ArcGIS® 9

Using Maplex for ArcGIS

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Maplex Tutorial

A good way to learn how to use ESRI® Maplex for ArcGIS® is to work through the process of labeling a map and storing labels permanently as annotation. This tutorial introduces you to some labeling techniques in the context of mapping land parcels and streets.

In this tutorial you will use Maplex for ArcGIS to:

• Place labels for polygon features.

• Place labels for line features.

• Improve label placements for street features.

• Export labels to annotation in a geodatabase feature class.

• Manually place unplaced annotation.

• Edit annotation.

The exercises in this tutorial use the tutorial data distributed with Maplex for ArcGIS. The default install location of the data is C:\ArcGIS\ArcTutor\Maplex. The exercises require that you have write access to this data. If you don't have write access, copy the data to a location for which you have write access.

Labeling with Maplex for ArcGIS

Imagine that you work for a small city and you need to make a map for the assessor. This map must have parcels labeled with a two-part parcel number, lot lines labeled with their length, and streets labeled with their street names. You've almost finished the map, but the labels aren't quite right. Now you are going to use the Maplex for ArcGIS extension to complete the labeling, and export the labels as annotation so they can be reused by other departments in the city.

Starting ArcMap and opening the Parcels map

The first step to improve the labels on your map is to start ArcMap™ and turn on the Maplex for ArcGIS extension.

1. Click the Start button on the Windows taskbar, point to Programs, point to ArcGIS, and click ArcMap.
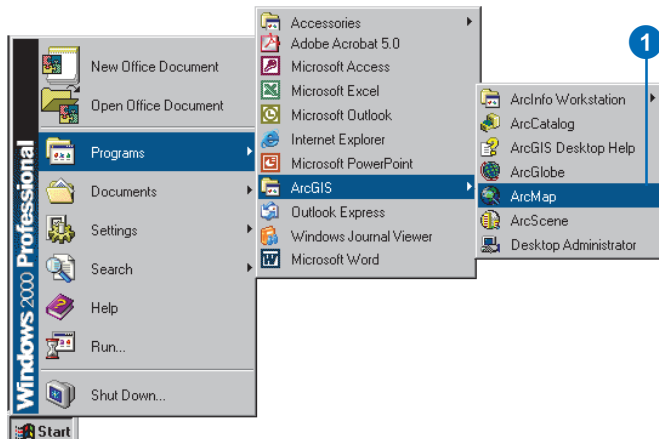
2. If ArcMap starts with a map selection dialog box, click the An existing map button. If it does not, skip to step 4.

3. Double-click Browse for maps. Skip to step 5.
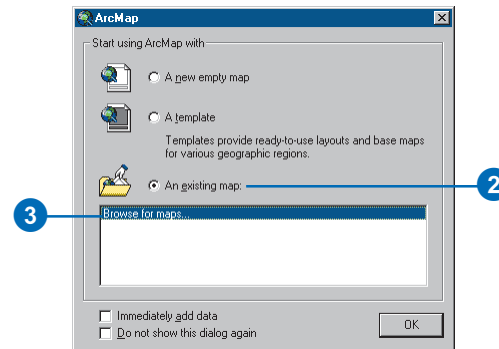
4. If the map selection dialog box does not open when ArcMap starts, click File on the main menu and click Open.

5. In the Open dialog box, click the dropdown arrow and navigate to the drive where you installed the tutorial data. The default installation path is C:\ArcGIS\ArcTutor\Maplex.

6. Double-click Parcels.mxd.

The Parcels map opens. This map contains several layers in a data frame named Parcel Map. Two of the layers, Streets and Parcels, have been labeled and have *label expressions* already built for them. You will 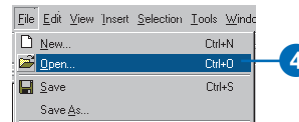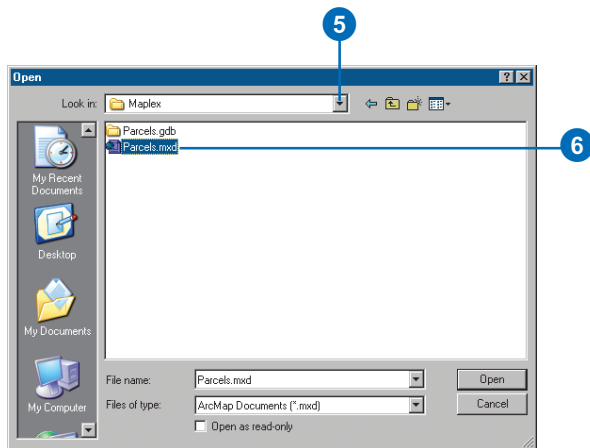improve the way their labels are drawn on the map. Another layer, Parcel Boundaries, is not currently labeled. You will add labels for this layer.

Enabling Maplex for ArcGIS

Before you can use Maplex for ArcGIS, you must enable the extension and set the Maplex Label Engine as the label engine for the data frame.

1. Click Tools and click Extensions.
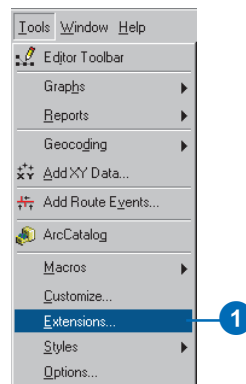
The Extensions dialog box appears.

2. Check Maplex to enable the extension.

3. Click Close.

Now that the extension is turned on, you can switch from the default label engine to the ESRI Maplex Label Engine.

4. Click View and click Data Frame Properties.

The Data Frame Properties dialog box appears.

5. Click the General tab.

This map has a reference scale of 1:5,000. This means that, regardless of the current map scale, the feature and font symbol sizes drawn onscreen are scaled relative to their size at 1:5,000 scale. Zooming out makes the symbols and fonts appear smaller, and zooming in
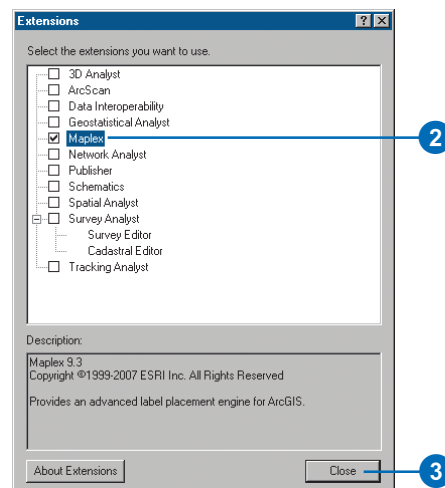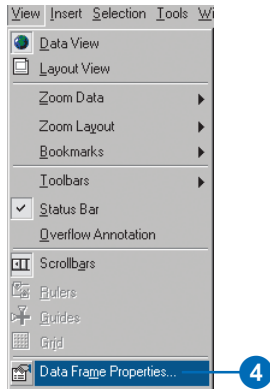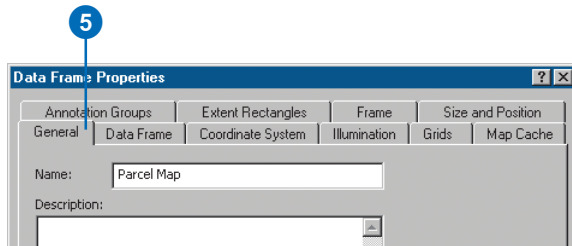
makes them appear larger. When you are making a map that will be printed at a particular scale, it is a good idea to set the reference scale before you begin labeling the map. Otherwise, you will not have a clear idea how the map labels will appear when the map is printed; more labels will appear on the map when you are zoomed in and fewer when you are zoomed out. With a reference scale, labels behave more like annotation.
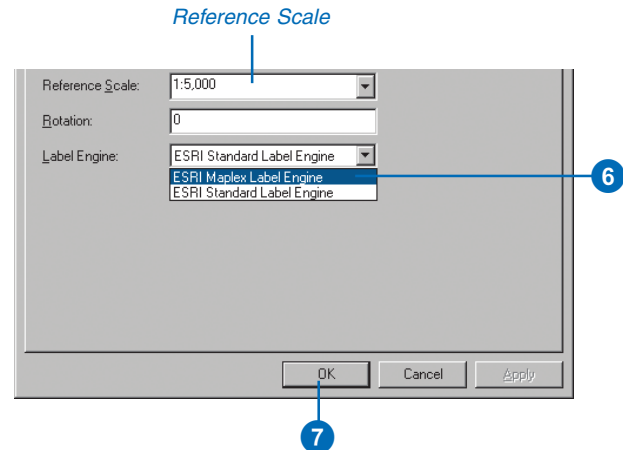
6. Click the Label Engine drop-down arrow and click ESRI Maplex Label Engine.

