


# Editing Parcel Fabrics Tutorial

 esri

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# Tutorial: Getting started with parcel fabric editing

A parcel fabric is built from either data migration of existing parcel datasets or data entry into an empty parcel fabric. Data migration of existing parcels into a new parcel fabric is the most common method that you will use to build a parcel fabric.

[Learn more about data migration into the parcel fabric](#)

**Complexity:**  
Beginner

**Data Requirement:**  
ArcGIS Tutorial Data Setup

**Data Path:**  
\\ArcGIS\\ArcTutor\\Parcel Editing

**Goal:**  
Become familiar with the parcel fabric editing environment

## Editing the parcel fabric in automatic edit mode

Once a parcel fabric is loaded into ArcMap, you can choose to either directly edit parcels in the map ([automatic edit mode](#)) or work with job workflow functionality ([manual edit mode](#)).

Before beginning this exercise, make sure that the **Parcel Editor** toolbar has been added to ArcMap. To load the toolbar, click **Customize** on the main menu, point to **Toolbars**, then click **Parcel Editor**. In this exercise, you will become familiar with editing in automatic edit mode.

Steps:

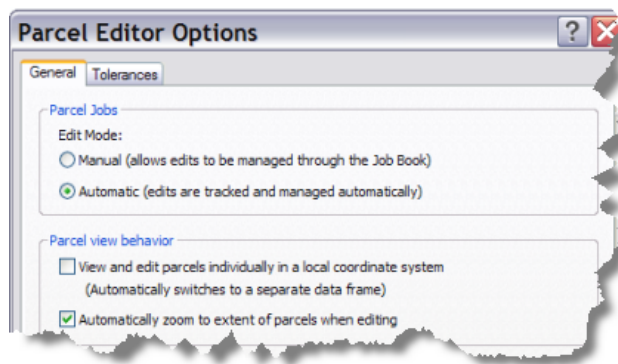
1. Start ArcMap and load the ParcelEditing map document (ParcelEditing.mxd) from the \\ArcGIS\\ArcTutor\\Parcel Editing\\ folder.
2. Make sure the map is zoomed to the **Parcel Editing Area** bookmark. Click **Bookmarks > Parcel Editing Area**.

You will now set the parcel fabric edit mode.

3. Click the **Parcel Editor** arrow on the **Parcel Editor** toolbar and click **Options**.
4. On the **Parcel Editor Options** dialog box, choose the **Automatic** option.

Using this option, parcels are edited directly in the map and each edit is tracked automatically in the job book.


5. Click the **Automatically zoom to extent of parcels when editing** check box and click **OK**.

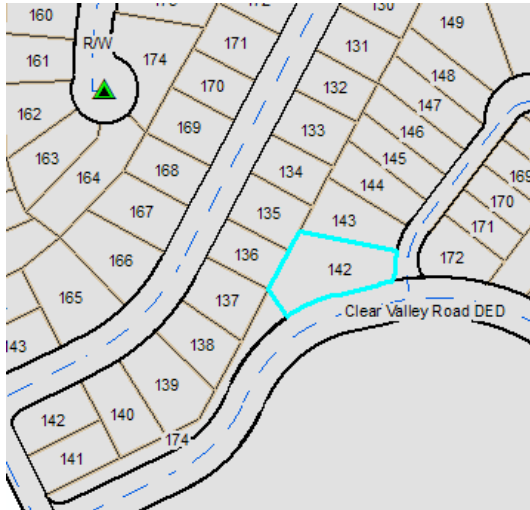


Setting the parcel fabric edit mode

When you open a parcel, the map automatically zooms to the extent of the parcel. If you do not check this option, the map remains at its current zoom extent.

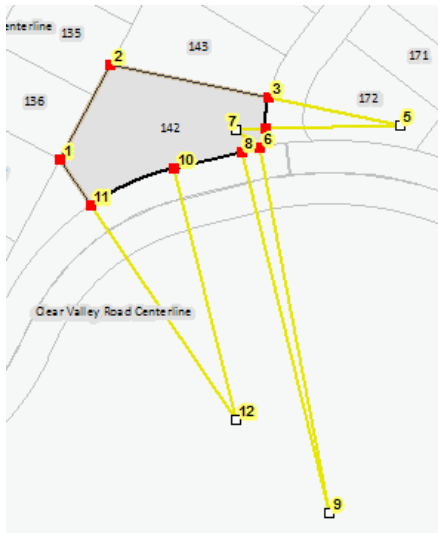
You will now open a parcel in the map.

6. Click **Parcel Editor** and click **Start Editing**. Close the **Create Features** window.
7. Click the **Select Parcel Features** tool  on the **Parcel Editor** toolbar and click on parcel 142 to select it.




Select a parcel.

8. Right-click the parcel and click **Open**. You can also double-click the parcel to open it.  
The parcel is opened in the map, and curved radial lines are visible. The **Parcel Details** dialog box also becomes visible.

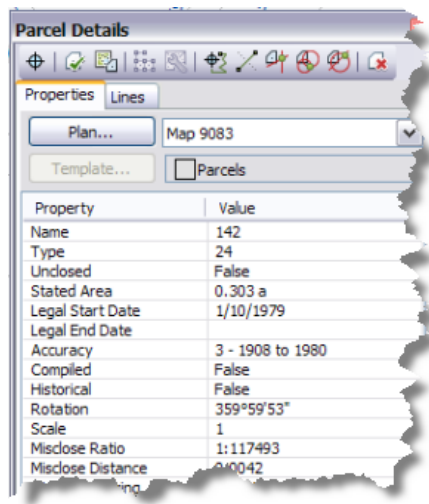


Open parcel

9. If the **Parcel Details** dialog box is not visible, click the **Parcel Details** tool  on the **Parcel Editor** toolbar to display the dialog box.

The **Parcel Details** dialog box shows the attribute information for the open parcel under the **Properties** tab. The **Name**, **Type**, **Unclosed**, **Stated Area**, **Legal Start Date**, **Legal End Date**, **Accuracy**, **Compiled**, and **Historical** attribute values are editable. The remaining attributes are system attributes maintained internally. The **Plan** list displays the parcels' associated plan or

record of survey. The **Template** button is unavailable. You can only set feature templates for newly created parcels in the parcel fabric, not for existing parcels.

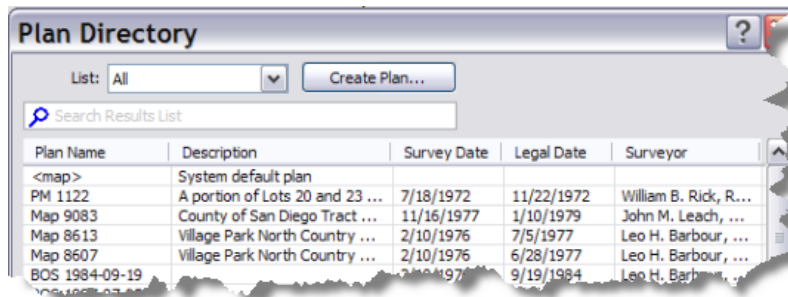


Parcel Details window

**Tip:** The **Name**, **Type**, **Stated Area**, **Legal Start Date**, **Legal End Date**, **Accuracy**, and **Compiled** attribute values are also editable when the parcel is selected in the map in an edit session. You do not have to open the parcel to edit these attributes.

- Click the **Plan** button to open the **Plan Directory** dialog box. The plan directory lists all available plans or records of survey defined for the current parcel fabric. On the **Plan Directory** dialog box, you can set a different plan for the parcel or create a new plan. For this exercise, you will not change the parcel's plan. Close the **Plan Directory** dialog box.

[Learn more about the plan directory](#)



Plan Directory

**Tip:** If you choose not to work with plans, the system default <map> plan is used for parcels that are not associated with any plans.

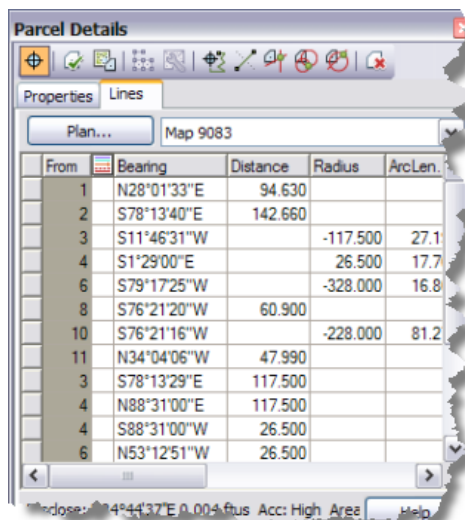
**Tip:**

The **Plan Directory** dialog box can also be opened from the **Parcel Editor** menu. When doing so, you can right-click a plan and click **Construction** to open the construction environment for the plan. In the construction environment, you can paste line work or traverse in construction lines. Parcels can be built from a network of construction lines and joined as new parcels to the parcel fabric.

[Learn more about working with parcel construction lines](#)

11. Click the **Lines** tab on the **Parcel Details** dialog box.

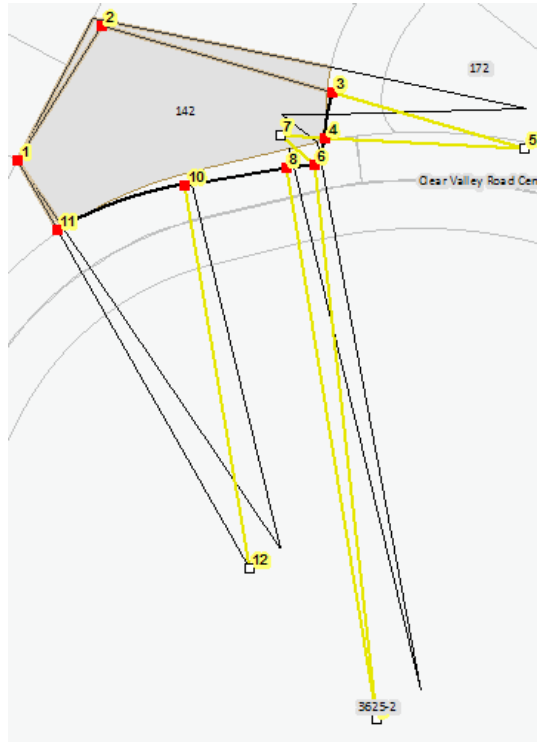
The parcel traverse lines are displayed with misclose information. You can edit line dimensions or add additional lines such as connection lines.



