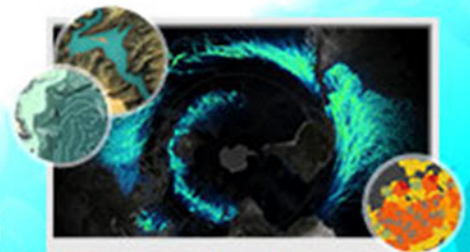


Exercise

Labeling a Map

Section 4 Exercise 1

February 2, 2021



Labeling a Map

Instructions

Use this guide and ArcGIS Pro to reproduce the results of the exercise on your own.

Note: The version of ArcGIS Pro that you are using for this course may produce slightly different results from the screen shots that you see in the course materials.

Time to complete

Approximately 50-60 minutes

Software requirements

ArcGIS Pro 2.7

ArcGIS Pro Standard license (or higher)

Note: The MOOC provides a separate ArcGIS account (user name and password) that you will need to use to license ArcGIS Pro and access other software applications used throughout the MOOC exercises. This account (user name ending with _cart) provides the appropriate ArcGIS Online role, ArcGIS Pro license, ArcGIS Pro extensions, and credits. We strongly recommend that you use the provided course ArcGIS account to ensure that you have the appropriate licensing to complete the exercises. Exercises may require credits. Using the provided course ArcGIS account ensures that you do not consume your organization's credits. Esri is not responsible for any credits consumed if you use a different account. Moreover, Esri will not provide technical support to students who use a different account.

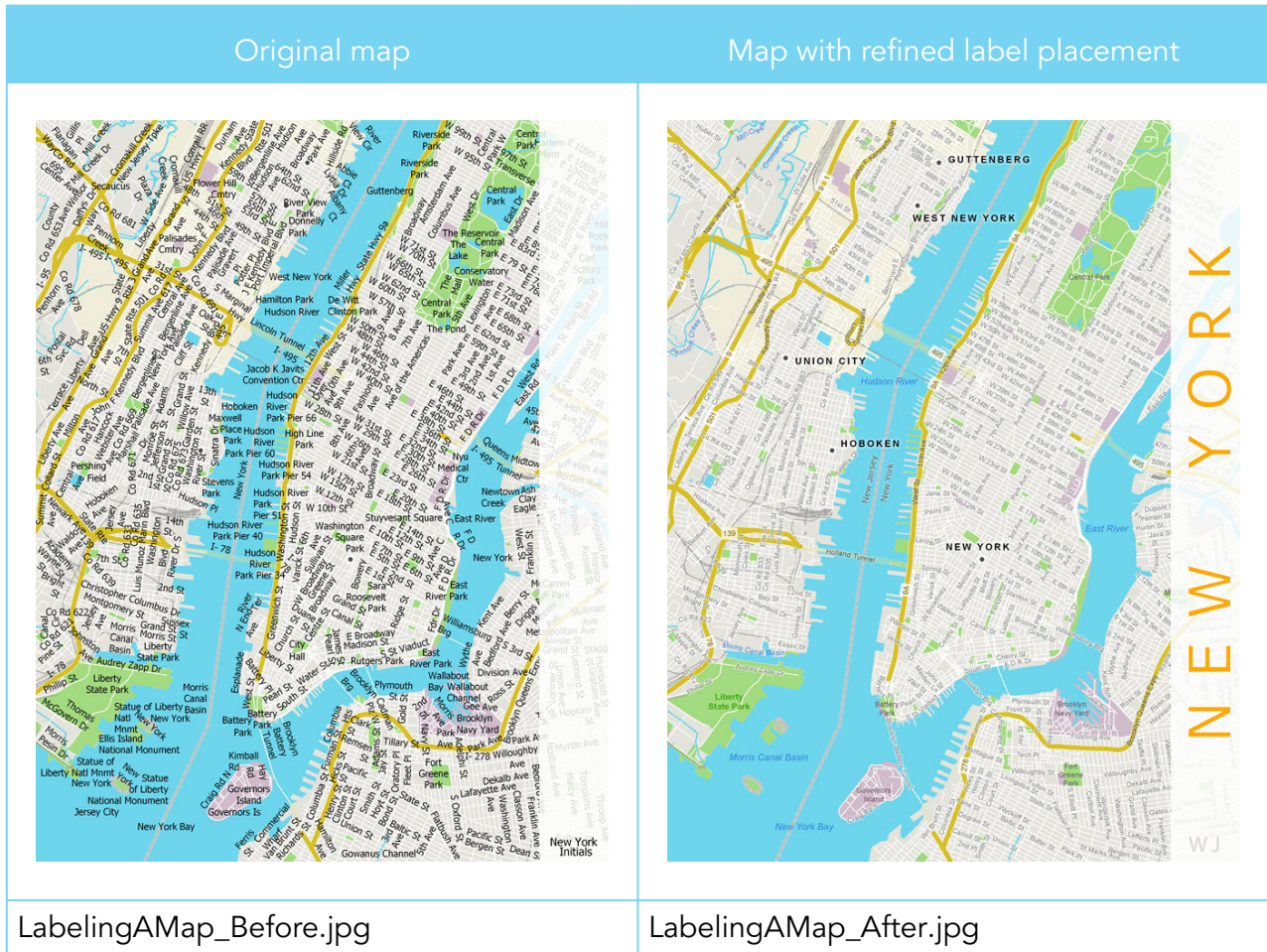
Introduction

Almost all maps have [labels](https://bit.ly/2UnZol4) on them. That fact alone makes labeling a very important piece of mapmaking and why learning about labeling is key. At its core, the text helps convey information that elements like points, lines, and areas cannot. Text is interesting—it is one of the more abstract elements because those letters do not exist on the ground in reality (with notable exceptions like the [Hollywood Sign](https://bit.ly/1LsoOZ0) in Los Angeles, California).

Carefully planned text placement adds tremendous value, as it helps the reader quickly discern what a feature is while providing important locational information. Graphically, it helps set a tone for the map and provides balance.

What will you learn?