7. Click OK.

The Maplex Label Engine will automatically start to recalculate the placement of the map's existing labels. Some of the labels that were previously visible may disappear, and the formatting of others may change. You will adjust the label placement settings later to ensure that all of the labels will be placed and formatted to suit your map design.

Adding the Labeling toolbar

Maplex for ArcGIS adds some tools to the Labeling toolbar. Now you'll add the Labeling toolbar to ArcMap.
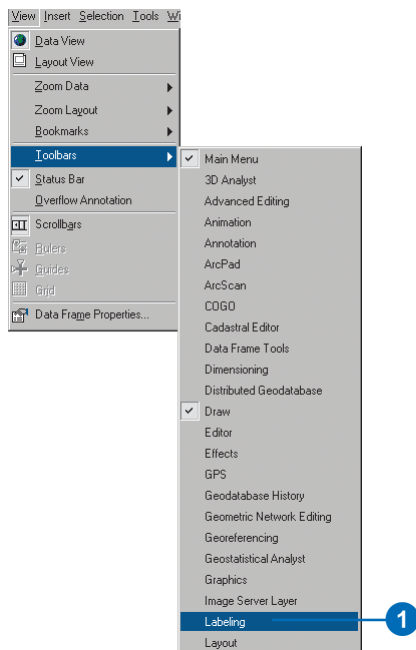
1. Click View, point to Toolbars, and click Labeling.

Because the Maplex for ArcGIS extension has been installed, the Labeling toolbar includes the Placement Quality dropdown list, and the Labeling menu has some new items. These additional controls are active because you turned on Maplex for ArcGIS in the Extensions dialog box. You can dock the toolbar to the ArcMap window, or you can leave it floating.
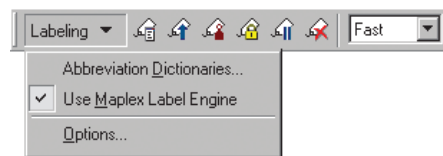
The tools on the Labeling toolbar are:

Abbreviation Dictionaries—Lets you specify how words in labels are abbreviated.

Use Maplex Label Engine—Lets you switch the Maplex Label Engine on or off for the active data frame.

Options—Lets you set basic and advanced Maplex Label Engine options for the active data frame.

Label Manager button—Lets you control all of the label classes in your map from a single dialog box.

Label Priority Ranking button—Lets you control the order in which label classes are placed. More of the labels from higher priority classes are usually placed.

Label Weight Ranking button—Lets you control the relative importance of features as barriers to label placement.

Lock Labels button—Locks the labels displayed in the current extent. This allows you to navigate around a map without having to wait for the label placements to be recalculated each time you pan or zoom.

View Unplaced Labels button—Shows the labels that could not be placed in a different color (the default color is red).

Pause Labeling button—Lets you suspend the drawing of labels while you continue to work with your data.

Placement Quality dropdown list—"Fast" allows you to place labels quickly using a simple calculation. "Best" uses a more complex calculation and takes longer.

Reviewing the labeling requirements for the map

Next you'll use Maplex for ArcGIS to label the features on your map to meet the assessor's specifications.

Two pieces of information, a serial number and a parcel number, must be displayed on the map for each parcel. This information is stored in two different fields of the parcel attribute table, and for labeling purposes they are concatenated together using a simple label expression. Since all of the information is numeric, the parts of the label should be stacked so that each number is placed on its own line where it can be clearly identified. When you switched to the ESRI Maplex Label Engine, many of the labels were stacked in order to fit them on the map. You will change the labeling options so that all of the labels will be stacked.

To avoid ambiguity about which labels belong to which parcels, the labels must fit within the parcels. The assessor's office works with printed maps at 1:5,000 scale. This map already has a reference scale set to 1:5,000, so fonts and symbols on the map are drawn so that their size would be correct when printed at 1:5,000. Many of the parcels are too small when represented at this scale to contain the labels at their current font size. To allow labels for these parcels to be placed, you will allow the Maplex label engine to reduce the font size of labels, when necessary, to fit them in the parcels.

The perimeters of the parcel polygons must be labeled with the length of the parcel boundaries. To make these labels easily legible, the text should be aligned with and slightly offset from the line symbol.

The streets are currently labeled with their street names. Because each street is represented by multiple street features, some of the streets have too many labels. This is a common problem with street labels. You'll improve the street labeling by identifying these line features as streets for the Maplex Label Engine, which will then consider all street segments of the same name to be one feature for labeling purposes.
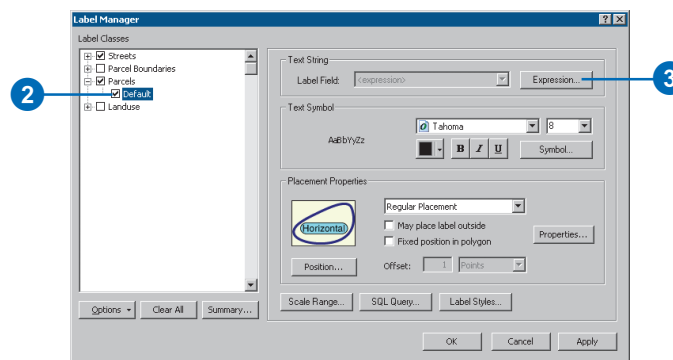
Viewing the Parcels layer label expression

You'll begin by making the Parcels layer match the assessor's specifications.

1. Click Label Manager on the labeling toolbar to open the Label Manager dialog box.

2. Click the default labels class under the Parcels layer.

The check box next to the Parcels layer is checked, as the layer was saved with labeling turned on. If you were starting to label a new layer, you would need to check this box.

The label placement method is set to label all the features the same way. In this exercise, you will use this method of labeling the layer. It is also possible to define classes of features within a layer and label them in different ways. See the ArcGIS desktop help for more information on setting up multiple label classes for a layer.

3. Click Expression.

This layer already has a label expression that concatenates the values of two numeric fields, SERIAL_NUM and NUMBER_, with a space character between them to produce the labels for the parcel polygons.

4. Click OK.

4
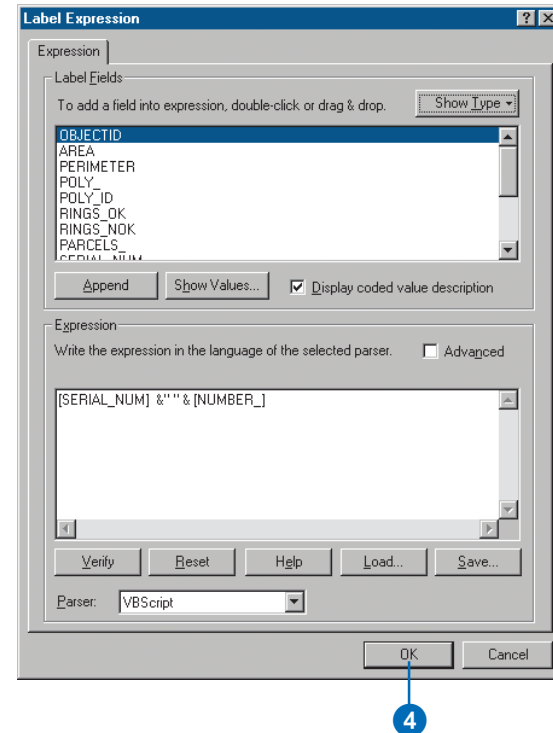
In the next task, you will use the space character between the quotation marks to split and stack the labels.

Stacking all of the parcel labels

Your map requirements state that, in addition to being separated by a space, the two parts of the parcel labels should be stacked. When you switched to the ESRI Maplex Label Engine, many of the labels were stacked to make them fit within the parcels, though the labels in larger parcels may not have been stacked. Now you will force all of the labels to be split and stacked at the space character.

1. Click Properties.
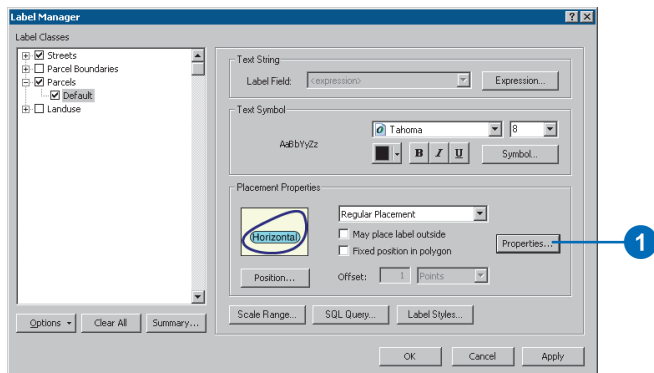
The Placement Properties dialog box appears. This dialog box has three tabs that vary in appearance depending on whether you are labeling a point, line, or polygon layer. These tabs allow you to control how the ESRI Maplex Label Engine places labels.