From	Bearing	Distance	Radius	ArcLen
1	N28°01'33"E	94.630		
2	S78°13'40"E	142.660		
3	S11°46'31"W		-117.500	27.1
4	S1°29'00"E		26.500	17.7
6	S79°17'25"W		-328.000	16.8
8	S76°21'20"W	60.900		
10	S76°21'16"W		-228.000	81.2
11	N34°04'06"W	47.990		
3	S78°13'29"E	117.500		
4	N88°31'00"E	117.500		
4	S88°31'00"W	26.500		
6	N53°12'51"W	26.500		

Parcel traverse grid

12. With the parcel still open, click the **Parcel Editor** arrow and click **Parcel Measurement View** to display the parcel using its COGO dimensions, scale, and rotation in the parcel fabric.



Displaying a parcel using parcel measurement view

Notice that the parcel has a  $4^{\circ}19'48''$  rotation. The parcel's rotation value is displayed in the **Rotation** attribute field under the **Properties** tab on the **Parcel Details** dialog box.

If parcel measurement view is toggled off, the parcel is displayed using its parcel fabric coordinates. Displaying a parcel in parcel measurement view displays a parcel using coordinates derived from its COGO dimensions, scale, and rotation. Displaying the parcel using parcel measurement view displays the true parcel shape according to its current COGO dimensions, scale, and rotation. This command is useful for finding erroneous parcels. Inaccurate or incorrect COGO dimensions will be reflected in the parcel shape when a parcel is displayed using parcel measurement view.

In the case of parcel 142, there are no differences in the parcel shape when the parcel is displayed using its COGO dimensions, but there is a rotation on the parcel.

[Learn more about parcel measurement view](#)

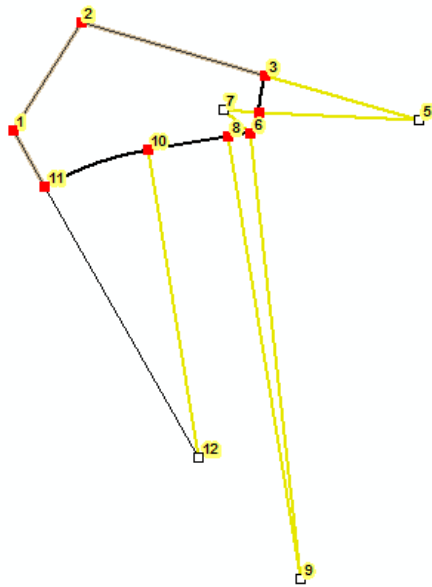
13. Toggle off parcel measurement view: click **Parcel Editor > Parcel Measurement View**.
14. Click the **Exit Without Saving** command on the **Parcel Details** dialog box to close the parcel and switch back to the parcel fabric layer.

Now you will open the same parcel, but this time, you will open it in a local coordinate system.


15. Open the **Parcel Editor Options** dialog box (**Parcel Editor > Options**) and choose **View and edit parcels individually in a local coordinate system**. Click **OK**.
16. Using the **Select Parcel Features** tool, double-click on parcel 142 to open it.



The parcel is opened in a stand-alone local coordinate data frame instead of the map. Editing parcels in a local coordinate data frame is useful for individual parcel editing and when using the map as a background reference is not necessary.



Open a parcel in a local coordinate data frame.

17. Click the **Exit Without Saving** command on the **Parcel Details** dialog box to close the parcel and switch back to the parcel fabric layer.
18. Click the **Parcel Explorer Window** tool  on the **Parcel Editor** toolbar to open the **Parcel Explorer** window.

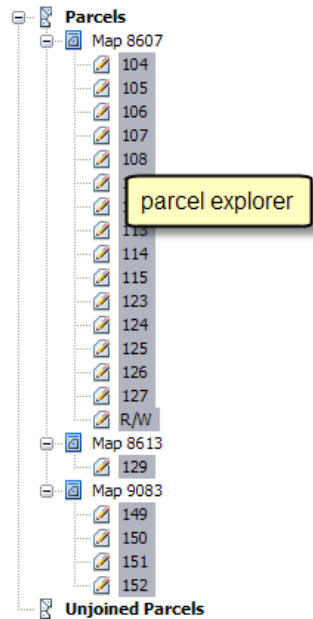
The **Parcel Explorer** window lists selected parcels by their plan. Parcels that are not yet part of the parcel fabric and unjoined parcels are also listed.

By default, the parcel explorer lists the last parcel that was opened.


19. Using the **Select Parcel Features** tool, drag a box to select a group of parcels in the map.

The **Parcel Explorer** window refreshes to display a list of the selected parcels, grouped by their plan.



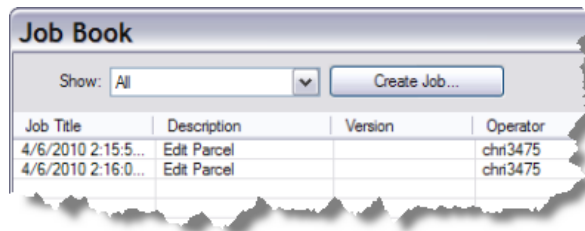


Parcel Explorer

 **Tip:** You can right-click parcels either in the map or in the **Parcel Explorer** window and click **Open** to open them for editing.

20. Click **Parcel Editor > Job Book** to open the parcel fabric job book.

The job book displays two jobs for both times that parcel 142 was opened.



Job Book

The job book tracks edits to the parcel fabric. Each time an edit is made—for example, a parcel merge or a parcel attribute edit—the edit is tracked as a mini job on the **Job Book** dialog box. You can select any mini job, right-click, then click **Zoom to Job Parcels** to zoom to the parcel that was edited. If you are working in manual mode using fabric jobs, you can create and edit jobs manually and reopen jobs from the **Job Book** dialog box.

21. Close the **Job Book** dialog box to complete the exercise in familiarizing yourself with the parcel fabric automatic edit mode.

## Editing the parcel fabric in manual edit mode

In this exercise, you will become familiar with editing the parcel fabric in manual edit mode using fabric jobs.


### Steps:

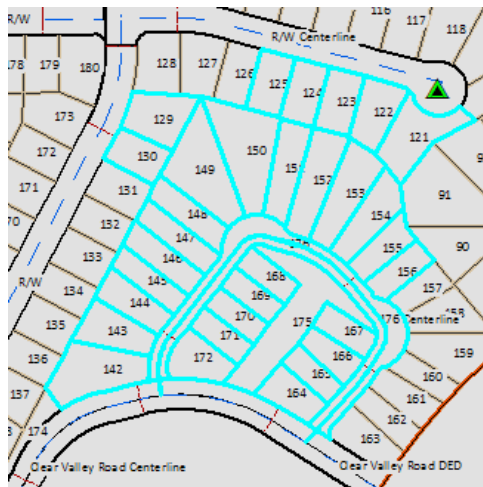
1. In ArcMap, make sure the ParcelEditing map document (ParcelEditing.mxd) is open and zoomed to the **Parcel Editing Area** bookmark.

You will now set the edit mode to manual.

2. Open the **Parcel Editor Options** dialog box and choose **Manual** as the edit mode. You can choose to leave **View and edit parcels individually in a local coordinate system** checked or unchecked. Click **OK**.

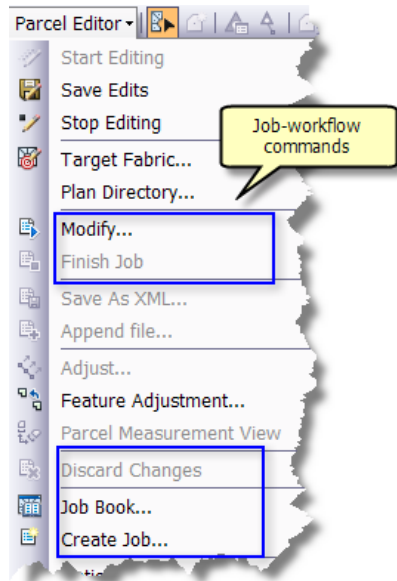
In manual edit mode, parcels are selected and opened in a fabric job for editing. After edits are complete, the job is posted back to the parcel fabric layer.

3. Click the **Select Parcel Features** tool  on the **Parcel Editor** toolbar and drag a box to select a group of parcels in the map.



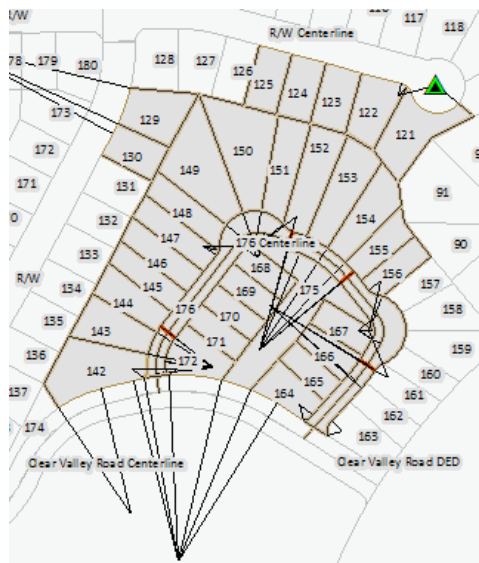
Select parcels to open in a job

4. Click the **Parcel Editor** arrow and click **Modify** to extract the selected parcels into a job. Notice that job workflow commands are now available on the Parcel Editor menu, for example, **Modify**, **Finish Job**, and **Create Job**.



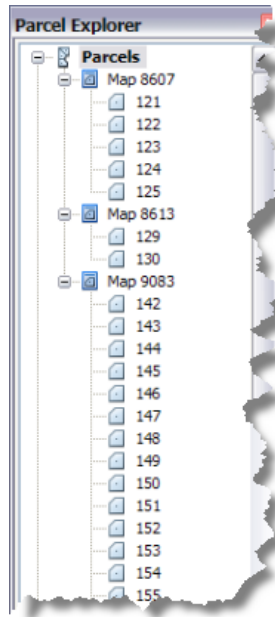
Job workflow commands

The selected parcels are opened in a job and are available for editing. The surrounding parcels are inactive.






Open selected parcels in a fabric job.

The **Parcel Explorer** window also becomes active, listing all parcels in the fabric job by their plan.




Parcel explorer


 **Tip:** Parcels in the parcel explorer can also be displayed with an unlocked icon . This icon indicates that these parcels were previously edited. On a versioned ArcSDE geodatabase, parcels that are displayed with a locked icon  are currently being edited in another version or by a different user on the same version. Locked parcels cannot be edited.