In this exercise, you will learn how to go beyond the labeling defaults. You will label a street map and then create a layout for it. Along the way, you will learn some tips and tricks about labeling that will lay the groundwork for future mapmaking.



Note: These image files are included in the exercise ZIP file.

While your final map does not need to look exactly like the map on the right, this example can be used as a reference. You might want to try making yours look like this example the first time through the exercise. Then, when you feel comfortable with the concepts, you could make another version with your own styling.

Step 1: Download the exercise data files

In this step, you will download the exercise data files.

- a Open a new web browser tab or window.
- b Go to <https://bit.ly/3bSAs1I> and download the exercise data ZIP file.

Note: The complete URL to the exercise data file is <https://www.arcgis.com/home/item.html?id=c94263b1eaa347e8aab6a6097e332934>. The file is 7 MB.

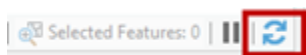
- c Extract the files to a folder on your local computer, saving them in a location that you will remember.

Step 2: Open an ArcGIS Pro project

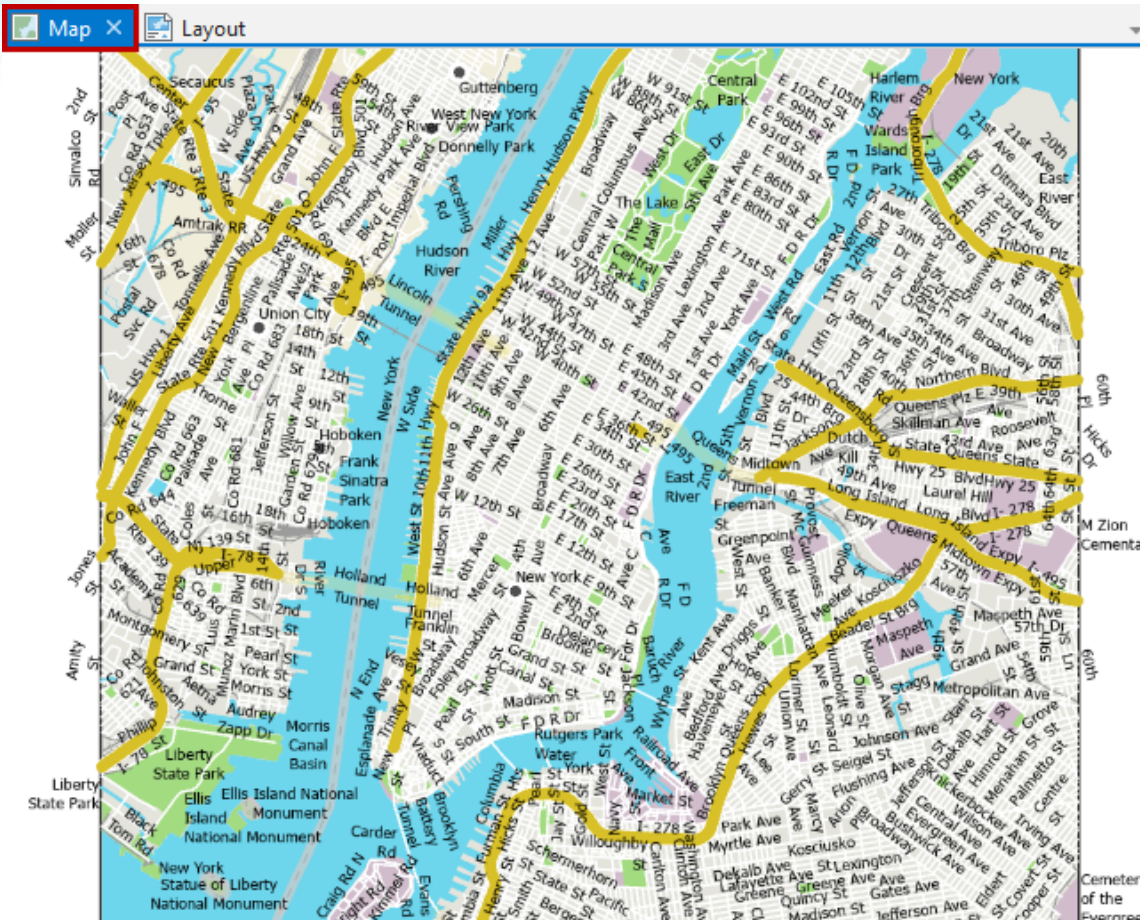
You will open and save the exercise project in ArcGIS Pro.

- a Start ArcGIS Pro and, if necessary, sign in using your provided course ArcGIS credentials (user name ending with _cart).
- b From the main ArcGIS Pro start page, click Open Another Project.
- c Browse to the location where you saved the exercise data file and open the LabelingAMap.ppkx project package.

Note: It may take some time for the labels to load. In the bottom-right corner, the Refresh indicator spins while the labels are loading.



- d At the top of the map window, if necessary, click the Map tab.



The project opens to a street map of New York City. It contains several layers that have been stylized, which are now ready to be labeled.

To maintain the original exercise project file, you will save your project with a different name.

- e From the Project tab, click Save As and type a name for your project, such as **LabelingAMap_<your first and last name>.aprx**.
- f Save the file to the folder on your computer where you are saving your work.

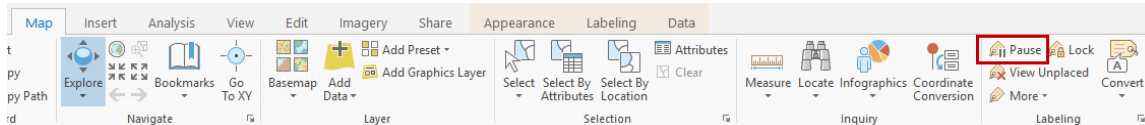
Next, you will explore options for temporarily suspending labeling in the map and for turning labels on and off.

Step 3: Turn off labels for all layers in the map

You will see that the map labels are drawn using the default label settings. There are a lot of labels in this map. When you have a map with a lot of labels, you can pause, or temporarily

turn them off. Pause is an interactive label tool that suspends the drawing of labels when you open a map.

