner. Then zoom in closely to the NE corner of parcel B102 and note that there is a gap.

14. While zoomed in to the NE corner use your edit tool to select the north boundary of parcel B102 and snap the NE corner to the eastern edge to close the gap.

15. Select all the line segments in the Construction layer. In your attribute table scroll to the COGO Direction and COGO distance fields. Then click on the "Update COGO Attributes" button on your COGO toolbar.

Update COGO Attributes

16. Click "Yes" on the "Update COGO Attributes" warning dialog box

17. Note that both the COGO Direction and COGO Distance for the last line changed. When you scroll to the right in your attribute table you can see that the original direction and distance values are still preserved in the PERM_DIRECTION and PERM_Distance fields respectively.

18. Turn your parcel layer back on. Our goal is to add the new parcel B102 to your parcel layer. As you can see we will need to split parcel B101 to create this new parcel. Up until now we have added this new parcel to the construction layer. In the next part of this exercise we will trace along this construction layer to split parcel B101 in the parcel layer.

19. Save your edits and stop editing.

20. Start an edit session to edit your parcels layer.

21. Right-click on the parcels layer and choose Selection > make this the only selectable layer
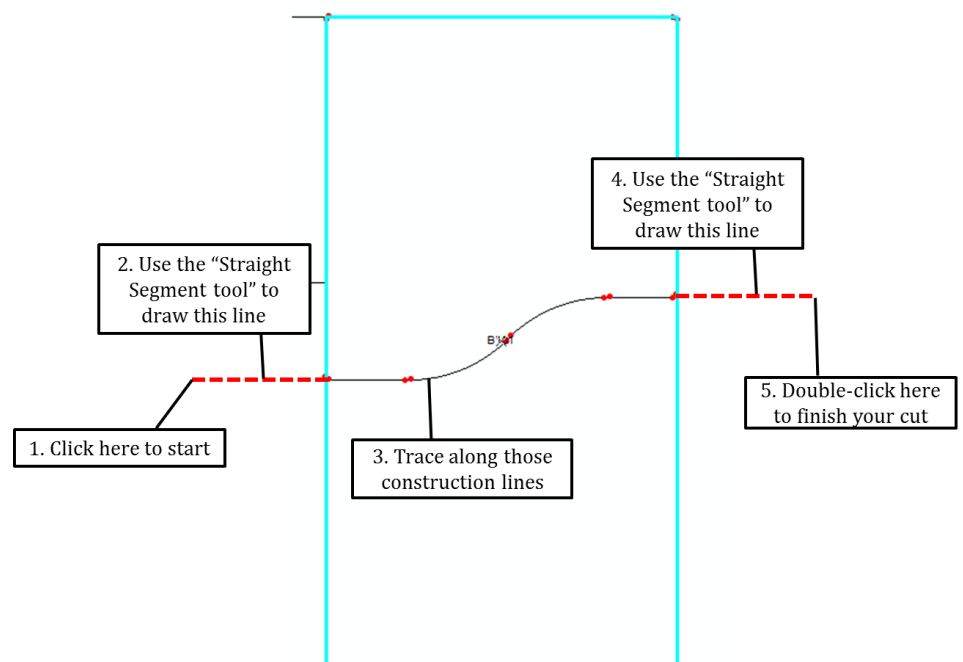
22. Select parcel B101

23. Click on the Split polygon tool on your Editor tool bar

24. Use the instructions on the right to split the parcel

25. Edit the PIN number for parcel B102

26. Save your edits and stop editing

27. Leave your map open for the next exercise

4. Use the "Straight Segment tool" to draw this line

2. Use the "Straight Segment tool" to draw this line

5. Double-click here to finish your cut

1. Click here to start

3. Trace along those construction lines

Exercise 3: Import lines into a construction geodatabase

1. In this exercise we will split parcel A123 into four parcels as shown on the right

2. Add the NewParcels shapefile to your map and note that it already contains those new parcels. Instead of using the COGO tools to draw those four new parcels in the construction layer, we will instead copy them from the NewParcel layer into the construction layer.