[Learn more about versioning and edit locks in the parcel fabric](#)

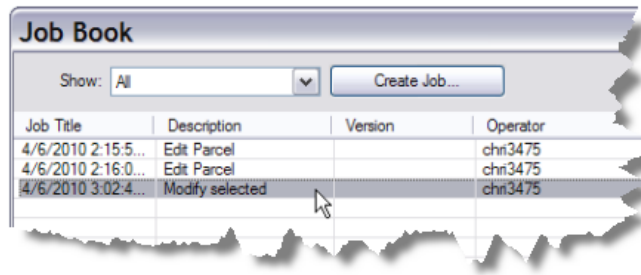
You can now double-click a parcel in either the **Parcel Explorer** window or in the map to open the parcel for editing. You can also right-click parcels to access commands for parcel division, parcel remainder, and so on.

5. Click **Parcel Editor > Finish Job**.

The fabric job is saved and posted back to the parcel fabric layer. Any edits made in the job will be updated in the parcel fabric and committed to the geodatabase once the edit session is saved. If the edit session is not saved, the edits posted from the job are lost. You can also click the **Undo** command  on the **Standard** toolbar to undo the creation of the fabric job.

 **Tip:** In an open fabric job, you can click the **Discard Changes** command on the **Parcel Editor** menu to discard the job. All edits in the job are discarded.

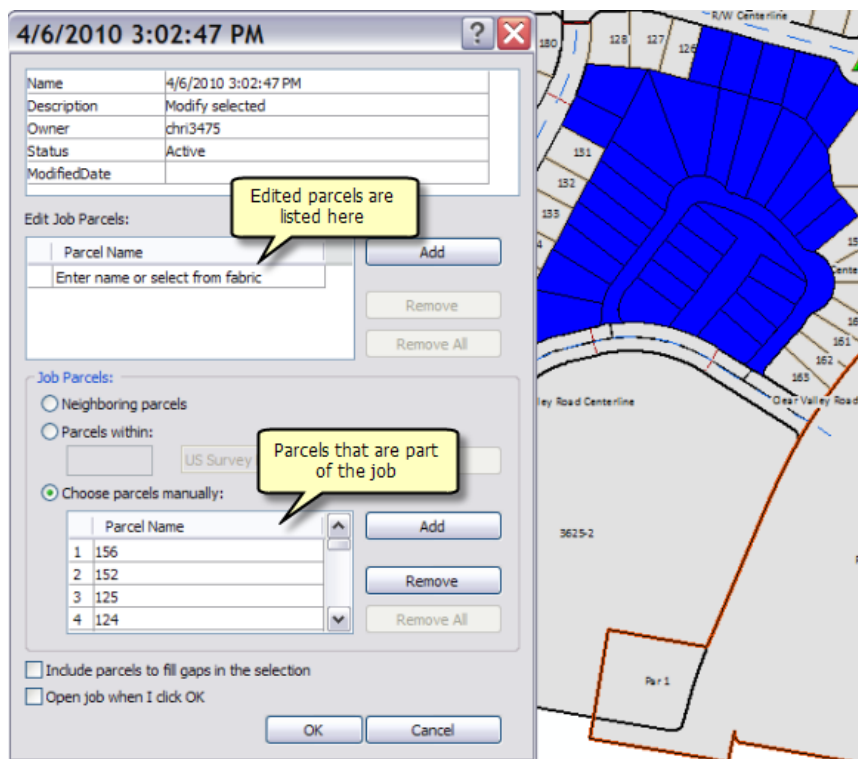
6. Click **Parcel Editor > Job Book** to open the **Job Book** dialog box. The job you just created has a description of **Modify selected**.



Job book

7. Right-click the job and click **Properties**.



The job creation properties dialog box is displayed and the parcels that are part of the job are colored in blue. If a parcel was edited in the job, it would be colored in red. You can edit the properties of the job in the job creation dialog box. You can also reopen the job for continued editing.




Job properties



**Tip:** If you are editing in automatic mode (without using manually created jobs), you can also view the properties of the mini jobs or tracked edits; however, you cannot reopen the edits or mini jobs for editing. You need to be working in manual mode to reopen a job from the **Job Book** dialog box.

8. Click **Cancel** on the job creation dialog box to complete the exercise in familiarizing yourself with the parcel fabric manual edit mode and complete the tutorial.

 **Tip:** Click the **Create New Parcel On A New Plan** tool  on the **Parcel Editor** toolbar to create a new parcel in a new plan. You can also open the **Plan Directory** dialog box, right-click a plan, then click **New Parcel** to create a new parcel in an existing plan.

 **Tip:** Right-click a parcel in the map or in the **Parcel Explorer** window to access parcel editing commands such as [Parcel Division](#) and [Parcel Remainder](#).

 **Tip:** Right-click a plan on the **Plan Directory** dialog box to create or paste lines as [parcel construction lines](#). Parcels can be built from a network of construction lines.

 **Tip:** Click the **Maintain Control Points** tool  on the **Parcel Editor** toolbar to insert [control points](#) into the parcel fabric. Control points can also be imported into the parcel fabric.

# Tutorial: Creating new parcels in the fabric

In this exercise, you will explore the various methods of creating and adding new parcels to a parcel fabric. You can create new parcels in existing plans or create new plans. Parcels can be traversed in the parcel traverse environment or can be built from a network of connected line work in the parcel construction environment. You will also learn how to enter new parcels into an empty fabric.

**Complexity:**  
Beginner

**Data Requirement:**  
ArcGIS Tutorial Data Setup

**Data Path:**  
\\ArcGIS\\ArcTutor\\Parcel Editing


**Goal:**  
Become familiar with creating and adding new parcels to the fabric.

## Creating a new plan

In this exercise, you will create and add a new plan to an existing fabric of parcels and plans.

Steps:

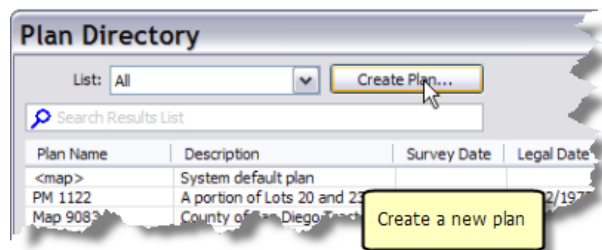
1. Open ArcMap and load the ParcelEditing map document (ParcelEditing.mxd) from your \\ArcTutor\\Parcel Editing\\ folder.
2. Make sure the map display is zoomed to the parcel editing overview area. Click the **Bookmarks** menu and click **Parcel Editing Area**.
3. Click the **Parcel Editor** arrow on the **Parcel Editor** toolbar and click **Start Editing**.

If the **Parcel Details** dialog box is not visible, click the **Parcel Details** tool  on the **Parcel Editor** toolbar.

4. Close the **Create Features** window.
5. Make sure the parcel fabric edit mode is set to automatic. Open the **Parcel Editor Options** dialog box (**Parcel Editor > Options**) and choose **Automatic** under **Edit Mode** on the **General** tab. Click **OK**.
6. Click the **Parcel Editor** arrow on the **Parcel Editor** toolbar and click **Plan Directory**.

The **Plan Directory** dialog box opens and displays a list of plans existing on this parcel fabric.

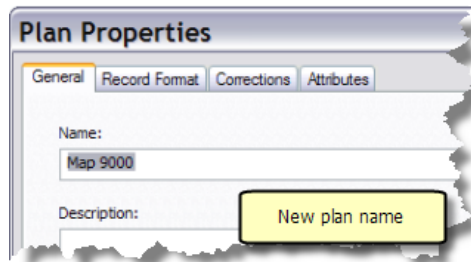
7. Click **Create Plan** to create a new plan.



The **Plan Properties** dialog box is opened.

8. On the **Plan Properties** dialog box, click the **General** tab and enter a name new for your new plan. For this tutorial, type Map 9000 as a plan name. You can also optionally enter a plan description.

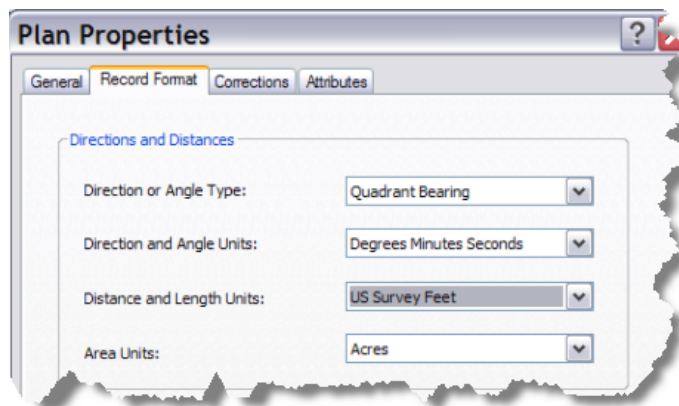




9. Click the **Record Format** tab to specify the units that you will be working with in this plan.

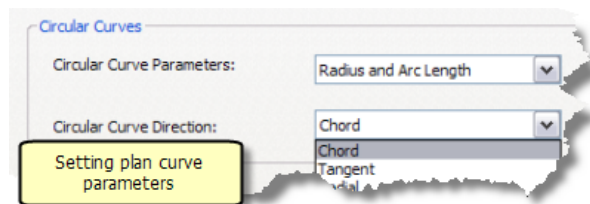
You will be working with a plan that displays directions in quadrant bearing format in degrees/minutes/seconds and distance in U.S. feet. Choose **Quadrant Bearing** from the **Direction or Angle Type** drop-down list, **Degrees Minutes Seconds** from the **Direction and Angle Units** drop-down list, and **US Survey Feet** from the **Distance and Length Units** drop-down list.

10. Leave the default for **Area Units**.



Setting plan units

11. Optionally, click the **Circular Curve Parameters** and **Circular Curve Direction** drop-down lists to specify circular curve parameters for this plan.




**Tip:** You will be able to identify which curve parameters a plan uses by looking at the curve dimensions on the plan. Curve dimensions are sometimes displayed in a curve table for labeled curves on the plan.

12. Click the **Corrections** tab on the **Plan Properties** dialog box.

Under this tab, you would click the **Uses true mid-bearings** option if the bearings of your parcel lines in the plan are the bearings from true north at the midpoint of the parcel. This option is typically used for very long parcel lines.

13. Click **Apply** on the **Plan Properties** dialog box to apply your changes.
14. Click the **Attributes** tab.

On this tab, you can enter information in the plan attributes such as survey date, surveyor, and [accuracy](#).

 **Tip:** You can add other attributes to the plans table, and these attributes will become available on the **Attributes** tab on the **Plan Properties** dialog box.

[Learn how to add additional attributes to tables in the parcel fabric](#)

15. Click the drop-down list next to the **Accuracy** field and choose accuracy level **3 - 1908 to 1980**. All new parcels created under this plan inherit the plan accuracy level of 3.

[Learn more about accuracy levels in the parcel fabric](#)

16. Click **OK** on the **Plan Properties** dialog box to create the plan and complete the exercise.

The new plan is listed on the **Plan Directory** dialog box. Close the plan directory.