- a From the Map tab, in the Labeling group, click Pause to suspend labeling in the current map.

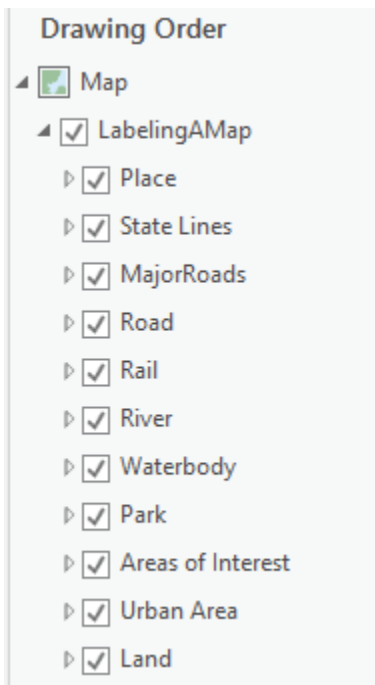


Because label placement takes a fair amount of time to compute (especially if it is complex), pausing label drawing is useful when you need to make changes and do not want or need your labels to redraw every time.

- b Click Pause again to turn the Pause tool off.

Note: It may take a minute for the labels to redraw in the map.

- c In the Contents pane, notice the drawing order of the layers in the map.



Think of these layers as drawn and layered top to bottom, with the last layer in the list being the layer at the bottom of the stack, or the layer that is underneath everything else.

- d Click the Place layer to select it.

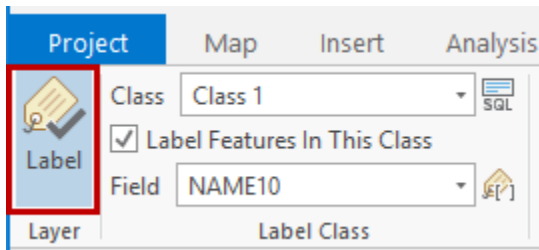
- e On the ribbon, from the Feature Layer contextual tab, click the Labeling tab.

This tab and the Label Class pane, which will be examined in the next step, will be the focus for most of this exercise.

On the Labeling tab, you will see which fields are being labeled; the font type, size and color; label placement settings; and some additional advanced settings.

You will now turn off the labels for this layer.


- f In the Contents pane, verify that the Place layer is still selected.
- g Click the Label button to turn off the labels.



Note: The Label button is a toggle button, and it will be blue if the labels are on.

This method is a good choice if you only want to turn labels off for a specific label. However, if you want to turn labeling on or off for several layers of the map at the same time, there is another option.

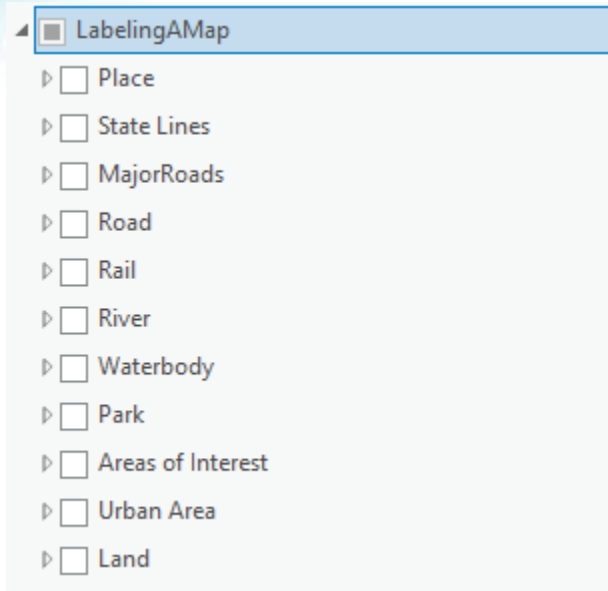
You can use the List By Labeling view in the Contents pane to control the visibility of labels for each layer of the map.

- h At the top of the Contents pane, click the List By Labeling button .
- i Expand one of the layer names in the Contents pane.

Drawing Order view shows what symbology is used to represent the features in the expanded layer. In Labeling view, the Contents pane will display the label classes that are used for that layer. You will learn more about label classes soon.

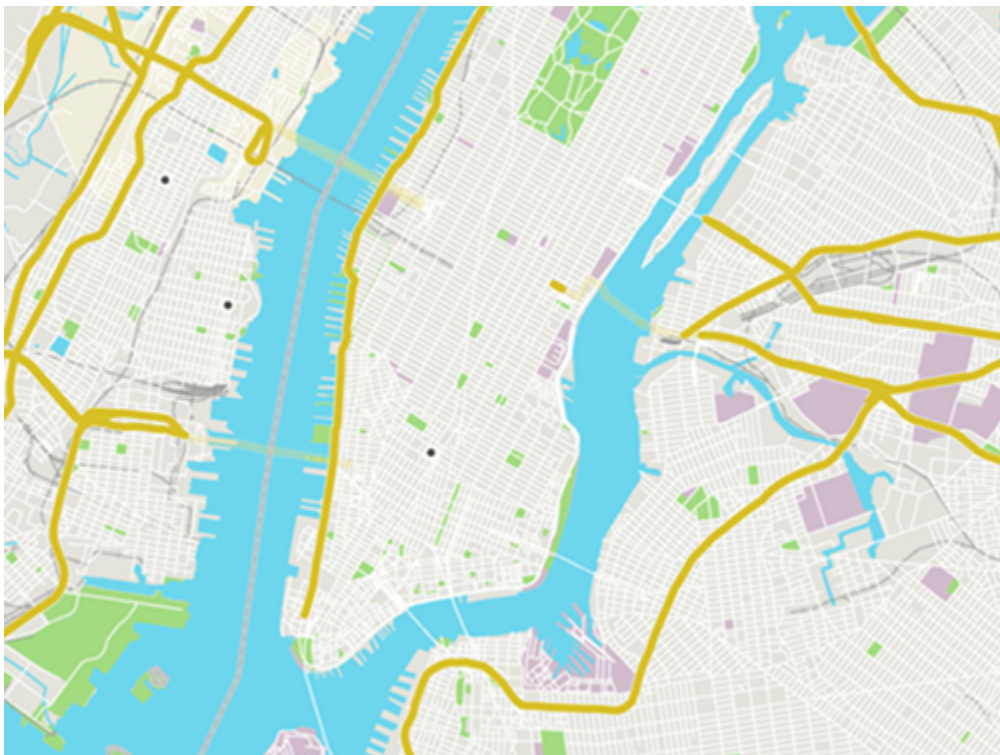
- j Minimize the layer name.
- k In the Contents pane, uncheck the boxes for each layer in the map to turn the labels off.