2. Click the Fitting Strategy tab.
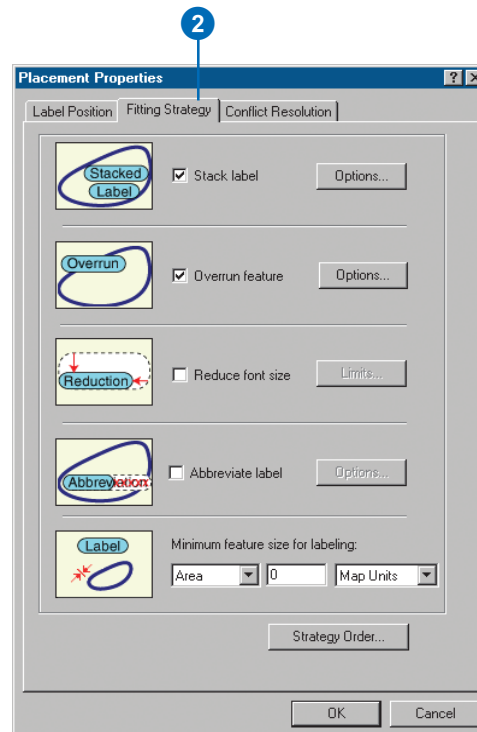
Note that the first label fitting strategy on this list, Stack label, is checked by default. This means that the ESRI Maplex Label Engine will try to make labels more compact by splitting and stacking them on two or more lines when space is an issue.

3. Click Options to change the label stacking options.
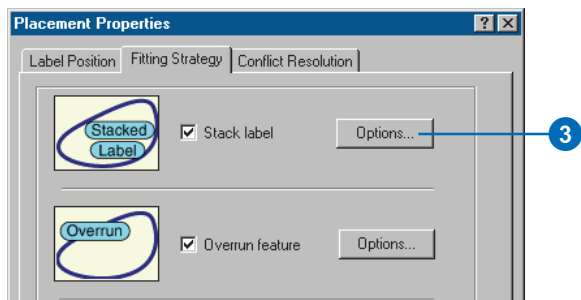
The Label Stacking Options dialog box appears.

This dialog box allows you to control how the stacked lines within the label are justified, what characters will be used to split lines, where the split should occur relative to the stacking characters, and whether or not the stacking characters should be visible in the label. It also allows you control whether stacking occurs only when space is an issue or whenever a stacking character is encountered in the label. Finally, it allows you to control the overall shape of the stacked label by specifying the number of lines and the minimum and maximum number of characters per line in the label.

The Stacking Separator table shows all of the stacking characters that Maplex will use to split and stack labels. By default, three characters—a space, a comma, and a hyphen—may be used to split a label. The list of Stacking Separators can be changed by adding to and removing from the table. You can specify for each character in the list whether it will always split a label by checking Forced split.

Space is the first stacking character in the default list, and it is the one that you want to use to split and stack the parcel labels.

4. Check Forced split.
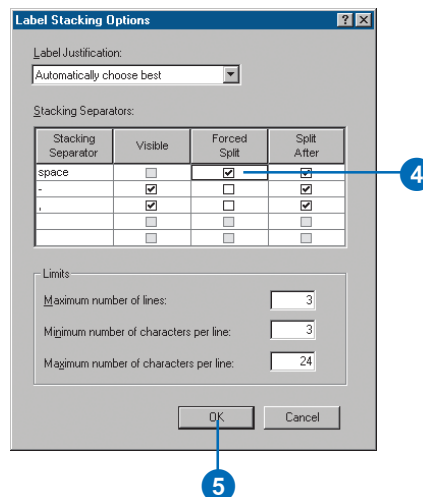
All labels will be automatically split and stacked at the space character.

5. Click OK.

If a label contains either of the other two stacking characters, it might also be split at those characters if it made the label or its neighbors easier to place.

You've set the labels to fit the first of the assessor's specifications. In the next step, you'll make sure that all the labels fit within their own parcels.

Making all parcel labels fit within parcels

Many of the parcel labels fit inside the parcels at the moment, but some don't quite fit. The parcels map specification requires that all parcel labels fit within the parcels, so you'll set Maplex to force the labels to fit.
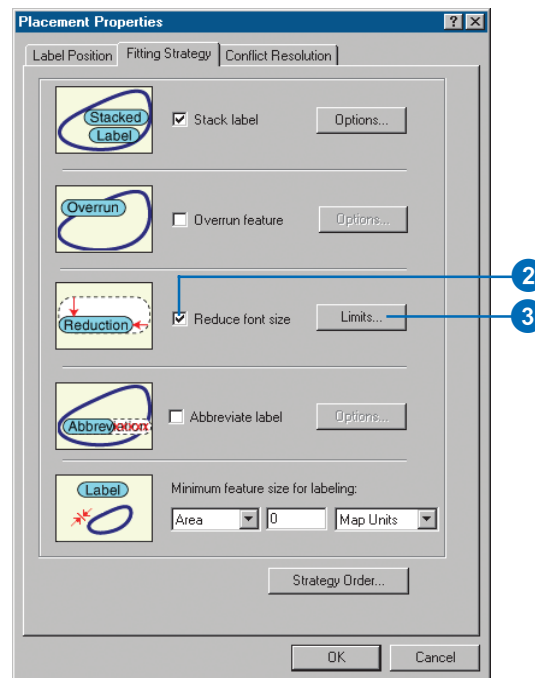
1. Uncheck Overrun feature.
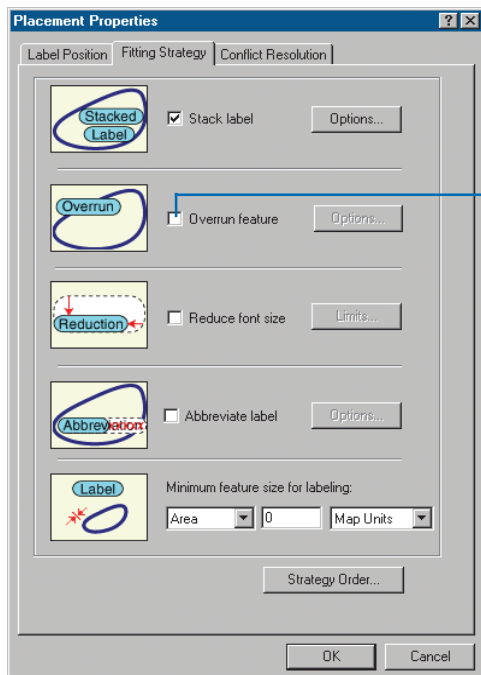
Labels may no longer overrun the boundary of polygons. However, this creates a new problem: some of the labels are larger than the polygons at the 1:5,000 map scale. Now that they cannot overrun the polygons,

these labels will not be placed. To place them, you'll need to allow the Maplex Label Engine to reduce their size.

2. Check Reduce font size.

3. Click Limits.

The current font size is displayed at the top of the Label Reduction dialog box. In this case it is 8 points. You'll allow the font size to be reduced by three points, to 5 points, in increments of one-half of a point. You'll also allow the width of the font to be compressed to three-quarters of its original width.

4. Type "5" in the Lower Limit text box, under Font Size Reduction.
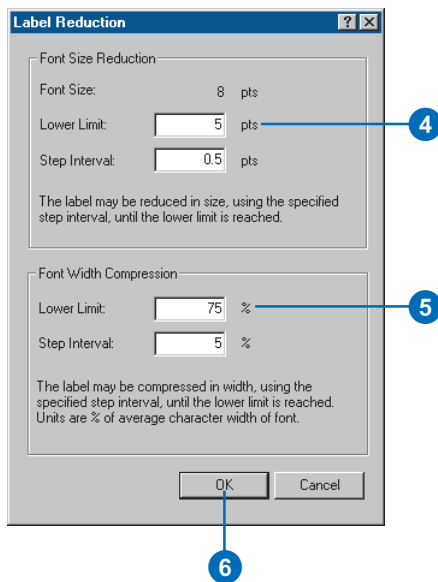
5. Type "75" in the Lower Limit text box for Font Width Compression.

6. Click OK.

The labels will be placed inside the parcels and reduced slightly in size when space is an issue.

Setting the priority weighting of the parcels and labels

Maplex for ArcGIS first places labels in empty areas on the map. Sometimes, due to space constraints, labels must overlap features. You can control which labels have placement priority and how labels may overlap features by setting weights.