17. Click **Parcel Editor > Stop Editing** to stop the edit session. Make sure to save your edits.

## Creating feature templates


Before creating a new parcel, you will create a feature template for fabric parcel polygons. Feature templates define all the information required to create a new feature, such as the attributes that are populated with the feature and the layer that the feature is stored in. Feature templates can be added at any time during editing and can be based on existing layer symbology such as parcel line type.

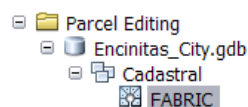
[Learn more about feature templates and the parcel fabric](#)

You will create a feature template for parcels created in the plan Map 9000.

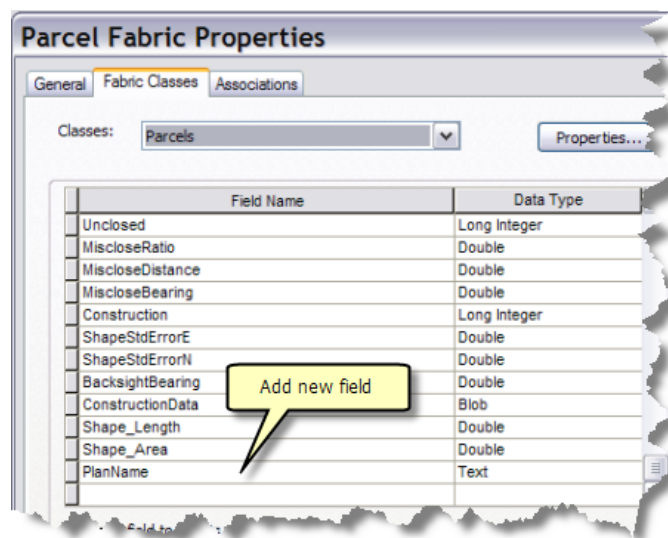
Steps:

Before creating the feature template, you are going to add a new attribute to the fabric parcels table:

1. In ArcMap, click the **Catalog Window** tool  on the **Standard** toolbar to open the Catalog window.
2. In the **Catalog** window, navigate to the location of your tutorial data, right-click the parcel fabric named FABRIC, then click **Properties**.



- On the **Parcel Fabric Properties** dialog box, click the **Fabric Classes** tab and choose **Parcels** from the **Classes** drop-down list.
- On the field list grid, scroll down to the first empty **Field Name** row to type a new field name. Type `PlanName` as the field name and set **Data Type** to **Text**.



- Click **OK** to add the field and close the **Parcel Fabric Properties** dialog box.

**Tip:** New fields can only be added outside an edit session in ArcMap.

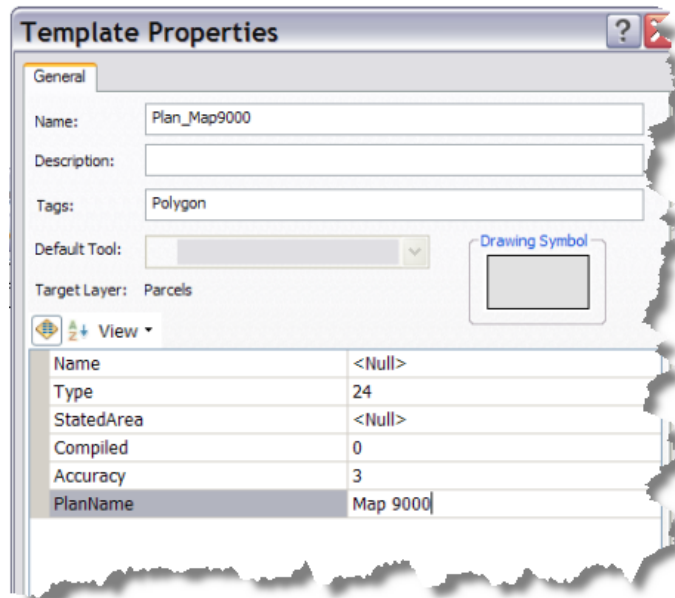
- Close or dock the **Catalog** window.
- Back in ArcMap, click **Parcel Editor > Start Editing** to start an edit session to create the feature template. Close the **Create Features** window.
- In the **Table Of Contents** window, right-click the parcels sublayer, point to **Edit Features**, then click **Organize Feature Templates**.

On the **Organize Feature Templates** dialog box, notice the default template for fabric parcel features. Add a new template for creating fabric parcels in the Map 9000 plan.

- Click the **New Template** command.
- With the Parcels sublayer checked, click **Finish** on the **Create New Templates Wizard** dialog box.

A second template named **Parcels** is added to the list of templates on the **Organize Feature Templates** dialog box.

- Right-click the second Parcels template in the list and click **Properties**.
- On the **Template Properties** dialog box, rename the template `Plan_Map9000`. Type 24 in the **Type** field, type 3 in the **Accuracy** field, and `Map 9000` in the **PlanName** field.



Setting template properties

- Click **OK** to apply the template properties. Close the **Organize Feature Templates** dialog box.

Each time a fabric parcel is created using the Plan\_Map9000 template, its type attribute is set to 24 (which is a Lot parcel for this data), its PlanName attribute is set to Map 9000, and its accuracy category is set to 3. Internally, parcels inherit their accuracy from the plan accuracy as well. You can override the plan accuracy by setting a different accuracy category on the parcel.

- Save the edit session to complete the exercise.

The above exercise is an example of how templates can be used to automate the creation of new fabric features.

## Creating a new parcel in automatic edit mode

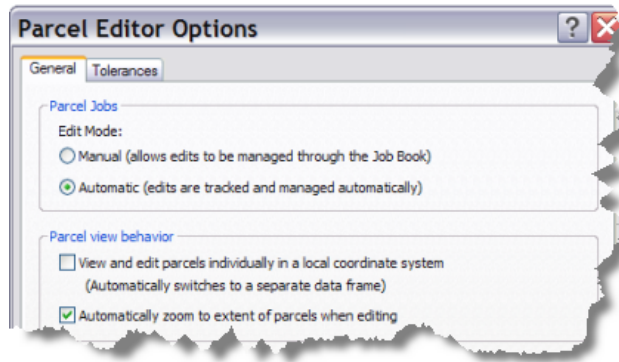
In the parcel fabric, you can either create and edit parcels directly in the map in **automatic edit mode** or create edit parcels in fabric jobs in **manual edit mode**. In this exercise, you will create a new parcel in automatic edit mode.

[Learn more about the parcel fabric editing environment](#)

Steps:


- In ArcMap, click the **Parcel Editor** menu and click **Options** to open the **Parcel Editor Options** dialog box.
- Under **Edit Mode**, make sure **Automatic** is selected.
- Under **Parcel view behavior**, click the **Automatically zoom to extent of parcels when editing** option.

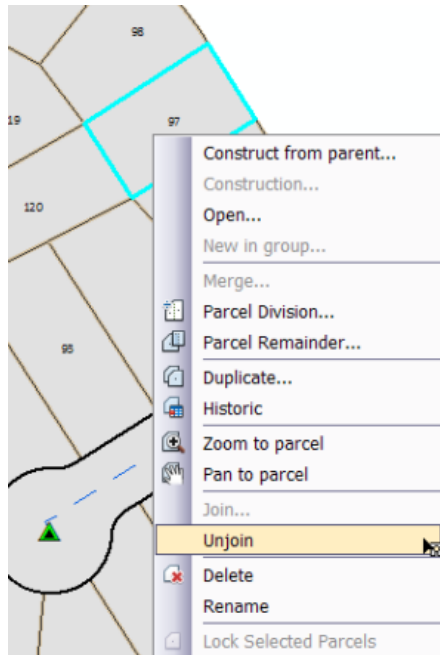
In this exercise, you will create a parcel in the projected map. You also have the option to create and edit parcels in a stand-alone local coordinate data frame. To work in a local coordinate frame, click the **View and edit parcels individually in a local coordinate system** option.



4. Click **OK** to apply your changes and close the **Parcel Editor Options** dialog box.

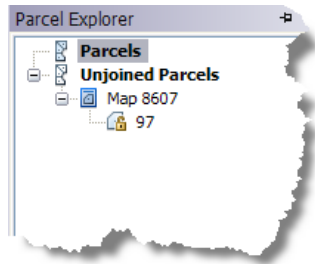
You will create a new parcel and join it to the parcel fabric layer. The parcel that you will create already exists in the tutorial data, so before creating the new parcel, you are going to unjoin the existing parcel from the fabric and delete it.

5. If necessary, start an edit session and close the **Create Features** window.
6. Click the **Select Parcel Features** tool  on the **Parcel Editor** toolbar, right-click parcel 97 in the map, then click **Unjoin**.





Unjoin a parcel.


The **Parcel Explorer** window becomes visible, and the parcel you unjoined is listed under **Unjoined Parcels**.



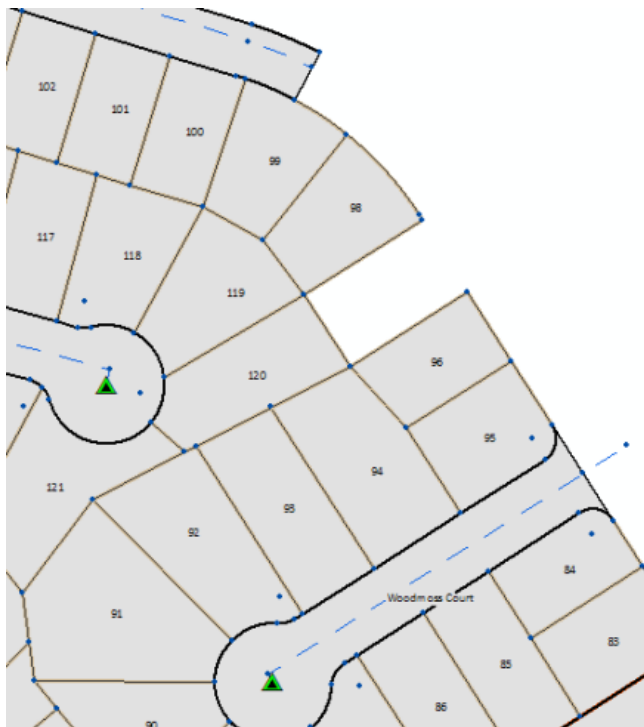
Unjoined parcel

 **Tip:** If the **Parcel Explorer** window is not visible, click the **Parcel Explorer Window** tool  on the **Parcel Editor** toolbar.

You are going to enter a new traverse for parcel 97. You can leave the existing parcel 97 as unjoined. Unjoined parcels are not part of the fabric layer but can be opened at any time and joined back to the parcel fabric at any time.