Hint: You can also press Ctrl and uncheck one box to turn all the layers off at the same time.



- 1 At the top of the Contents pane, click the List By Drawing Order button  to return to the Drawing Order view.

Note: It may take some time to redraw the map.



After turning off the labels for all layers in the map, you see only the map of New York City.

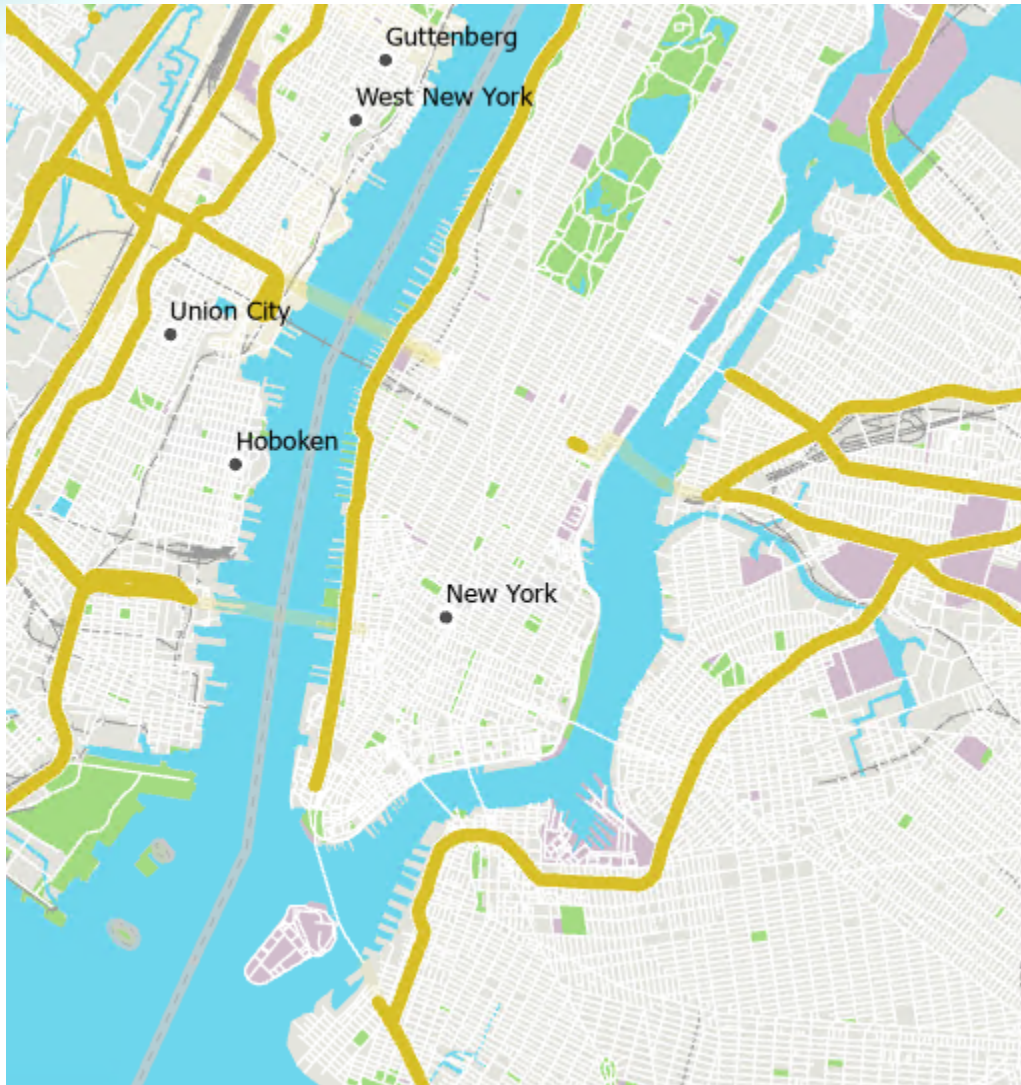
You will use a combination of the Contents pane, Label Class Properties pane, and the Labeling tab to refine the label placement for each feature. You will start with the labels for the Place layer, which is a point feature class. A feature class is a collection of geographic features that share the same spatial representation (points, lines, or polygons) and a common set of attributes.

Step 4: Label point features

The Place layer includes point features for the five major cities in the map extent. You will learn about options for label placement, appearance, formatting, and sizing while labeling these points.

- a In the Contents pane, select the Place layer, if necessary, and turn on the labels for this feature class.