1. Click the Conflict Resolution tab.
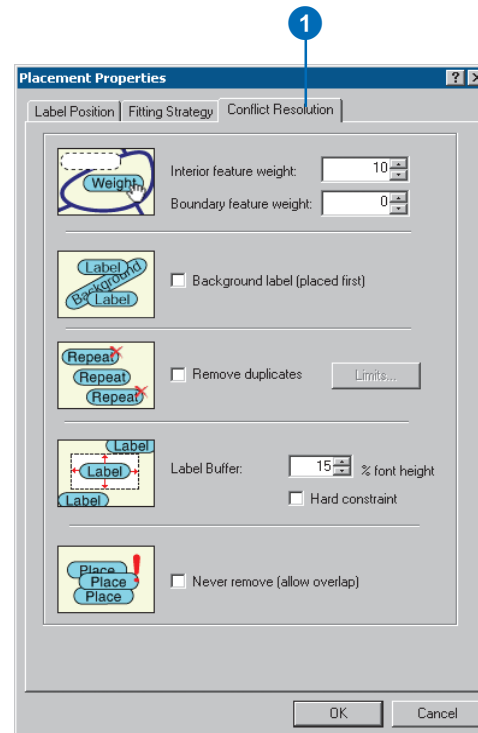
2. Type "0" for the Interior feature weight text box.
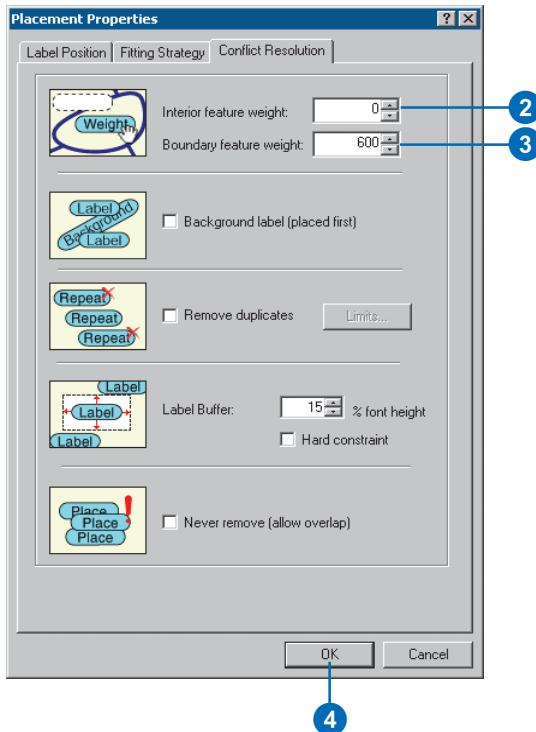
A weight of zero means that the map space used by that feature or label can still be regarded as available for other map labels or features.

3. Type "600" for the Boundary feature weight.

A label or feature with a weight of one thousand may not be overlapped. A weight of 600 is an intermediate value that will tend to prevent labels from overlapping

the parcel boundaries. If a feature or label must be overlapped by a label, Maplex will choose to overlap the feature or label with the lower weight.
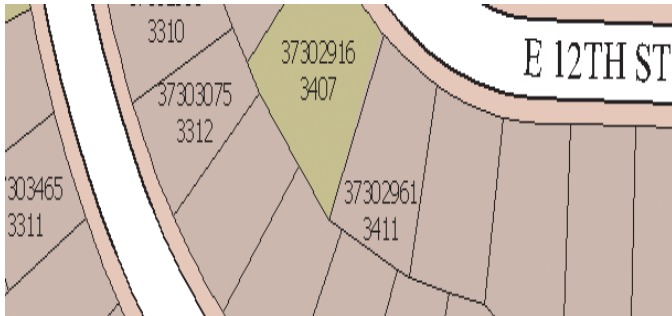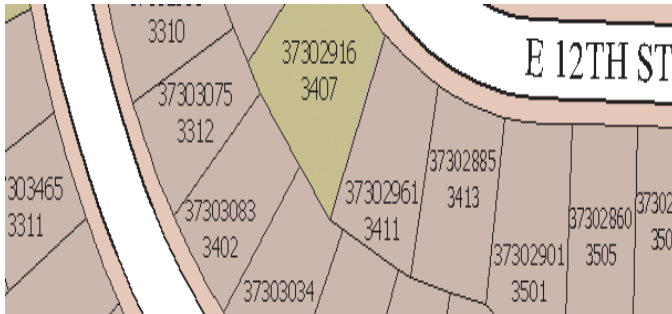
4. Click OK.

5. Click OK.
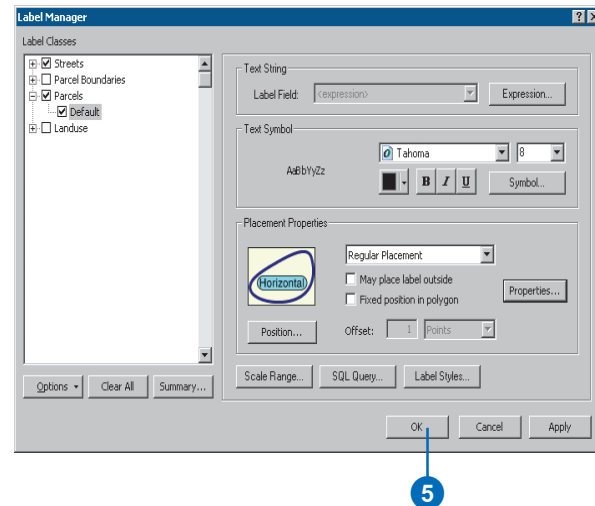
The map labels will be recalculated by Maplex for ArcGIS according to the new rules you have applied to the Parcels layer.

Take a moment to compare the labeling results from before and after you made these changes.

Before the changes you made, many labels were unplaced because of conflicts with features or other labels.

After you enabled font size reduction and font width compression, more labels could be fit onto the map without space conflicts.

You've met the assessor's map specification for labeling the parcels. In the next section, you'll work on labeling the lot lines.
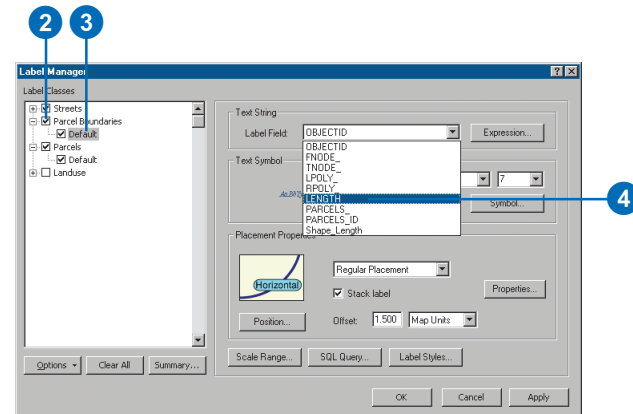
Labeling the parcel boundaries

The lot lines between the parcels are stored in a separate line feature class. One of the requirements for the map is that these lines must be labeled with their length. In this section, you will label the parcel boundaries.

1. Click Label Manager on the Labeling toolbar to open the Label Manager dialog box.

2. Check the box next to the Parcel Boundaries layer to turn on labeling for this layer.

3. Click the default label class under the Parcel Boundaries layer.

4. Click the Label Field drop-down arrow and click LENGTH so the parcel lines will be labeled with the right attribute.

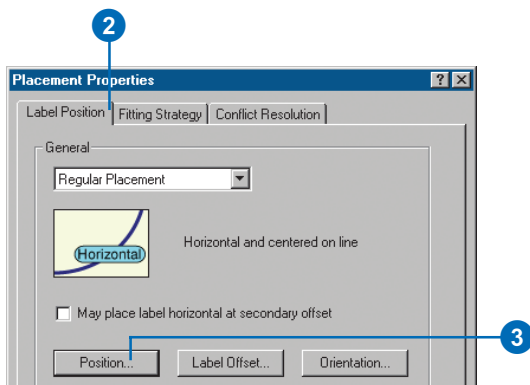The parcel boundaries will be labeled with their length.

Aligning labels with the parcel lines

According to the assessor's map specification, the labels for the parcel lines should be aligned with the lines. You'll make sure that the label position aligns with the lines.
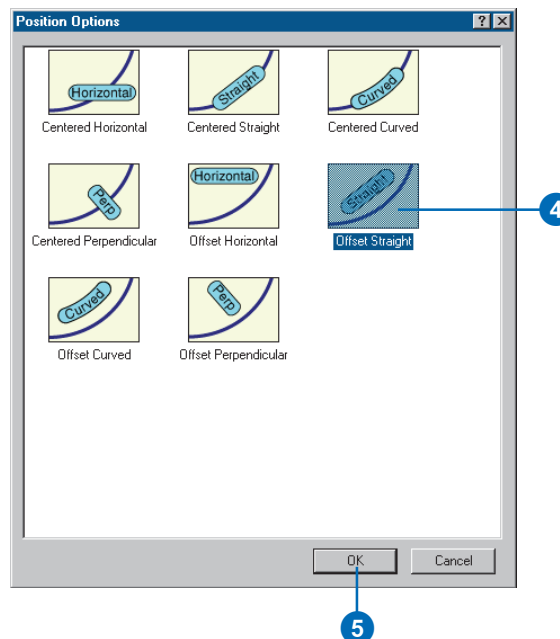
1. Click Properties.
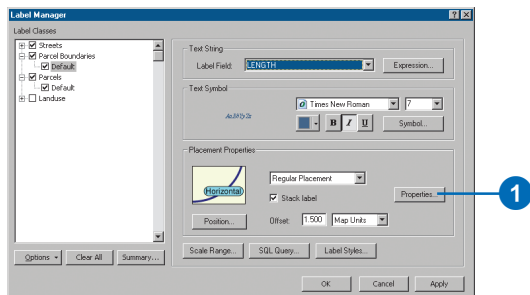
2. Click the Label Position tab.
3. Click Position.