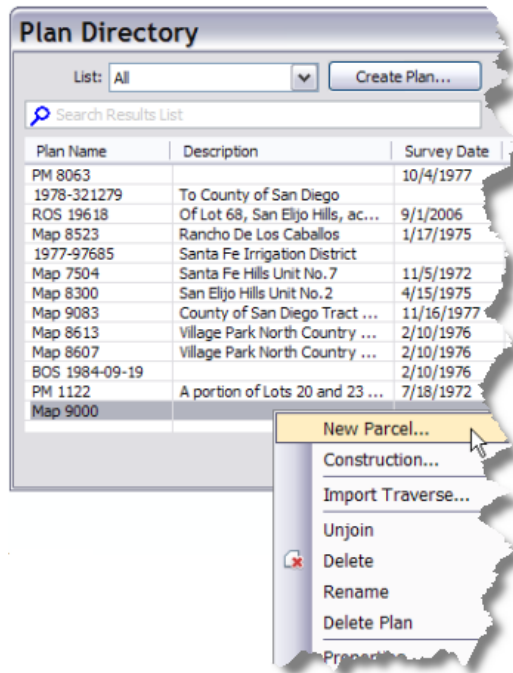
 **Tip:** To delete a parcel instead of unjoining it, right-click the parcel in the map and click **Delete**. You can also delete unjoined parcels by right-clicking the parcel in the **Parcel Explorer** window and clicking **Delete**.

7. Zoom to the area where the new parcel will be added to the fabric layer.




Zoom to the area where the parcel will be added to the fabric layer.



8. Click **Parcel Editor > Plan Directory** to open the **Plan Directory** dialog box.
9. Right-click the plan you created in the exercise above (Map 9000) and click **New Parcel**.



Create a new parcel in a plan.

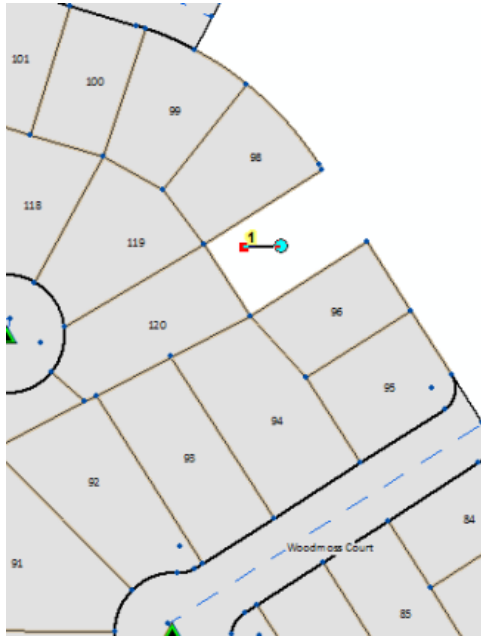
The **Construction** tool becomes available in the map, and the **Parcel Details** dialog box becomes visible.

 **Tip:** If you do not want to work with plans, you can right-click the <map> plan, which is a system default plan. All parcels will simply have <map> as their associated plan.


 **Tip:** If the **Parcel Details** window is not visible, click the **Parcel Details** tool  on the **Parcel Editor** toolbar.

10. Click anywhere in the map to add the starting point of the parcel traverse.





Starting point of traverse

 **Tip:** You can also click an existing point in the map as your starting point. If you snap to existing points in the map, you will still have to join and connect the parcel to the fabric once it's created.

11. On the **Parcel Details** dialog box, make sure the **Properties** tab is active.
12. Click the **Template** button and choose the Plan\_Map9000 template on the **Select Feature Template** dialog box. Click **OK**.

Notice under the **Properties** tab that the Plan\_Map9000 template has the **Type** field set to 24, the **PlanName** field to Map 9000, and the **Accuracy** field to 3 - 1908 to 1980.

13. Type 97 for the parcel Name field.

Parcel Details

Properties Lines

Plan... Map 9000

Template... Plan\_Map9000

Property	Value
Name	97
Type	24
Unclosed	False
Stated Area	
Legal Start Date	
Legal End Date	
Accuracy	3 - 1908 to 1980
Compiled	False
Historical	False
Rotation	
Scale	
Misclose Ratio	
Misclose Distance	
Misclose Bearing	
PlanName	Map 9000

Parcel attributes

14. Click the **Lines** tab on the **Parcel Details** window to begin entering the parcel traverse.
- Templates have been defined for fabric line types in the tutorial data. The lines sublayer was displayed and symbolized by line type, and templates were created for each type so that line symbology could easily be applied to parcel traverse lines in the lines grid.
15. On the **Lines** grid, click the **Template** field and choose the **Frontage** template for the first line in the parcel traverse.
  16. Type 32-30-0-2 (SE quadrant bearing shortcut) in the **Bearing** field and 69.00 in the **Distance** field. Press ENTER to create the first line.

Parcel Details

Properties Lines

Plan... Map 9000

From	Template	Bearing	Distance	Radius	ArcLen...	To	Category	Type
1	Frontage	S32°30'00\"E	69.000			2	Boundary	Frontage
2	Frontage	S32°30'00\"E				0	Boundary	Frontage
	Frontage					0	Boundary	Frontage

Help

First line in parcel traverse

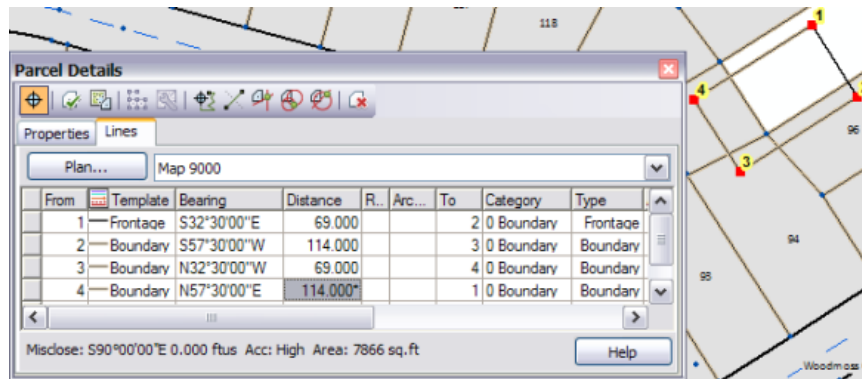


**Tip:** Notice that the from- and to-points are automatically populated for you unless you edit them. If you edit a from- or to-point, you need to make sure to check and edit the remaining from- and to-points in the traverse lines grid.

17. Type a **Bearing** value of 57-30-0-3 (SW) and a **Distance** value of 114.00 for the second traverse line.
18. Type a **Bearing** value of 32-30-0-4 (NW) and a **Distance** value of 69.00.


19. For the last traverse line, type a **Bearing** value of 57-30-0-1 (NW) and a **Distance** value of 114.00\*.

Typing an asterisk ( \* ) after the distance value indicates that this is the last traverse line and that the line's to-point should be the same as the starting from-point of the traverse, which is 1. Once the traverse is closed onto its starting point, misclose information for the traverse is displayed at the bottom of the **Parcel Details** dialog box.



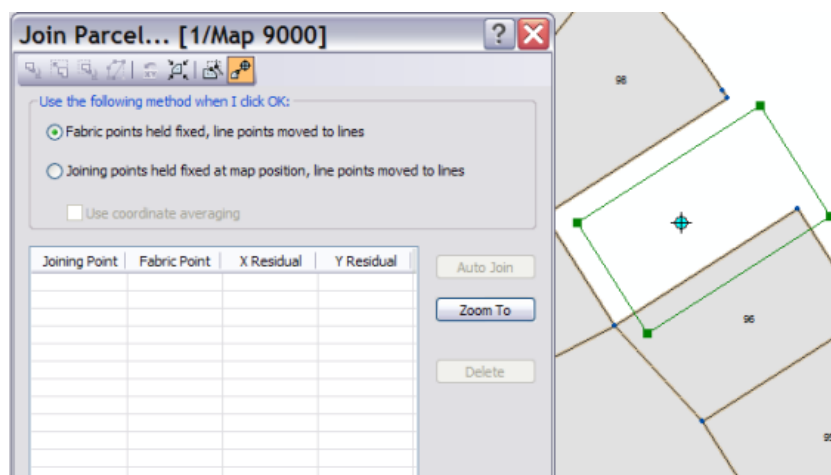
### Parcel traverse in the map

- On the **Parcel Details** dialog box, click the **Keep changes to parcel data and join** command to save the parcel and begin joining the parcel to the fabric.


 **Tip:** You can also click the **Keep changes to parcel data** command to save the parcel as unjoined. In the *Parcel Explorer* window, you can right-click the parcel and click **Join** to join the parcel to the fabric at any time.


Parcel joining is an interactive process where the parcel points of a floating parcel or group of parcels are matched with their corresponding points in the parcel fabric.

21. With the **Join Parcel** dialog box open, drag the new, floating parcel and position it such that join lines can be easily established.

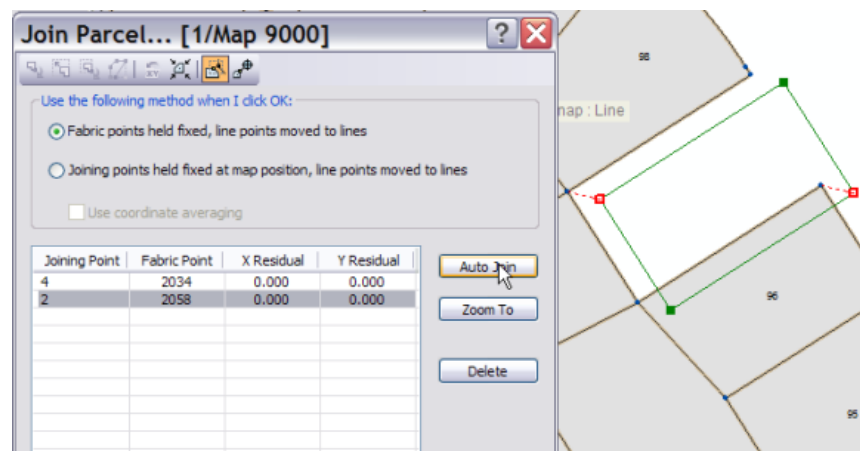


Drag parcel to join position

22. Click the **Create Join Link Using a Dragbox Around a Fabric Point and a Join Point** tool  on the **Join Parcel** dialog box and drag a box around the joining parcel's top left point and the corresponding fabric point to create your first join link.
23. Repeat step 22 to join the joining parcel's bottom right point.