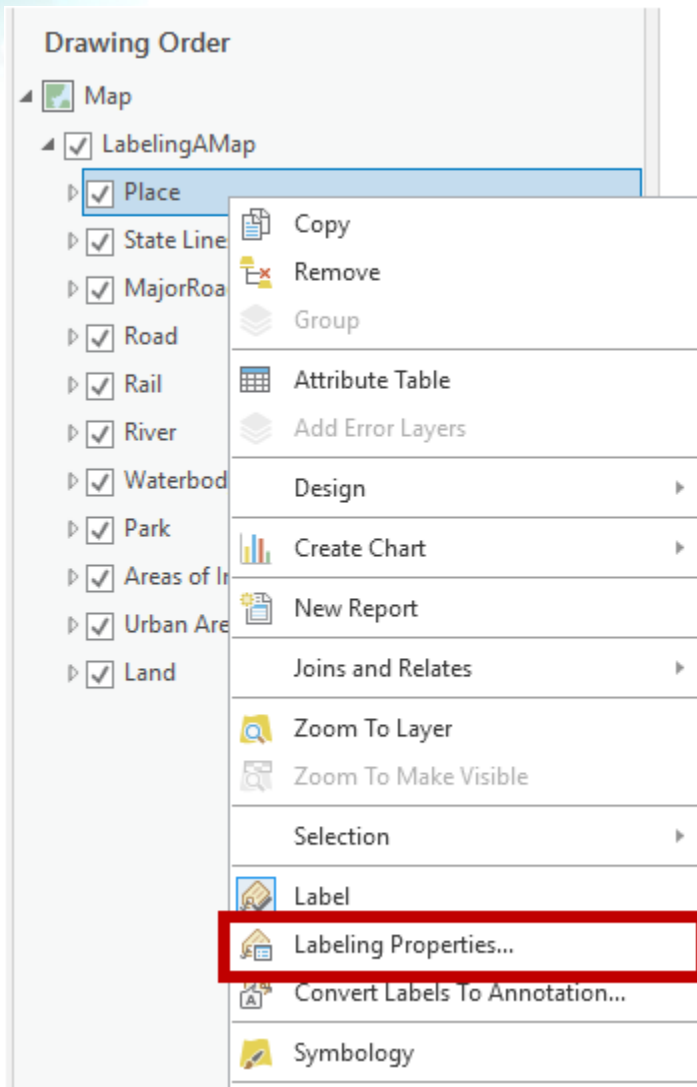
Hint: Remember that the Label button is located on the ribbon, from the Labeling tab, and it will be blue when the labels are turned on.



You should see city name labels around the point features in your map.

On the Labeling tab, you can see some default label settings for this feature class.

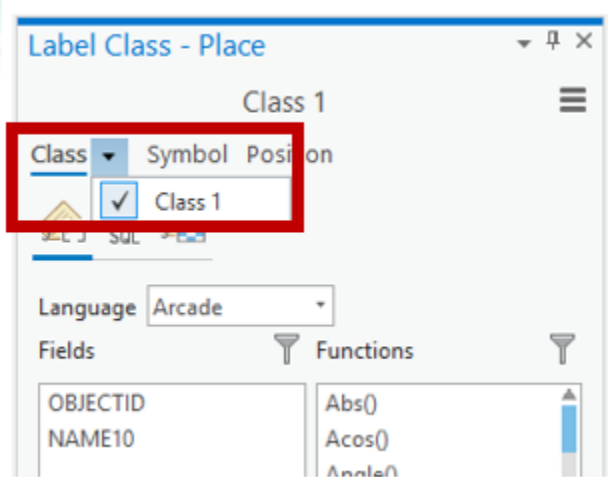
- b** In the Contents pane, right-click the Place layer and choose Labeling Properties.



The Label Class pane opens. You can use [label classes \(https://bit.ly/2JBDUQf\)](https://bit.ly/2JBDUQf) to specify different labeling properties for features within the same layer.

Note: You can dock or undock the Label Class pane, as desired.

In the Label Class pane, the Class tab tells you which label class that you are working on. Label classes will help you resolve conflicts and establish a hierarchy systematically. Label classes restrict labels to certain features or specify the attribute fields used for labels, symbols, scale ranges, label priorities, and placement options for a group of labels. The arrow next to the Class tab opens a drop-down list that lists all label classes for a feature class; the Place feature class has one label class.



Note: You can write SQL (Structured Query Language) queries or *Arcade Expressions* (<https://bit.ly/2n9T6JP>) in this pane to further isolate features that you want to label.

- c At the top of the Label Class pane, click the Symbol tab to see stylistic attributes that you can adjust for the label.
- d At the top of the Label Class pane, click the Position tab to see the label placement attributes that you can adjust.

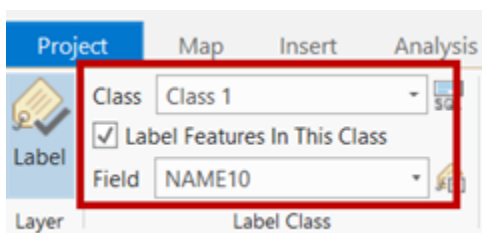
Note: If you are familiar with Esri Maplex for ArcGIS and ArcMap, the options on the Position tab will be familiar to you—if not, exciting times ahead!

Now we will look at how you can use these attributes to adjust the style and placement of your labels.

Step 5: Modify point feature label appearance

First, you will modify some of the stylistic attributes of the labels.

- a From the Labeling tab, in the Label Class group, ensure that Class 1 is the class being labeled and that the field is NAME10.

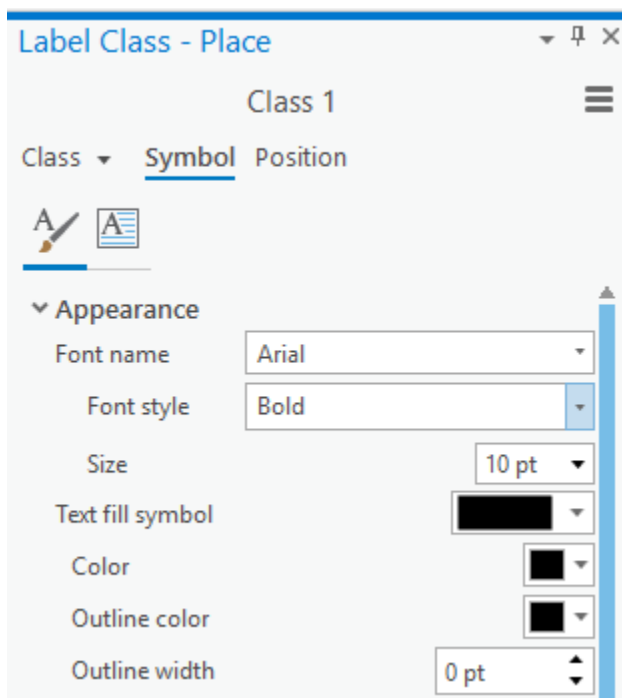


NAME10 is the field in the layer attribute table that contains the city names.