The Position Options dialog box appears. There are different position options available for point, line, and polygon features. Because you are labeling the parcel lines, you see the label position options that are available for line features.
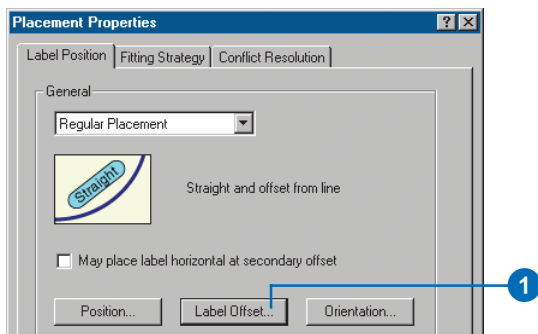
4. Click Offset Straight.

5. Click OK.

The parcel line labels will now be aligned with the lines.

Offsetting labels from the parcel lines

To make the line lengths easier to read, you will offset the labels slightly from the parcel lines.
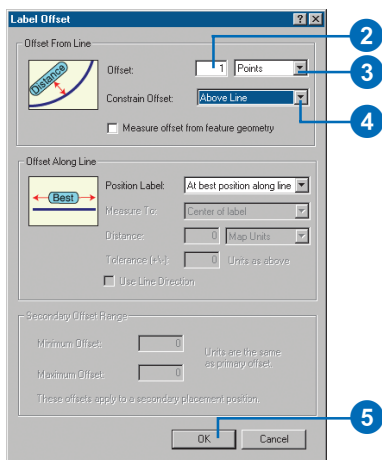
1. Click Label Offset.

The Label Offset dialog box appears.

You can set offsets at a distance from a line and from the end of a line. For this map, you want the labels to be offset from the lines by one point.

2. Type "1" in the Offset text box.

3. Click the drop-down arrow and click Points.

4. Click the drop-down arrow and click Above Line.

5. Click OK.

The parcel line labels will be placed one point above the lines.

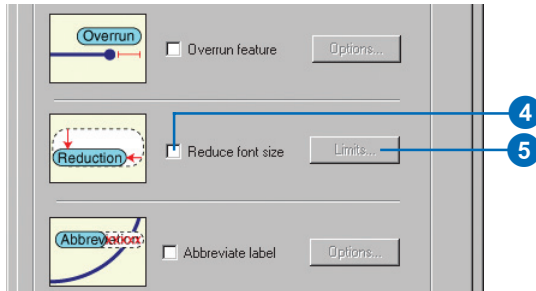### Adjusting the label fitting strategy for parcel lines

Now that you have set up the placement for the parcel line labels, you will adjust the label fitting strategy. You will turn off stacking, allow the labels to extend slightly beyond short parcel line features, and let the label engine reduce the font size where that will allow it to place more labels.
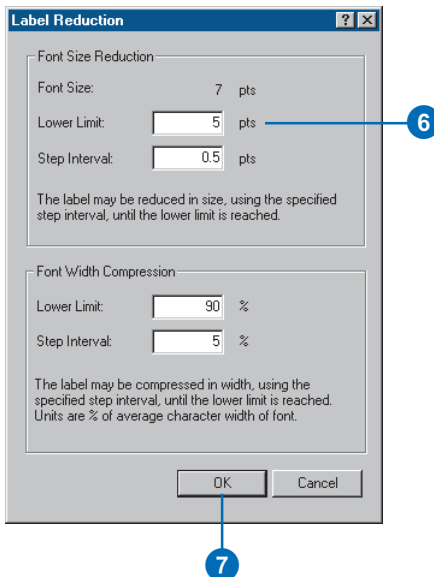
1. Click the Fitting Strategy tab.
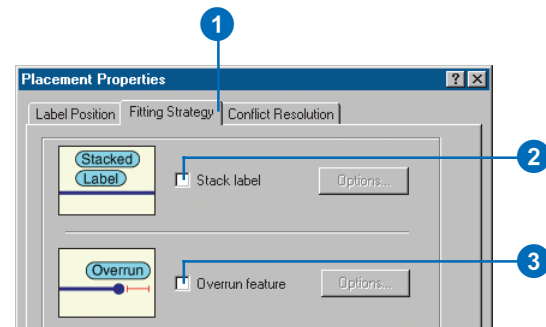
2. Uncheck the Stack label box so the labels won't be stacked.

3. Uncheck the Overrun feature box so the labels will not extend beyond the ends of the parcel lines.

4. Check the Reduce font size box.

5. Click Limits.

6. Type "5" in the Lower Limit text box to set the lower limit on the font size for the parcel line labels.
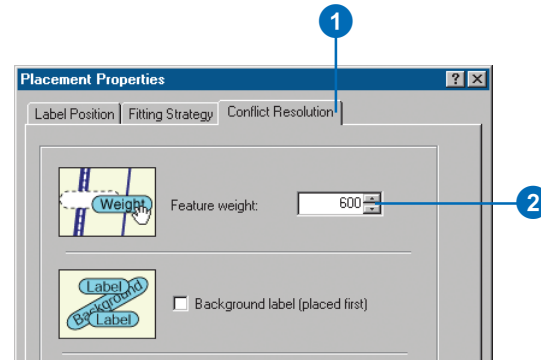

7. Click OK.

The parcel line labels will now be able to extend slightly beyond the shorter line features and may be reduced to as small as 5 points from their base font size of 7 points. This will allow a greater number of larger labels to be placed where there is more space available and smaller labels where there is less.

Adjusting the conflict resolution strategy for parcel lines

Now that you have set the label fitting strategy for the parcel line labels, you will adjust the conflict resolution strategy.

1. Click the Conflict Resolution tab.
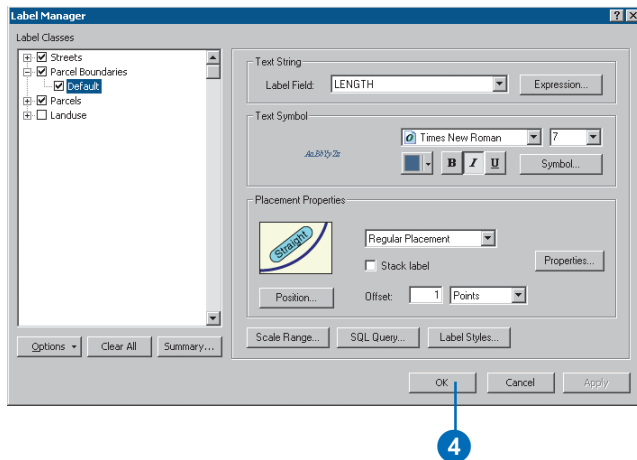
2. Type "600" in the Feature weight text box.

This is an intermediate weight value that will usually prevent these labels from overlapping the parcel line features, unless the other positions are blocked by more highly weighted features.
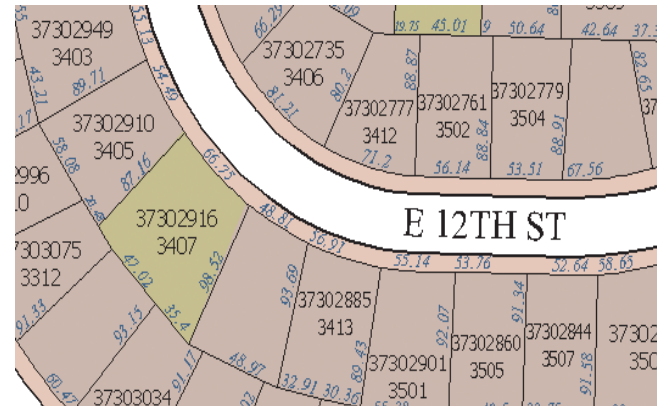
3. Click OK.