 **Tip:** You can also use the **Construction** tool to manually snap on the joining parcel's point and snap on the corresponding fabric point to create a join link.

24. Click **Auto Join** on the **Join Parcel** dialog box to detect the remaining join lines.




Auto join

Notice that there are join residuals displayed in the **Join Parcel** dialog box.

Join residuals are computed from a transformation between the joining parcel's points and the corresponding points in the parcel fabric. If only two points are joined, a Helmert transformation is used. If more than two points are joined, a least-squares transformation is used. Each time another point is joined, join residuals, scale, and rotation are recalculated.

[Join residuals](#) are an indication of how well the joining parcel fits with the surrounding fabric.

25. Click **OK** on the **Join Parcel** dialog box to complete the join.

 **Tip:** You can click **Close** on the **Join Parcel** dialog box at any time during the join process to cancel the join. The parcel is then saved as unjoined and is listed as an unjoined parcel on the **Parcel Explorer** window.

26. Save the edit session to complete the exercise.


## Creating a new parcel in manual edit mode

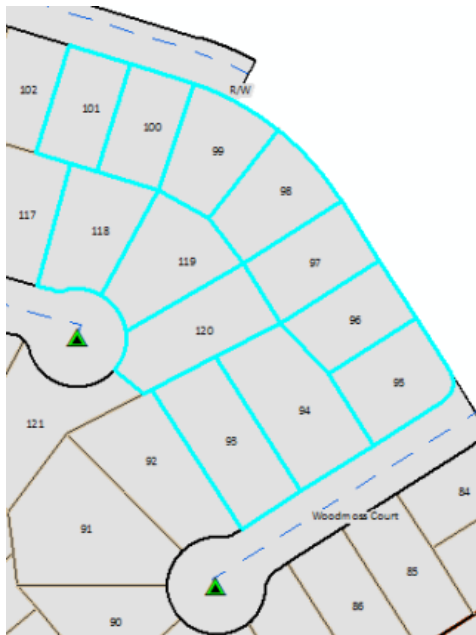
In **manual edit mode**, parcels are created and edited in [fabric jobs](#). Jobs are tracked in the job book and can be saved and reopened at any time. In this exercise, you will create the same parcel that was created in the above exercise, but this time you will work in a fabric job.

Steps:

1. On the **Parcel Editor Options** dialog box, choose the **Manual** edit mode. Leave **View and edit parcels individually in a local coordinate system** unchecked.


You will now create and open a job to enter your new parcel:

2. In an edit session in ArcMap, click the **Select Parcel Features** tool  on the **Parcel Editor** toolbar.
3. Drag a box to select the parcels shown in the graphic below that will be part of the job. When creating a new parcel in a fabric job, the appropriate reference parcels should be added to the job so that the new parcel can be joined to the fabric layer.

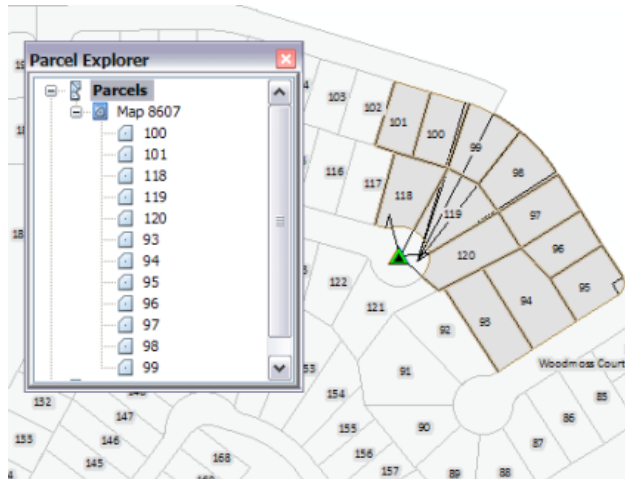


Select parcels to open in a job.


4. Click the **Parcel Editor** menu and click **Modify** to open the parcels in a job.


 **Note:** Job workflow commands, such as **Modify** and **Finish Job**, are available under the **Parcel Editor** menu when the fabric edit mode is set to manual.

The parcels are opened in a fabric job with the selected parcels displayed as active and the surrounding, nonjob parcels dimmed. The **Parcel Explorer** window becomes visible and lists all the parcels in the open job, grouped by their plans.



Parcel Explorer in an open fabric job

 **Tip:** You can also open an empty fabric job. With no parcels selected, click **Parcel Editor > Modify**. You would create an empty fabric job when adding parcels to an empty parcel fabric.


 **Tip:** You can also formally create a job with a name and description by clicking **Parcel Editor > Create Job**. On the **Create New Job** dialog box, you can specify the parcels that will be edited as well as the surrounding reference or job parcels.

### [Learn more about the Create New Job dialog box](#)

Before adding the new parcel, you need to unjoin and delete the existing parcel 97.

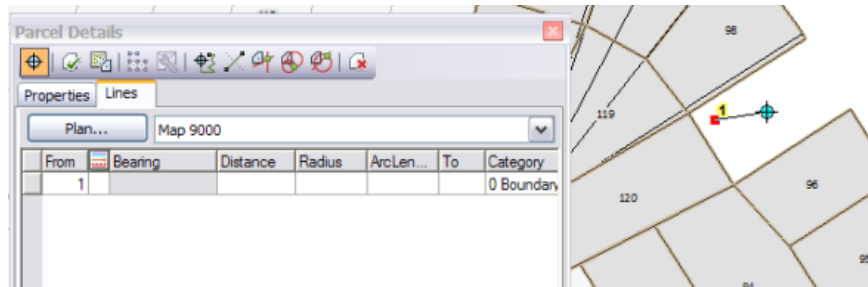
5. Using the **Select Parcel Features** tool , right-click parcel 97 and click **Unjoin**.

The parcel is listed as an unjoined parcel in the **Parcel Explorer** window.

6. Click the **Create A New Parcel In A New Plan** tool  on the **Parcel Editor** toolbar.
7. On the **Parcel Details** dialog box on the **Properties** tab, click the **Plan** button, choose Map 9000 on the **Plan Directory** dialog box, then click **Set as Active Plan**.
8. Click the **Template** button, choose the Plan\_Map9000 template on the **Select Feature Template** dialog box, then click **OK**.

The template is applied to the new parcel.


9. On the **Property Details** dialog box, type 97 as the parcel name.
10. Click in the map to add the starting point of the parcel traverse.



New parcel in a fabric job

11. Follow steps 17 to 25 under the Creating a new parcel in automatic mode exercise to create and join your parcel.
12. Once you have joined your new parcel to the surrounding job parcels, click **Parcel Editor** > **Finish Job** to post your job changes back to the parcel fabric layer.

Once the edit session is saved, the job changes are committed to the geodatabase.

 **Tip:** To reopen the job, click **Parcel Editor** > **Job book** and double-click the job listed on the **Job Book** dialog box.



# Tutorial: Running a fabric least-squares adjustment

This tutorial describes a workflow for a parcel fabric least-squares adjustment. The fabric adjustment uses the stored bearings and distances on the parcel lines, together with the control point coordinates, to obtain a best-fit solution of all the spatial information. In this tutorial, the control points have already been entered and [linked to their corresponding fabric points](#). After the adjustment completes, an adjustment summary is presented. The adjustment summary is used to better understand attribute information on the lines and to identify any problems with the data that may need to be corrected. Once the problems have been fixed, the fabric point data is adjusted. The adjustment is run repeatedly until the maximum displacement in the northings and eastings are close to zero, meaning that the adjustment has converged onto an optimal solution.

**Complexity:**  
Advanced

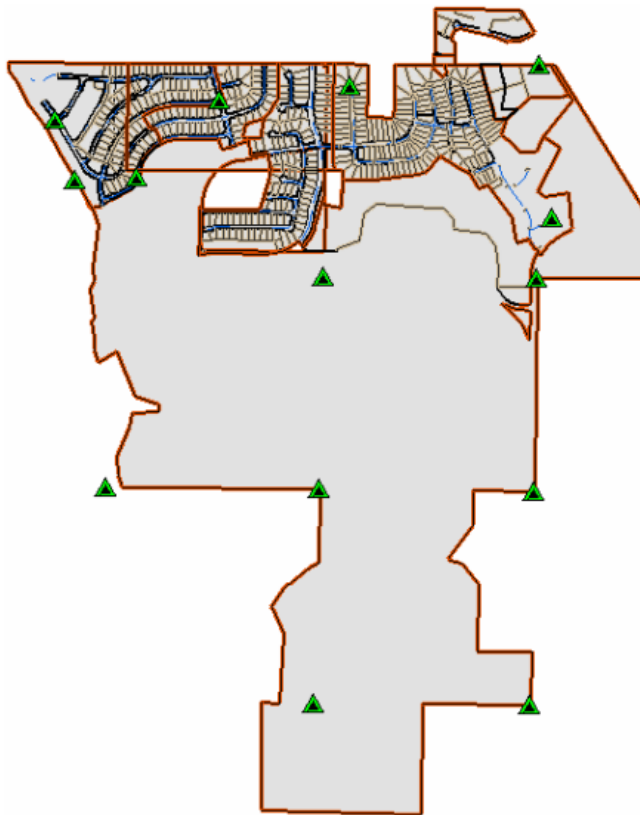
**Data Requirement:**  
ArcGIS Tutorial Data Setup

**Data Path:**  
\\ArcGIS\\ArcTutor\\Parcel Editing

**Goal:**  
Successfully complete a fabric least-squares adjustment

## Steps:

1. Open ArcMap and load the Parcel Editing map document (ParcelEditing.mxd) from your \\ArcTutor\\Parcel Editing\\ folder.
2. Zoom to the fabric adjustment area shown below or click the **Bookmarks** menu and click **Fabric Adjustment Area**.




Fabric adjustment area

3. Click the **Parcel Editor** arrow and click **Start Editing**.

4. Close the **Create Features** window. You will not work with this window in this tutorial.

Before running a fabric adjustment, you will do a check fit of the control network. The check fit process checks how well the parcel network fits with the control network.