The readability of the labels in the map can be improved. You will change the appearance using the options in the Label Class pane.

- b In the Label Class pane, click the Symbol tab and expand the Appearance section, and then set the following parameters:
- Font name: Arial
 - Font style: Bold
 - Size: 10 pt
 - Color: Black

Note: Outline Width is 0, so Outline Color has no effect.

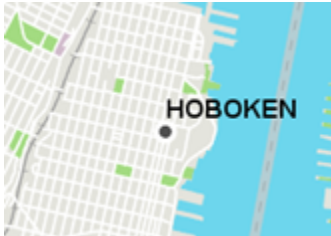


- c Click Apply

Tips and Tricks: When labeling, limit the number of fonts used. More than two is generally excessive. You can play with variations in font size, color, italics, and boldness to differentiate items.

- d In the Label Class pane, in the Appearance section, explore the options in the Text Case field.

- e In the Text Case field, choose a value and click Apply to see the effect.
- f Because you want the Place labels to stand out in this map, change Text Case to Upper Case, and then click Apply.

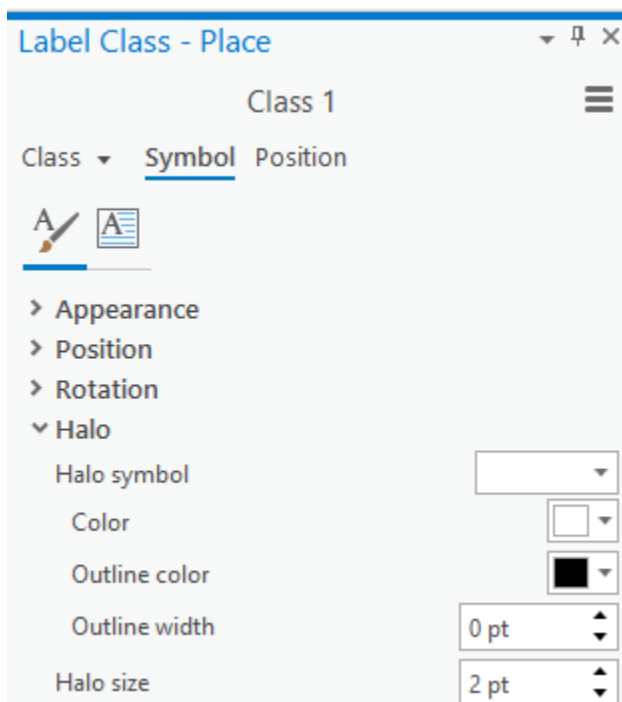


If you look at the Hoboken place label, you can see how the text extends into the blue polygon representing the water body between New Jersey and New York. When you have dark text labels on a dark background, you can apply a halo effect to the label to make it stand out.

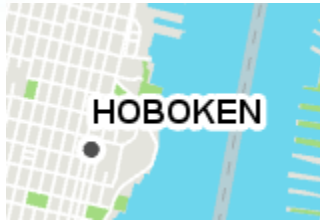
- g In the Label Class pane, from the Symbol tab, expand the Halo section.
- h For Halo Symbol, choose White Fill.

Hint: Point to the polygon symbols to view their names.

- i Change Halo Size to 2 pt.



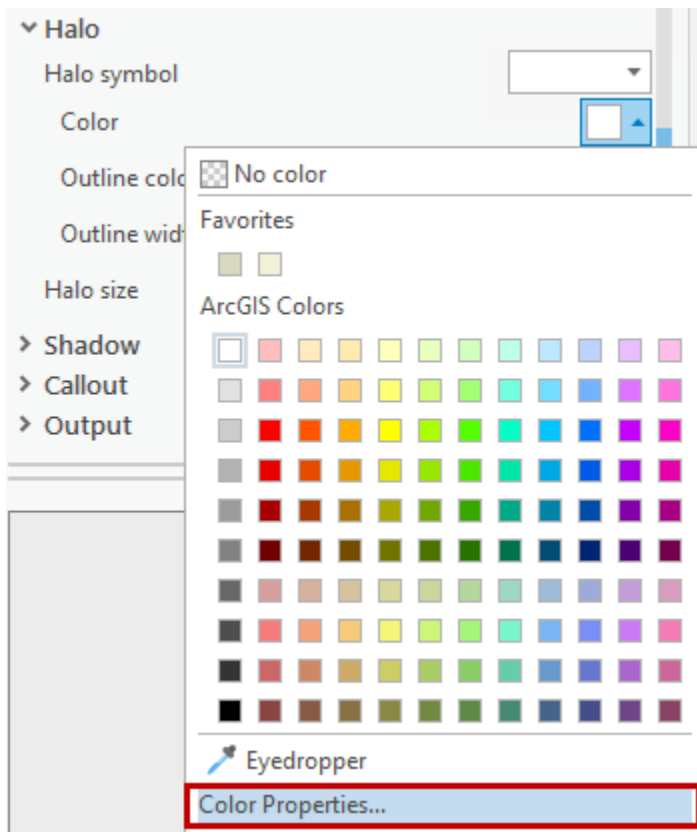
- j At the bottom of the Label Class pane, click Apply.



Tips and Tricks: Halos are great for helping a label stand out. ArcGIS Pro also provides a transparency option. Halos are generally needed less on water area features, as there are not many features in the water competing with the label.