3

4. Click OK.

4
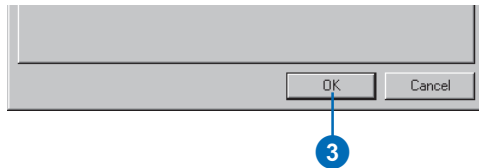
You've finished setting the labeling parameters for the parcel line features; they should now be placed according to the assessor's map requirements.

Removing the extra street names

There is one last label placement problem to fix. The street labels are currently repeated for some streets. This is because the streets are represented by several separate features, and each feature is currently being labeled. To reduce the visual clutter this causes on the map, you will remove the redundant street labels.

Redundant street label
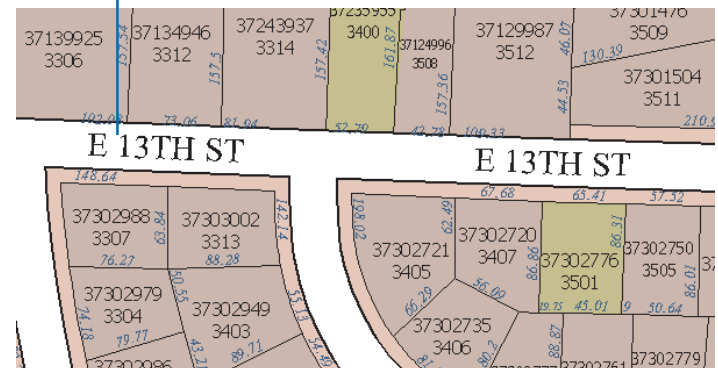
1. Click Label Manager on the Labeling toolbar to open the Label Manager dialog box.
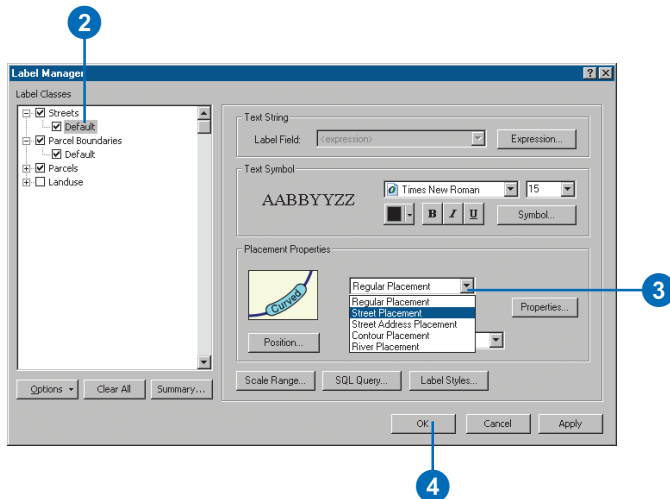

2. Click the default label class under the Streets layer.

3. Click the Placement Style drop-down menu and select Street Placement.

   Selecting Street Placement makes the ESRI Maplex Label Engine merge connected features with the same label, for purposes of labeling.

4. Click OK.

   The map is redrawn and the redundant street labels are removed. Some streets may still have more than one label, however, to reduce ambiguity after intersections.

Redundant street label has been removed
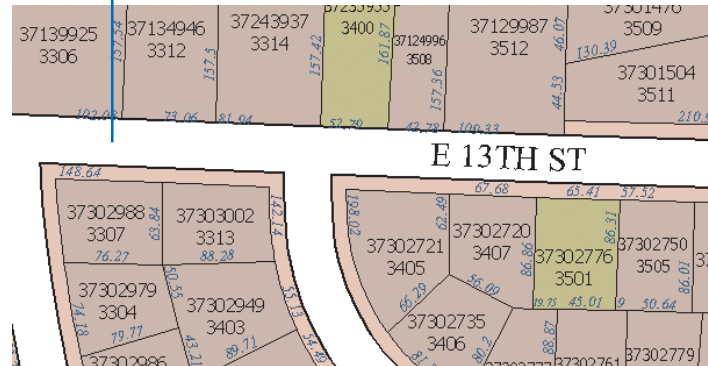
On the Labeling toolbar there are two placement-quality options: Fast and Best. Fast presents a quicker preview of the placed labels and is the default option. The Best option uses more complex placement calculations and places the labels in their final position.

5. Click the Placement Quality drop-down arrow and click Best.

You've succeeded in making the map labels conform to the assessor's requirements. At this point you could switch to layout view; add map elements such as a scalebar, North arrow, and legend; and print the map for the assessor.

In the next section, you will make the labels available for other departments that do not have Maplex for ArcGIS. To do this, you will need to convert the labels to annotation.
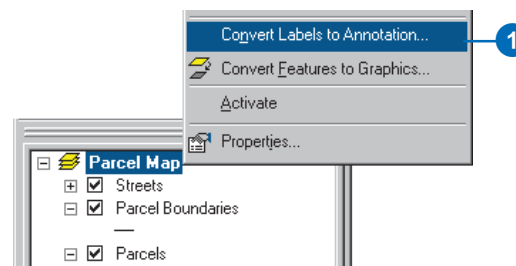
Converting labels to annotation

The labels that Maplex for ArcGIS generates are dynamic labels—they are placed each time the map is redrawn on the screen, unless you lock the labels using the Lock Labels button on the Labeling toolbar. When you save a map that uses the ESRI Maplex Label Engine, the map can be shared with others who have Maplex for ArcGIS installed on their computer, and the same parameters will be used to place the labels. However, people who have ArcMap but not Maplex for ArcGIS cannot see labels created using Maplex for ArcGIS. To share the labels, you must convert them into annotation and store them in a particular map document or in a geodatabase.

Storing annotation in a map document is a good option if there is relatively little of it, usually less than 100 pieces, and if it is only intended to be used with that map. Map document annotation may be organized into annotation groups, which can also be used to store other graphics. This kind of annotation is only editable using the tools on the Drawing toolbar and cannot be shared between map documents.

Storing annotation in a geodatabase is generally a better option than storing it in a map document. Annotation in a geodatabase is stored in annotation feature classes. These are editable with the Editor and Annotation toolbars and can be added to many maps. Drawing performance is better with geodatabase annotation, and such annotation is easier to edit and share.

You will convert this map's labels to annotation stored in a geodatabase so they can be shared by other departments.

1. Right-click Parcel Map in the ArcMap table of contents and click Convert Labels to Annotation.

Depending on whether you are using an ArcView® or a higher (ArcEditor™ or ArcInfo™) licensed seat of ArcMap, there will be some differences in the Convert Labels to Annotation dialog box. The following screenshots illustrate those differences.
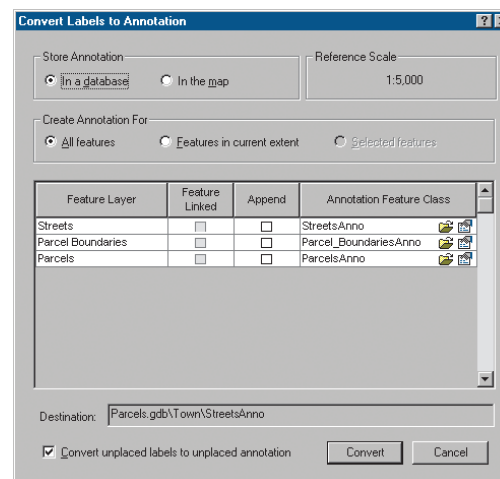
The Convert Labels to Annotation dialog box with an ArcView licensed seat of ArcMap. Creating feature-linked annotation is only possible with an ArcEditor or ArcInfo license. If you have geodatabase features labeled, the annotation will be stored in the current geodatabase by default, but you can browse to another geodatabase.
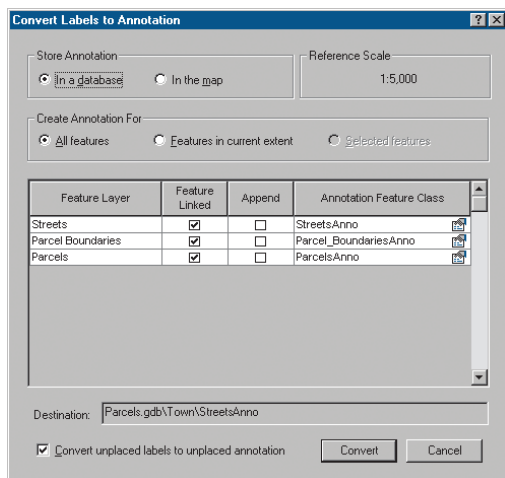
The Convert Labels to Annotation dialog box with an ArcEditor or ArcInfo licensed seat of ArcMap. Annotation will be feature-linked and stored in the current database by default. If you choose not to create feature-linked annotation, you can browse to the database where you want to store the annotation. Feature-linked annotation must be stored in the same geodatabase as the features to which it is linked.