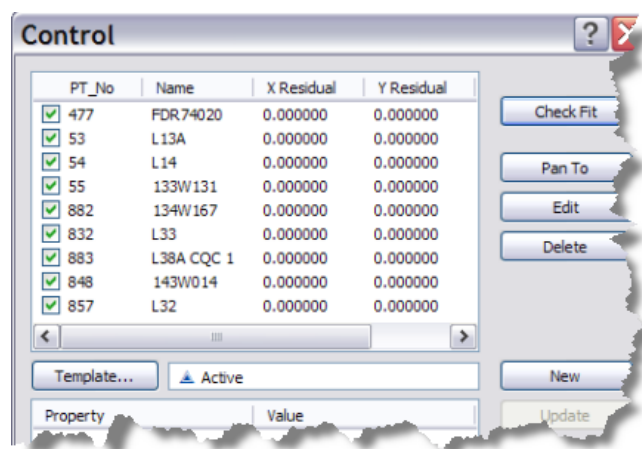
 **Note:** It is always good practice to run a check fit on your control points before running a fabric least-squares adjustment. The check fit residuals indicate how well the parcel network will fit with its control network. Parcel lines are going to have to adjust at least by the amount of the check fit residuals in the least-squares adjustment. Therefore, check fit residuals can be used as a guideline for setting adjustment tolerances on the Adjust Coordinates dialog box. If check fit residuals are large and inconsistent with each other, it makes no sense to run a least-squares adjustment. Parcel lines are going to have to adjust at least by that amount, and the result will be an unstable adjustment. The reasons for the large and inconsistent residuals should be identified first, and the problems should be rectified. In most cases, very large check fit residuals are caused by control points that are linked to the wrong fabric point.

5. Click the **Maintain Control Points** tool  on the **Parcel Editor** toolbar.

All visible control points in the map extent are listed on the **Control** dialog box.

6. Click the **Check Fit** button.


Check fit residuals are displayed next to each control point.

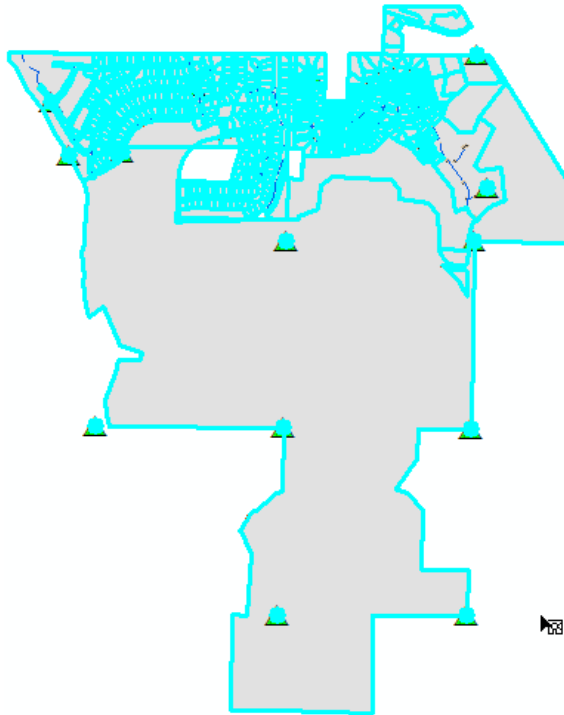


Check fit residuals


Since all residuals are 0, the parcel network fits very well with the control network. Check fit residuals don't need to be 0 to run a fabric adjustment but should be within an acceptable range. In this case, residuals of 2 feet and above would be investigated before a fabric adjustment is run.

7. Close the **Control** dialog box.

8. Click the **Select Parcel Features** tool  on the **Parcel Editor** toolbar and drag a box to select all the parcels in the fabric adjustment area.




Select adjustment parcels

 **Tip:** You don't have to select the control points being used in the adjustment. Control points are automatically detected on selected parcels because they are linked to fabric points.

9. Click the **Parcel Editor** arrow and click **Adjust**.

When first doing an adjustment on a new set of parcel data, the initial step is to use the adjustment summary displayed in the **Least Squares Adjustment Summary** dialog box to understand how good the COGO attributes are and to understand if there are any potential problems in the data that need to be fixed. The adjustment process will compute coordinates that are the best-fit position for all the fabric points; this computation uses all the bearing and distance values on the lines.

 **Note:** The adjustment computation does not alter the original COGO attributes on lines.

The adjustment summary compares the new positions of the parcel lines with the original observed or recorded COGO values and reports the differences between the computed and observed values. These numbers are called residuals, or computed minus observed (c-o) values. Any residuals that are large compared with the check tolerance you specify are outliers, meaning


that they fall outside your expected range. This means that the check tolerance you specify defines your tolerance for outliers in the data. If you choose a higher check tolerance, it means that you are willing to accept larger differences between the adjusted end points of lines and the associated COGO values. The report will only show (c-o) values that are greater than the distance or bearing check tolerance that you specify. Until you get to know the data, you will not know what to use as check tolerances. The approach described in this tutorial shows how to interpret results in the adjustment summary, allowing you to get to know your parcel data and choose appropriate check tolerances for the parcels that you are adjusting.

[Learn more about check tolerances on the Adjust Coordinates dialog box](#)

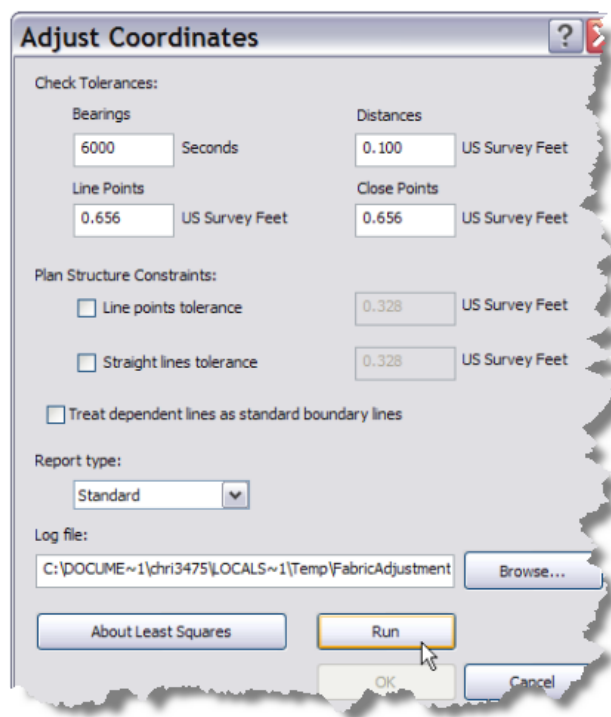
The distance check tolerance is the best tolerance to use when getting to know the parcel record data.

10. On the **Adjust Coordinates** dialog box, change the **Check Tolerance** for **Distances**. Type a value of 0.100 US Survey Feet.

In this example, you start with the assumption that the data is very good, and you expect the adjustment to succeed with all residuals less than 0.3 feet (3 times the distance check tolerance).

 **Note:** A fabric adjustment fails if any residual is greater than three times the bearing or distance check tolerance.

11. Accept all other defaults on the **Adjust Coordinates** dialog box and click **Run**.



Adjust Coordinates dialog box

The **Least Squares Adjustment Summary** dialog box appears and reports that the adjustment fails.

12. Scroll down the report to find the heading **Parcel Lines Report - Difference between Computed and Observed/Recorded (c-o)**.

The screen shot below displays part of the parcel lines report.


```

ROS 6692/ROS 6692 Line: 813-831 Distance(c-o)=0.293
ROS 6692/ROS 6692 Line: 831-832 Distance(c-o)=0.186
ROS 6692/ROS 6692 Line: 837-842 Distance(c-o)=-0.124
ROS 6692/ROS 6692 Line: 848-857 Distance(c-o)=0.267
## ROS 6692/ROS 6692 Line: 857-54 Distance(c-o)=-0.334
## ROS 6692/ROS 6692 Line: 54-860 Distance(c-o)=0.528
ROS 6692/ROS 6692 Line: 861-862 Distance(c-o)=0.117
## LS 269/LS 269 Line: 884-51 Distance(c-o)=0.359
## LS 269/LS 269 Line: 52-885 Distance(c-o)=-0.496
## LS 269/LS 269 Line: 885-884 Distance(c-o)=-0.622
LS 269/LS 269 Line: 884-515 Distance(c-o)=0.128
LS 269/LS 269 Line: 885-874 Distance(c-o)=-0.176
ERROR: Unable to complete adjustment, 5 parcel lines did not adjust within 3x the
specified tolerances.

```

Parcel lines report

Outliers are indicated in the report with a **##** symbol. Note that there are five lines in the report with this symbol, and also that the last line of the report explains that the problem with these lines are that the difference between their recorded distance values and the new computed position exceed three times the tolerance that you specified. In other words, the differences between the computed distances and the recorded distances for these five lines are all greater than 0.30 feet.

 **Note:** The residuals are determined by a preliminary adjustment; none of the points have had their positions changed in the database at this stage.

These five outliers in the lines occur in two parcels, called LS 269 / LS 269 and ROS 6692/ ROS 6692. (These parcels have been stored to represent the plan boundaries, and so the plan name and parcel name are the same. The convention for naming in the report is [parcel name]/[plan name].)

The largest outlier of these five lines is 0.622 feet. This means that for the adjustment to succeed, the **Distances** check tolerance should be at least one-third of this value—in other words, after rounding to two decimals, at least 0.21.

One simple approach to have the adjustment succeed is to increase the check tolerance. However, if the check tolerance required for the adjustment to be successful is very large (10 feet or more), then this is a strong indication of a mistake in the data. In these cases, it is important to check that the values recorded for these reported problem lines match the original record values, as found on the legal description for the parcel.

Notice that there are also two points with the object ID's 876 and 881 that are very close to each other. These two points are listed under the **Close Points Report**. Close points are fabric points that are closer than the specified Close Points tolerance and that do not have a line between them.

```

Close Points Report: Tolerance = 0.656
=====
Points 876 881 are 0.006 apart
1 close points found.

```

Close points report

Close points indicate that it is very likely the points should be the same point, that there is a topological inconsistency, and that these points should be merged. It is important to merge close points, because by doing so you are increasing the **redundancy** in the network; this is good for helping the adjustment succeed. For example, if there are two points close together that each have two lines defining their positions, you can merge the points and increase the redundancy by having four lines defining the position of just one point.

The least-squares adjustment summary has provided you with information about the actions needed to make this adjustment successful: first, to increase the check tolerance, and second, to merge some close points. It is important to note that increasing the check tolerance to 0.21 feet will make this adjustment succeed for this particular set of parcel data. However, after the points are merged, the data will have been changed, and different adjustment summary results will be expected. A good rule of thumb, if the previous adjustment was not successful, is to use three times the previously used value. In this case, use 0.3 feet. First, however, the close points need to be merged.

The fabric is not editable when the **Least Squares Adjustment Summary** dialog box is open; however, the information in the adjustment summary is also available in the results file.