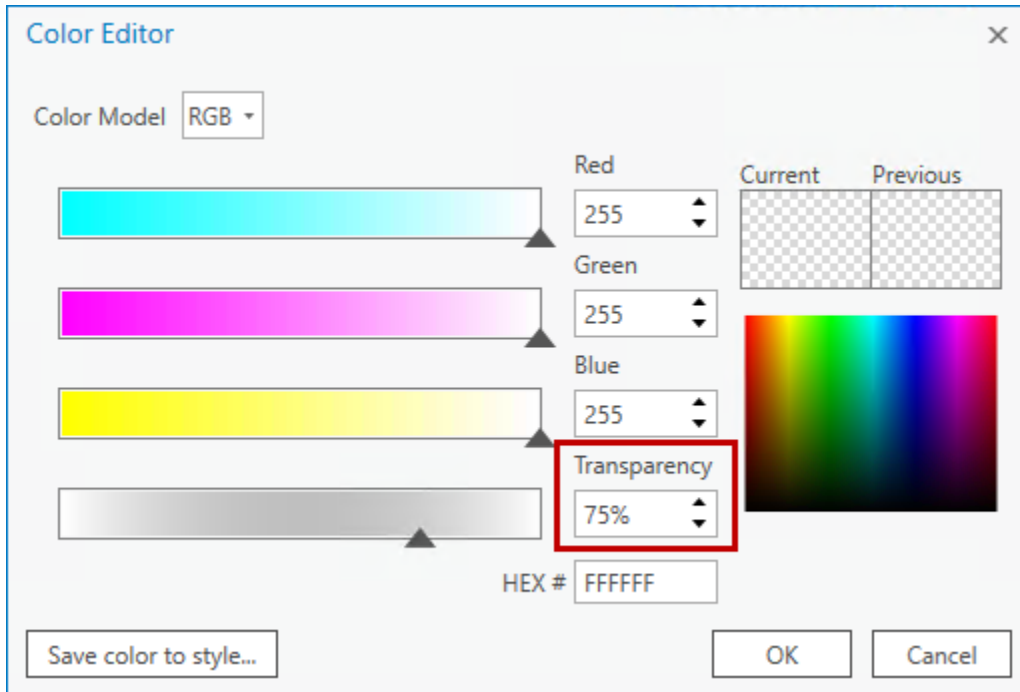
You will now adjust the halo transparency.

- k For Color, click the white color chip to open the color palette.
- l At the bottom of the color palette, click Color Properties.

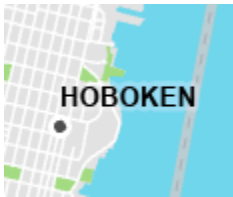


The Color Editor opens.


- m Change Transparency to **75%**.



- n Click OK to close the Color Editor, and then click Apply to see the changes in your map labels.

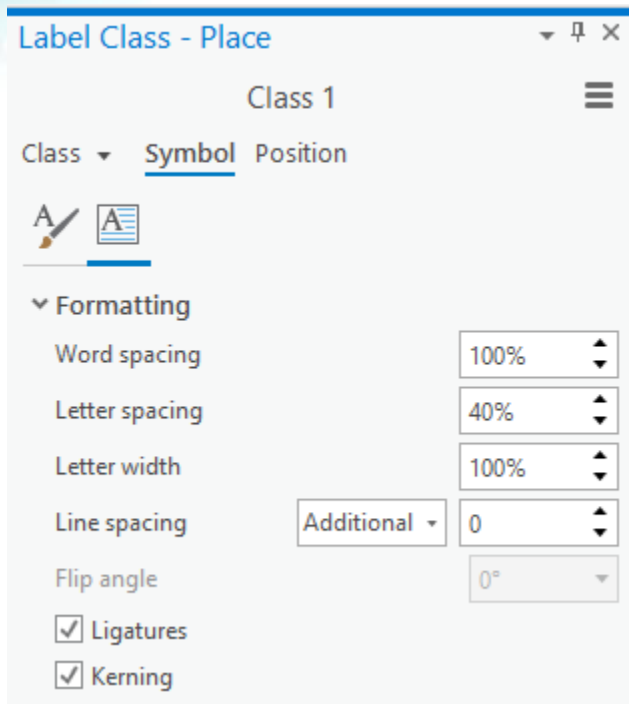


The label halos are subtler now.

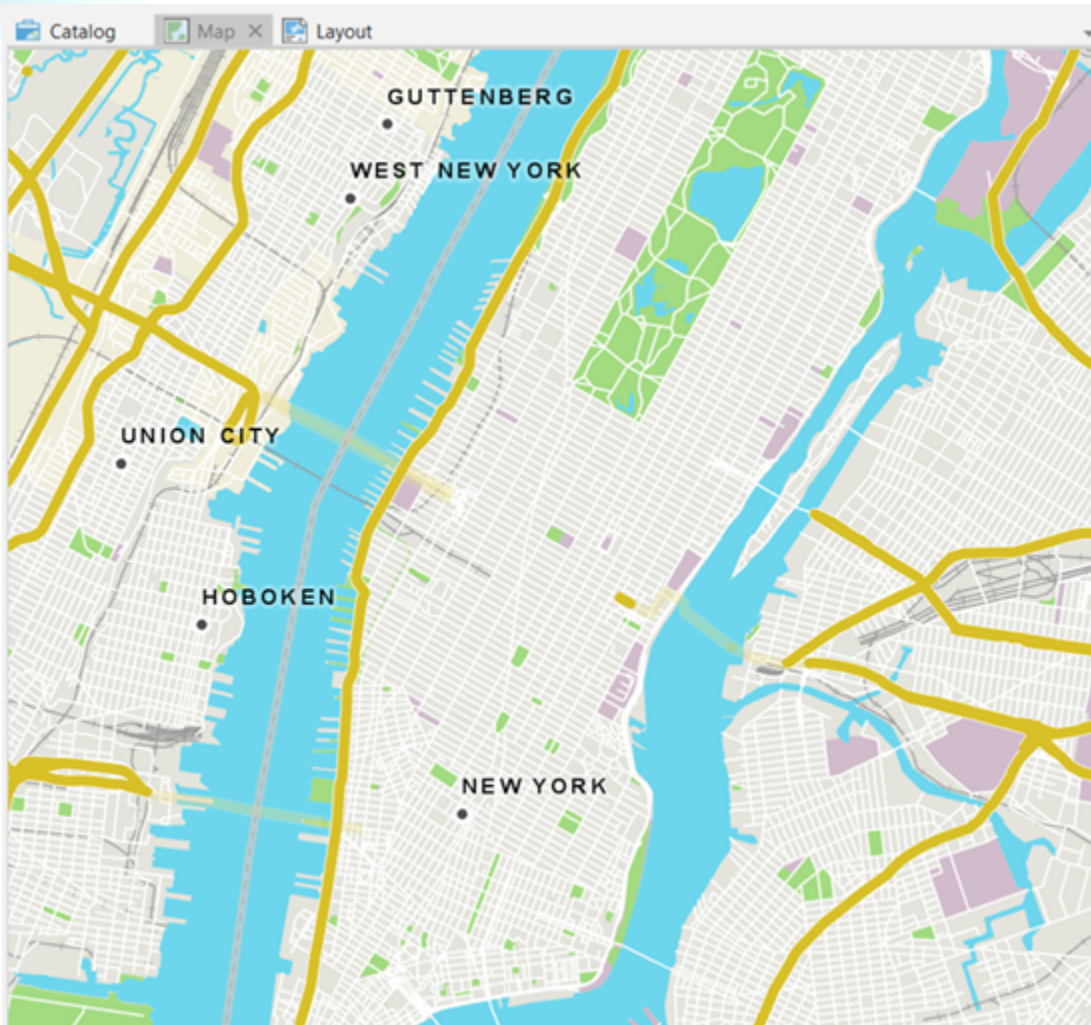
- o In the Label Class pane, under the Symbol tab, click the Formatting button , and then expand the Formatting section.