The Convert Labels to Annotation dialog box allows you to convert the labels from each of the visible labeled layers on the map. If you did not want to convert a layer's labels to annotation, you could uncheck that layer in the ArcMap table of contents or turn labeling off for it before starting to convert the labels. You can convert labels to annotation for one layer at a time by right-clicking the layer instead of the data frame, then clicking Convert labels to annotation.

You will convert these labels to standard annotation and, to reduce processing time, you will only convert the labels in the current extent.

2. Click Features in current extent.
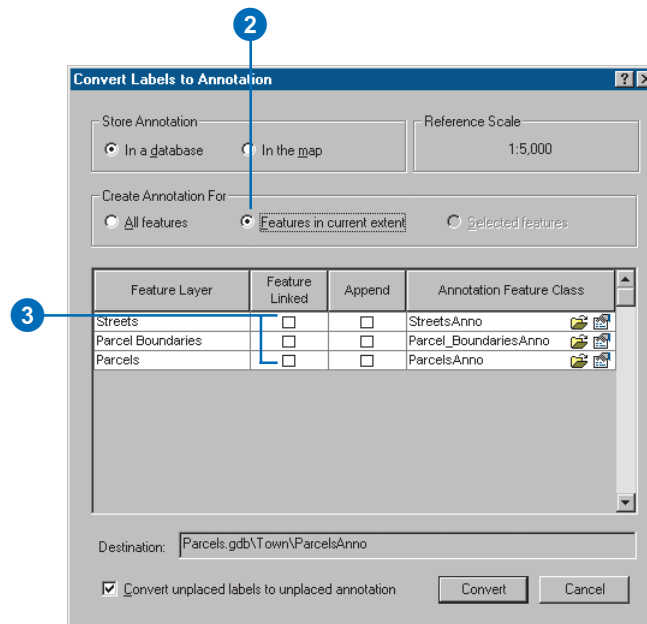
3. If the Feature Linked boxes are checked, uncheck them to create standard annotation features.

The Append check boxes allow you to store the new annotation features in an existing annotation feature class. You will not use this option, as there are no annotation feature classes in this geodatabase.

The names of the new annotation features classes are shown in the Annotation Feature Class column. You

could type a new name for each annotation class, but for this exercise, you will accept the default names.

The Browse buttons beside the new annotation feature class names let you navigate to a geodatabase to store the annotation. You will store the annotation in the same geodatabase as the feature classes on the map.

The Properties buttons let you control some details of how the annotation is stored and how it will behave during editing. You can enforce a consistent style and reduce database storage space for the annotation by requiring editors of the annotation features to select the symbol from the annotation symbol table. When you create feature-linked annotation, you can also control whether or not new annotation features are created when new features are created in the related feature class and whether the annotation will be updated when a related feature's shape is edited. When you store the annotation in a multiuser geodatabase, you can also specify a configuration keyword to set RDBMS-specific storage parameters for the feature class.

You do not need to set any of these advanced annotation properties for this exercise.

4. Click Convert.
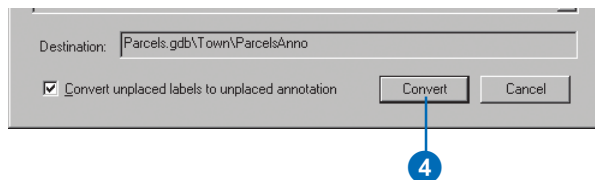
A message box appears reporting the status of the conversion process. This process may take a minute or two because ArcMap is recalculating positions for all of the labeled features in the current extent, then converting them to annotation. When the conversion process is complete, three new layers are added to the map.
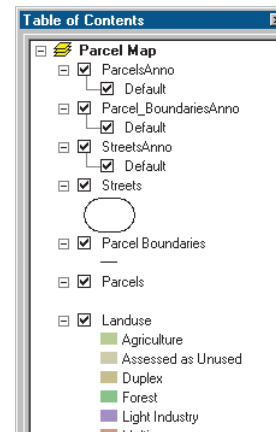

Next you will begin editing so you can place annotation derived from labels that could not be placed by the label engine.

Starting editing

Some of the labels could not be placed on the map because of space constraints. These labels were converted to annotation features in the new feature classes, but they are marked as unplaced and do not appear on the map.

Unplaced annotation features are geodatabase features and must be added during an edit session. Now you'll start editing and get ready to place the unplaced annotation.

1. If the Editor toolbar is not currently visible, right-click on any toolbar and click Editor.
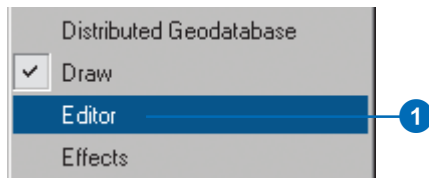
2. If the Annotation toolbar is not currently visible, right-click on any toolbar and click Annotation.
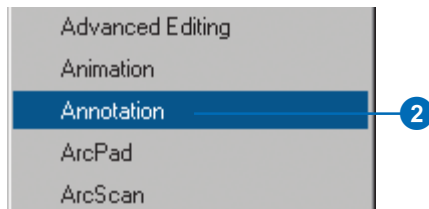
3. Click Editor and click Start Editing.

4. Click the Target drop-down arrow on the Editor toolbar and click Parcel_BoundariesAnno.

5. Click the Unplaced Annotation Window button on the Annotation toolbar.


The Unplaced Annotation window appears. You can resize it, dock it to the ArcMap window, or leave it floating.

Next you'll place some unplaced annotation.

Placing unplaced annotation

The Unplaced Annotation window lets you manage the process of placing or deleting the unplaced annotation. You'll use the Edit Annotation tool on the Annotation toolbar to edit the annotation feature after you place it.

1. Click the Show drop-down arrow and click ParcelBoundariesAnno.
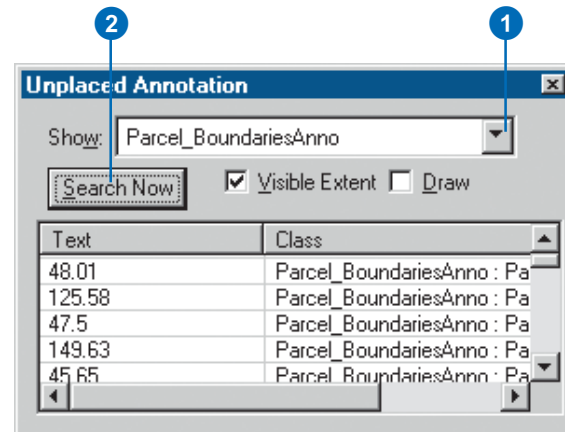
2. Click Search Now.

A number of annotation features could not be placed. Several of these were labels of features that were only partly within the visible map extent. These would probably have been placed if you had converted all of the labels to annotation, instead of just those in the visible extent.
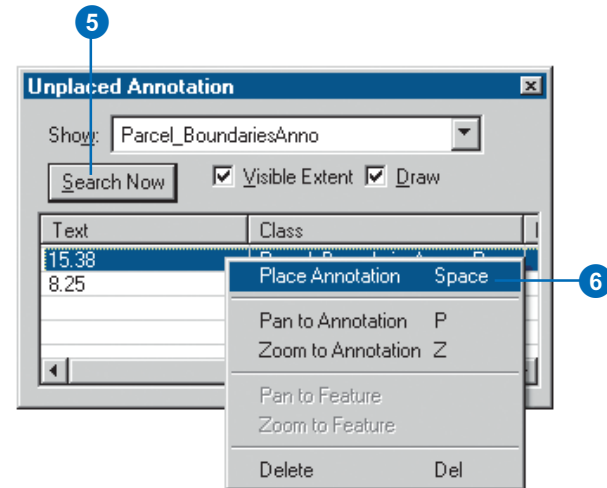
3. Check the Draw box.
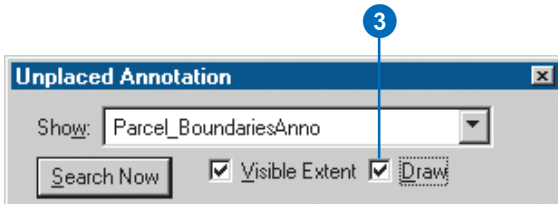
4. Click the Zoom In tool and zoom in to the area between E 12th Street and E 13th Street.
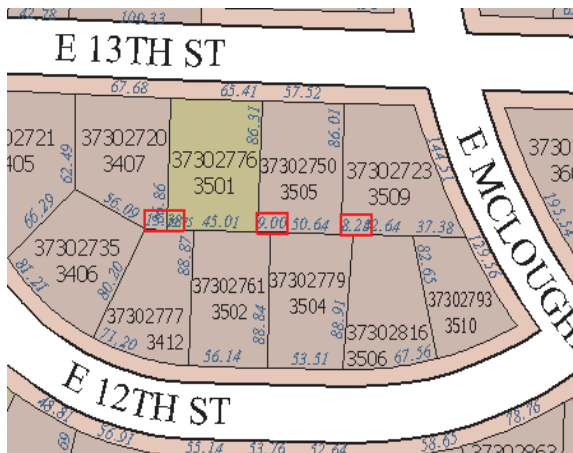
5. Click Search Now.