13. Click the **Results File** button to access the results file of the adjustment summary.

The default text editor on your system opens the complete adjustment report for this adjustment.

```


FABRICADJUSTMENTREPORT.TMP - Notepad
File Edit Format View Help
<Company Name> Adjustment of Parcels Page:
Parcel Editor C:\DOCUME~1\chr13475\LOCALS~1\Temp\FabricAdjustmentRe04-Apr-11
ADJUSTMENT FAILED


Close Points Report: Tolerance = 0.656
=====
Points 876 881 are 0.006 apart
1 close points found.


Linepoints Report: Tolerance = 0.656
=====
0 Linepoints found outside of the Check Tolerance

Parcel Lines Report - Difference between Computed and Observed/Recorded (c-o)
=====
Map 7670/Map 7670 Line: 52-53 Distance(c-o)=0.158
326/Map 7473 Line: 703-699 Distance(c-o)=0.104
330/Map 7473 Line: 804-805 Distance(c-o)=0.111
330/Map 7473 Line: 806-807 Distance(c-o)=-0.106
POR RW/Map 7473 Line: 666-778 Distance(c-o)=0.135
327/Map 7473 Line: 699-703 Distance(c-o)=0.104
327/Map 7473 Line: 703-665 Distance(c-o)=0.106
327/Map 7473 Line: 665-664 Distance(c-o)=0.137
328/Map 7473 Line: 664-665 Distance(c-o)=0.137
ROS 6692/ROS 6692 Line: 813-831 Distance(c-o)=0.293
ROS 6692/ROS 6692 Line: 831-832 Distance(c-o)=0.186
ROS 6692/ROS 6692 Line: 837-842 Distance(c-o)=-0.124
ROS 6692/ROS 6692 Line: 848-857 Distance(c-o)=0.267
## ROS 6692/ROS 6692 Line: 857-54 Distance(c-o)=-0.334
## ROS 6692/ROS 6692 Line: 54-860 Distance(c-o)=0.528
ROS 6692/ROS 6692 Line: 861-862 Distance(c-o)=0.117
## LS 269/LS 269 Line: 884-51 Distance(c-o)=0.359
# LS 269/LS 269 Line: 51-884 Distance(c-o)=-0.496
  
```

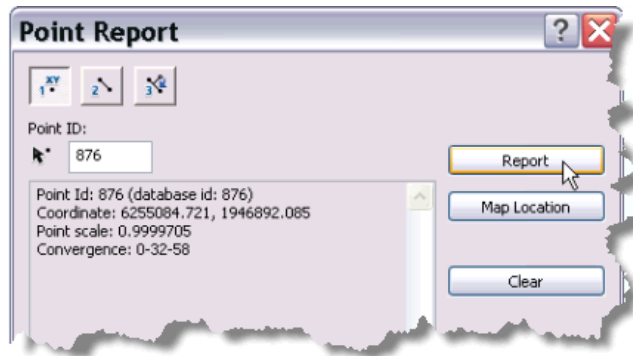
Adjustment summary results file

14. Click **Cancel** to close the **Least Squares Adjustment Summary** dialog box.
15. Click **Cancel** to close the **Adjust Coordinates** dialog box.
16. Using the **Select Parcel Features** tool  and drag an empty box on the map display to clear the selection of the parcels that were adjusted.

You will now merge the close points. To locate the points, you will use the point reporting tool  located on the **Parcel Editor** toolbar.

17. Click the **Point Reporting on 1,2 or 3 Points** tool  located on the **Parcel Editor** toolbar.
18. If necessary, move the **Point Report** dialog box such that all the adjustment parcels are visible.
19. On the **Point Report** dialog box, click the one point button and type 876 in the **Point ID** text box.
20. Click the **Report** button.

Coordinate information, point scale, and convergence are displayed for the point.



Point reporting on one point

[Learn more about the point reporting tool](#)

21. Click the **Map Location** button.

The map is panned to center on the point that is reported, and the point location flashes briefly in the map.

22. In the **Table Of Contents** window, right-click the points sublayer and click **Label Features** to turn on point ID labels for the points.
23. With the **Point Report** dialog box open, click the **Zoom In** tool located on the **Tools** toolbar and drag a box to zoom to the location of point ID 876.

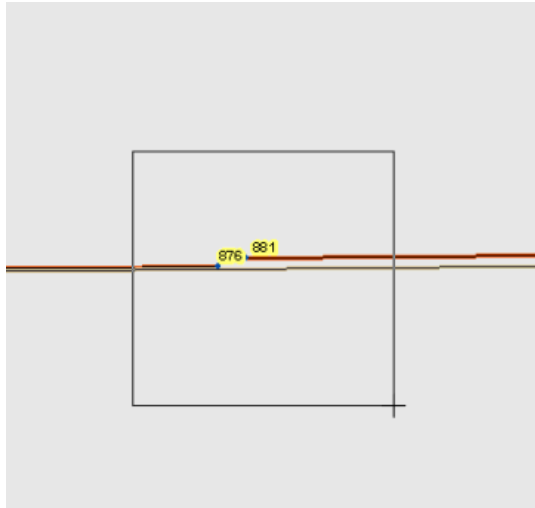
You will need to zoom in several times to locate the point. As you zoom in to the point, you may need to click the **Map Location** button several times to get an idea of where the point is in the map.



Close points displayed in the map



24. Close the **Point Report** dialog box.
25. Click the **Merges Unconnected Points Inside a Given Rectangle** tool  located on the **Parcel Editor** toolbar.
26. Drag a box around the close points.




Merge points

27. Click **OK** on the **Mean Points** dialog box to accept the default mean point tolerance.  
The points are meaned (averaged) and merged into a single point.



Merged point

28. Close the adjustment results file.
29. Zoom back to the extent of the adjustment parcels. Click the **Bookmarks** menu and click **Fabric Adjustment Area**.
30. Open the job book. Click the **Parcel Editor** arrow and click **Job Book**.  
Notice that there is a job with a "Mean Points" description. Each edit is tracked automatically in the job book, and the job book provides an audit of edits on the fabric.
31. Close the job book.
32. Click the **Select Parcel Features** tool  on the **Parcel Editor** toolbar and drag a box to select all the parcels in the fabric adjustment area as you did in step 6.
33. Click **Parcel Editor > Adjust**.

Since the adjustment data has been edited by the merging of two points, you should expect the behavior and results for the adjustment summary to be slightly different. It was previously determined that a distance tolerance of 0.21 feet should be used for the adjustment to succeed. To be assured that the adjustment succeeds, you will use three times the previously used number, and use 0.3 as the tolerance.

34. Type 0.3 for the **Distances** check tolerance on the **Adjust Coordinates** dialog box.

The **Adjust Coordinates** dialog box has the following settings:

- Check Tolerances:**
  - Bearings:** 6000 Seconds
  - Distances:** 0.300 US Survey Feet
  - Line Points:** 0.656 US Survey Feet
  - Close Points:** 0.656 US Survey Feet
- Plan Structure Constraints:**
  - ☐ Line points tolerance: 0.328 US Survey Feet

Change the Distances check tolerance.

35. Click **Run**.

The adjustment completes successfully. Notice that there is now information displayed about the maximum shift of the adjustment.

The **Least Squares Adjustment Summary** dialog box displays the following information:

- ADJUSTMENT COMPLETED**
- Adjustment Settings:**
  - Linear Units: Foot\_US
  - Coordinate System: NAD\_1983\_StatePlane\_California\_VI\_FIPS\_0406\_Feet
  - Check Tolerances:
    - Bearings: 1°40'00"
    - Distances: 0.30
  - Dependent lines: No
  - Historical Data: Yes
  - Fixed Boundary: No
  - Results File: C:\DOCUME~1\chri3475\LOCALS~1\Temp\FabricAdjustmentReport.lst
- Adjustment Statistical Summary:**
  - Number of Control Points = 9
  - Number of Parcels = 426
  - Number of Points = 1464
  - Number of Bearings = 4409
  - Number of Distances = 3633
  - Number of Unknowns = 3336
  - Redundancy = 4706
  - Bearings Exceeding Tolerance = 0
  - Distances Exceeding Tolerance = 5
  - Close Points Found = 0
  - Line Point Errors Found = 0
- Maximum shift information:**
  - Max. coordinate shift: Easting = -0.055, Northing = 0.139 at point 884
  - Average coordinate shift: Easting = 0.010, Northing = -0.000
  - Mean (average) of coordinate residuals = 0.00

Annotations in the image highlight:

- Largest coordinate shift in the adjustment:** Points to the maximum shift summary box.
- Point with the largest shift:** Points to the text "at point 884" in the maximum shift summary.

Maximum shift

Maximum shift, which is the largest coordinate shift in the adjustment, is displayed above the **Accept** button for quick access. The same maximum shift information is displayed in the adjustment summary with the point ID. In this adjustment, the point with an ID of 884 moved more

than any other point in the adjustment and had a shift in easting of -0.55 feet and a shift in northing of 0.139 feet.

In the fabric least-squares adjustment, the goal is rerun or iterate the adjustment until the points are no longer changing and the maximum shift becomes 0.00 feet for both easting and northing. The fabric adjustment needs to be manually iterated—iteration is not automatic.

36. Click **Accept** on the **Least Squares Adjustment Summary** dialog box.
37. On the **Adjust Coordinates** dialog box, click **Run** to perform the second iteration of the adjustment.

Notice that the maximum shift is now at point ID 1018, and it has moved less than one hundredth of a foot.

Max. coordinate shift: Easting = -0.004, Northing = -0.002 at point 1018  
Average coordinate shift: Easting = -0.002, Northing = -0.000

Maximum shift

Since the shift value approached closer to zero after the second adjustment, the fabric adjustment is converging. If the shift values become higher after the first iteration, this indicates that the adjustment is diverging. A diverging solution happens when one of two things has occurred:


- a. There is a large blunder in the dataset, and no solution is possible until the blunder is corrected.
- b. The best solution for the given dataset has already been reached, and the solution converges only to diverge on the next iteration. This occurs when 0.00 easting and 0.00 northing convergence is too stringent for the quality and precision of the dataset.

If the data is good quality and there are no major blunders, a fabric least-squares adjustment will usually converge after three iterations.

38. Click **Accept** and run the adjustment for the third iteration.

The maximum shift of 0.001 easting and 0.000 northing shows that the adjustment has converged.

39. Click **Accept** for the third time on the **Least Squares Adjustment Summary** dialog box and click **OK**.
40. Click **OK** on the **Adjust Coordinates** dialog box to apply and complete the adjustment.
41. Click **Parcel Editor > Save Edits** to save the edit session and complete the tutorial.

 **Tip:** Once a fabric adjustment has converged, you can run the adjustment one more time to perform the postprocessing options under **Plan Structure Constraints** on the **Adjust Coordinates** dialog box. An adjustment should be converged first; plan structure constraints are performed afterwards.