3. Right-click on the Construction layer and choose Edit Features > Start Editing

4. Make the NewParcels the only selectable layer, and then select all 4 parcels in this NewParcels layer

5. Click on Edit > Copy as shown on the right

6. Click on Edit > Paste. Set the Target to "Construction" as shown below:
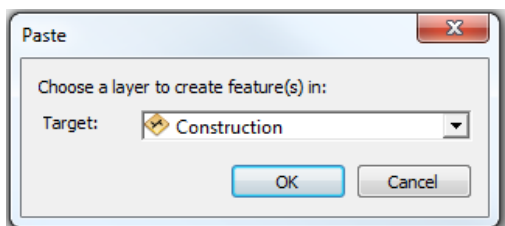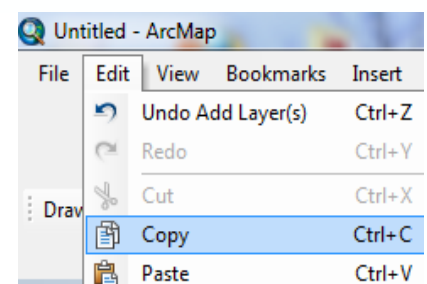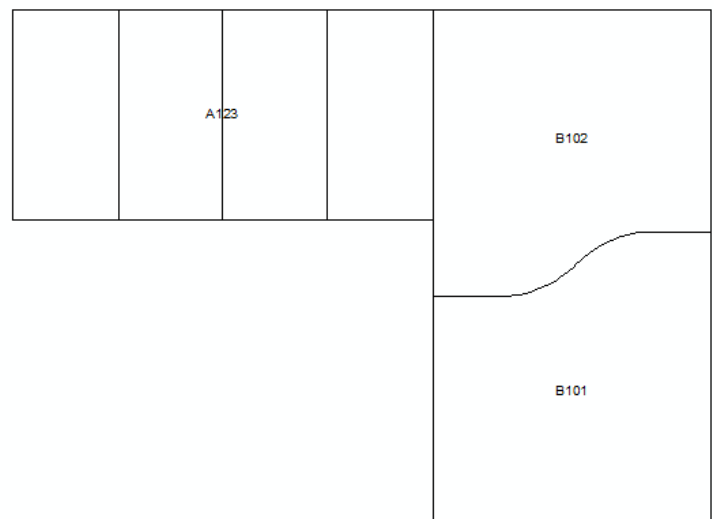
7. Open the attribute table for the Construction layer and note that four line features were added, where each feature traces entirely around one of the new parcels.

8. With all four new line segments selected click on the "Split into COGO lines" button on the COGO toolbar. When asked, make sure the Template is set to "Construction".

9. Note that you now, instead of four features, you have selected 16 features. Scroll to the right in your table and note that the COGO Directions and Distances have automatically been populated.

10. Turn off the NewParcels and remove those from your map.

11. Save your edits and stop editing.

12. Start an edit session to edit the Parcels layer. Use the cut polygon tool three times to split parcel A123 into four separate parcels by tracing along the appropriate construction lines.

13. Save your edits and stop editing.

Exercise 4: Using a construction layer in ArcGIS Basic

1. Open a new map document and also open the Catalog window inside ArcMap

2. Open the ExampleDatabase in the Topic7_5 folder and export the ConstructionExample feature class to a shapefile as shown below.
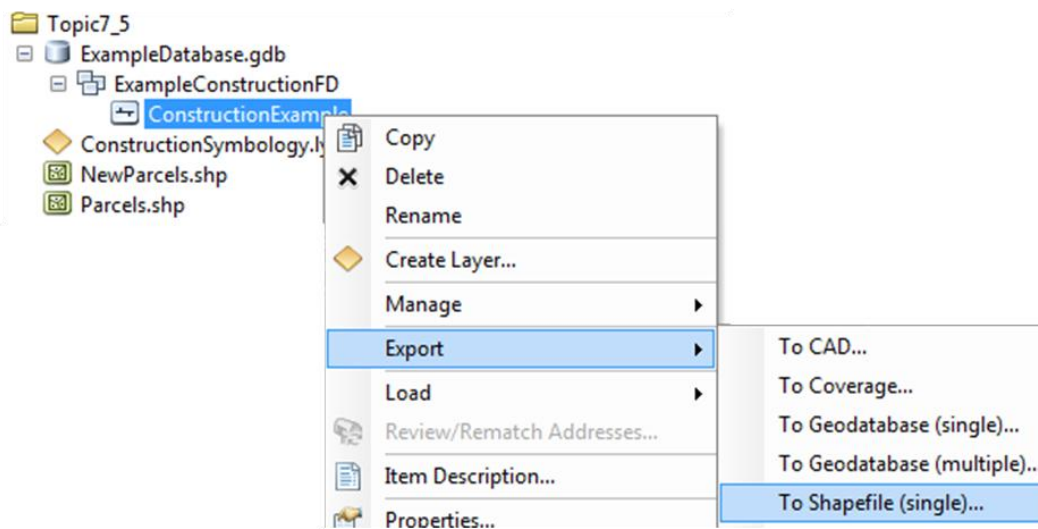
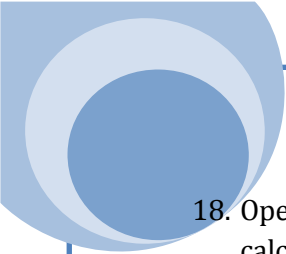3. In the Feature Class to Feature Class dialog box set the Output location to the Topic7_5 folder and name your output feature class "ConstructionLines.shp".