6. Right-click the first label on the overflow list and click Place Annotation.
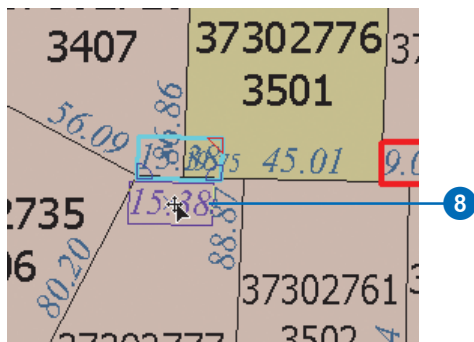
You could also use this context menu to pan or zoom to the unplaced annotation feature's location or to delete it.

The annotation feature appears on the map.

7. Click the Edit Annotation tool.

8. Click in the middle of the annotation feature and drag it below the parcel boundary line.


When you place the pointer on the middle of the annotation feature, you see the Move pointer. Clicking the middle of the annotation feature and dragging it with this pointer allows you to move the annotation feature. If you click and drag one of the blue Rotate handles on the lower right and left corners of the annotation feature, you can pivot the feature around the other Rotate handle. The red handle is the Resize handle. You'll use it to make the annotation feature smaller.

The pointer becomes the Resize pointer when it is over the Resize handle. Dragging toward the center of the annotation feature makes it smaller. Dragging away from the center makes it larger.

9. Click the red Resize handle on the upper right corner of the annotation feature and drag it down and toward the middle of the feature. When the annotation feature seems small enough, release the mouse button.
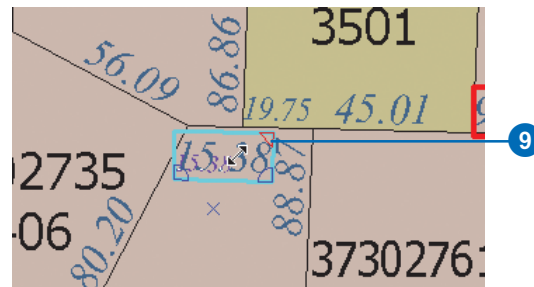

10. Click the Back button.
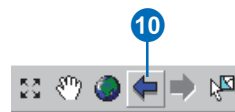
You have placed one of the unplaced annotation features, moved it into the correct position, and resized it to fit. You can find and place the other unplaced annotation features using the same technique.

You can also use the tools on the Annotation toolbar to edit annotation features on the map. In the next section, you will edit one of the street names that was placed when you converted the labels to annotation.

Editing an annotation feature

Some of the annotation that was placed by the ESRI Maplex Label Engine may not be exactly where you want it. Because annotation is editable, unlike labels, you can select these annotation features and move, modify, or delete them.

1. Press the Z key and click and drag a box around the E 12 TH ST area.
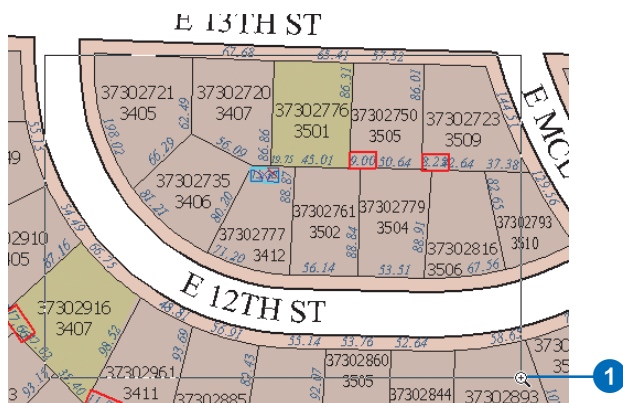
The Z key is an editing shortcut that lets you zoom in while you are using the editing tools. There are several other useful editing shortcut keys. For a complete list, look in the ArcGIS Desktop Help index under "shortcuts" and the subtopic "for editing in ArcMap".
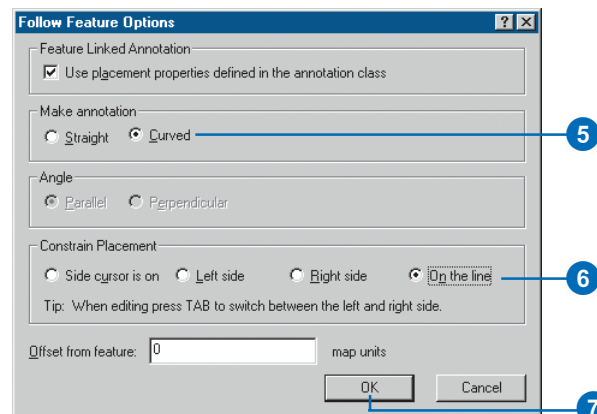
You are going to move the E 12TH ST annotation feature to a new location.

2. Click E 12TH ST.

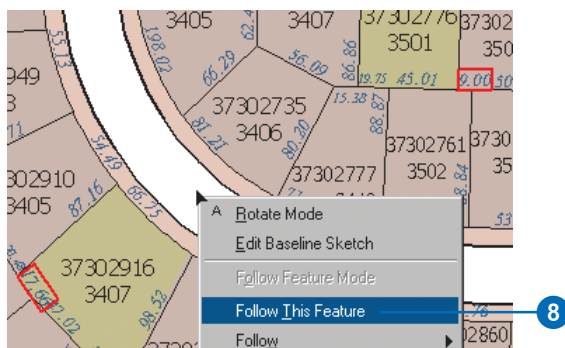3. Right-click and click Convert to Single Part.
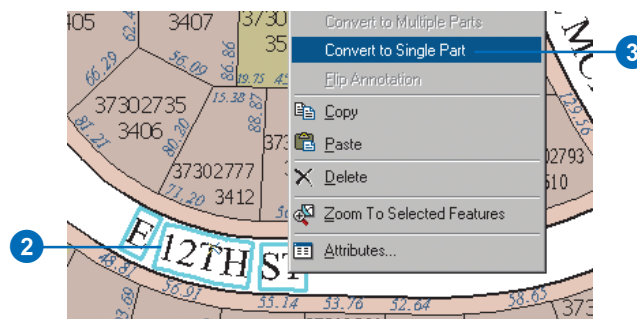
The parts of the annotation feature are aligned along the same path. You will constrain this annotation feature to follow the street feature, then move it.
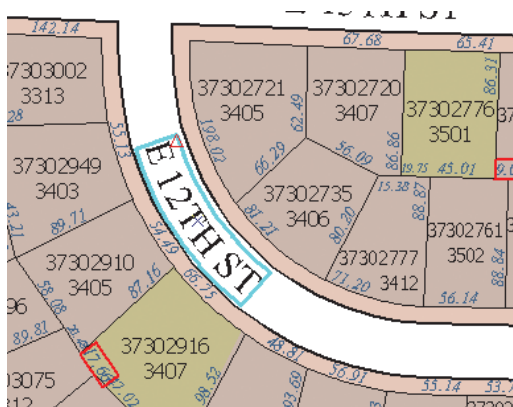
4. Press the O key.

5. Click Curved.
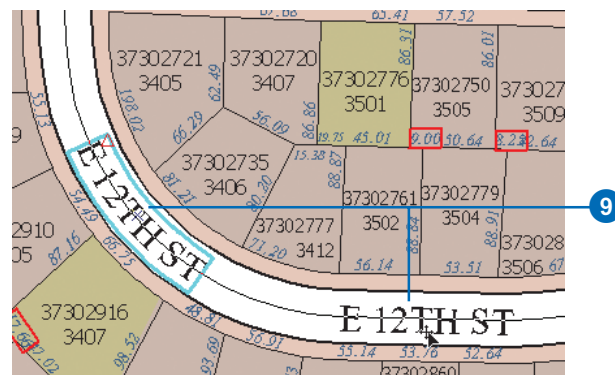
6. Click On the line.

7. Click OK.

8. Move the pointer over the middle of the street feature, right-click, and click Follow This Feature.

The street centerline flashes and the E 12TH ST annotation feature is placed along it where you clicked.

9. Click E 12TH ST and drag it to the right.

The annotation feature is constrained to follow the street feature.

You've used Maplex for ArcGIS to label a map, converted the labels to annotation features in a geodatabase feature class, and placed and edited some of the annotation. For more information about editing annotation, see the ArcGIS Desktop Help.