4. Click OK to run the tool

5. Open the attribute table for the new ConstructionLines.shp.

6. There are a number of fields we do not need: for example there is no need to have the PERM_Direction, PERM_Distance, etc. fields because this construction layer, unlike the one we worked with in exercises 1 through 3, will not automatically populate those fields.
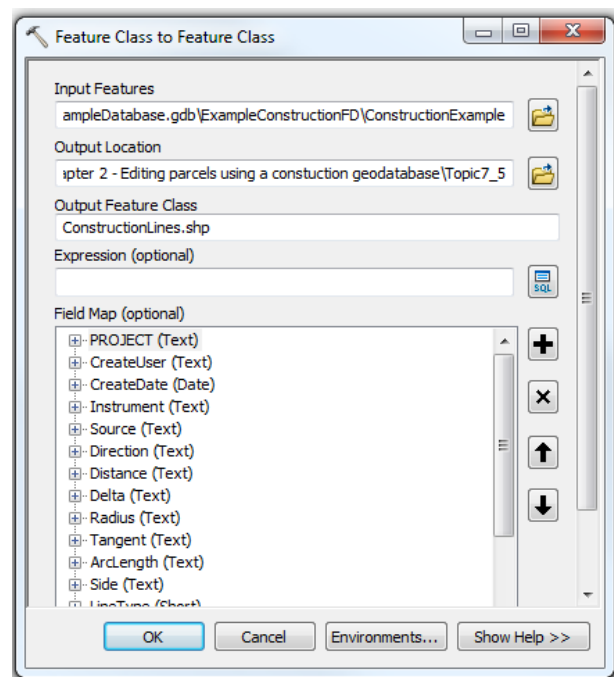
7. Open the Search window in ArcMap and do a search for "delete field" as shown on the right.

8. Open the Delete Field (Data Management) Tool

9. Set the Input Table to "ConstructionLines" and then check the box in front of all fields starting with "PERM_" as well as the "SHAPE_Leng" fields as shown below.
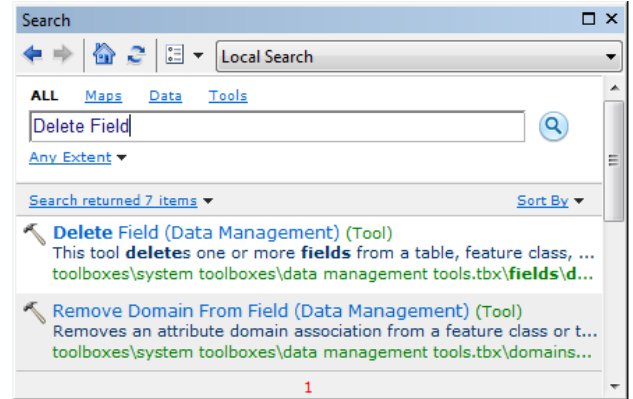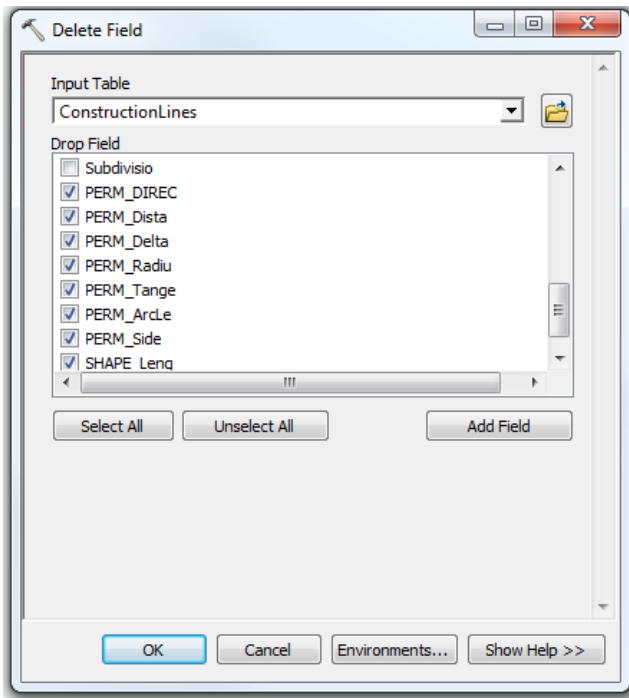
10. Click OK to run the tool. Open the attribute table for the ConstructionLines layer again to verify that those fields have been deleted.

11. Add the Parcels_Ex4 and NewParcels_Ex4 shapefiles to your map

12. Open the properties for the ConstructionLines layer and go to the Symbology tab. Click on the "Import.." button and import the symbology from "ContructionSymbology.lyr" in the Topic7_5 folder.

13. Symbolize both the Parcels_Ex4 and NewParcels_Ex4 features as hollow symbols. Label the Parcels_Ex4 layer with the Parcel_ID number.

14. Parcel A101 will be split into three new parcels as shown in the NewParcels_Ex4 layer. Start an edit session for the ConstructionLines layer.

15. Make NewParcels_Ex4 the only selectable layer and select all three new parcels.

16. Copy and paste those three new parcels (hint: click on Edit > Copy and then on Edit > Paste) into the ConstructionLines layer.

17. Remove the NewParcels_Ex4 layer from your map

18. Open the ConstructionLines attribute table and note the addition of three new lines. Field calculate the CreateUser and CreateDate fields.

19. Save your edits and stop editing. Then start an edit session to edit the Parcels_Ex4 layer.

20. Click on parcel A101 and then click on the Cut Polygon tool. Cut this parcel into three polygons using the "Cut Polygon" tool and by tracing along the construction lines.