Here, you can see options for formatting, paragraph styles, and internationalization. You will increase the letter spacing to see how one of these options affects the labels.

- p In the Formatting section, change Letter Spacing to **40%**.



- q Click Apply to see the changes in your map labels. You can also try other values to see their effects. Your labels should look similar to the following map.



- r Save your project.

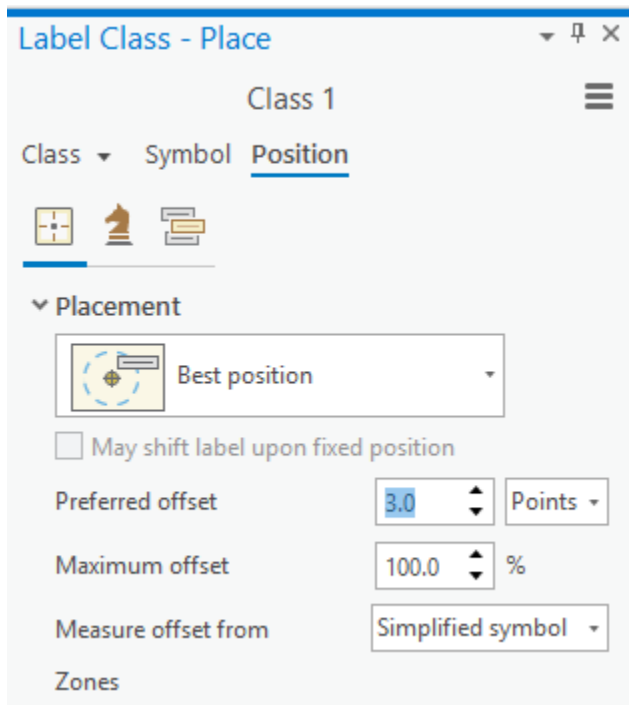
Step 6: Modify point feature label placement

Well-placed labels can make a map more understandable and useful. The default label engine used by ArcGIS Pro, Maplex, provides a special set of tools that allows you to improve the quality of the labels on your map. It lets you control how labels should be placed relative to features, how labels can be modified or reduced to allow more label placement when the available space is constrained, and how conflicts between labels are resolved.

In this step, you will explore options to adjust the placement of your labels.

- a In the Label Class pane, click the Position tab.

- b Expand the Placement section.
- c In the drop-down list below Placement, confirm that Best Position is selected.
- d For Preferred Offset, increase the value to 3.0 points.

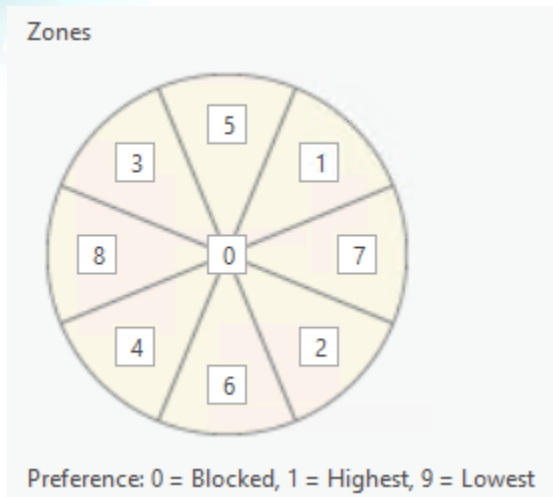


The Best Position label placement option allows you to set the preferred location or zone for label placement around a point. The values identify the order in which the labels will be placed—first, to the northeast of the point, in Zone 1. If the label cannot be placed there, the next option is Zone 2 and so on.


Note: Refer to ArcGIS Pro Help for more information about [setting user-defined zones for point label placement](https://bit.ly/2JzQzDr) (<https://bit.ly/2JzQzDr>).

- e In the Zones pie graphic, change the value order (starting from the top position and going clockwise) to **5, 1, 7, 2, 6, 4, 8, and 3** by typing the values into the fields.

Note: Because you do not want the label to appear on top of the feature, you will leave the center position set to 0.




Updating these values will provide better label placement.

- f At the top of the Label Class pane, under the Position tab, click the Fitting Strategy button .
- g Expand the Stack section and uncheck the Stack Label box to turn off stacking.

Turning off this option will prevent the Maplex from stacking, or splitting, long labels into multiple lines.

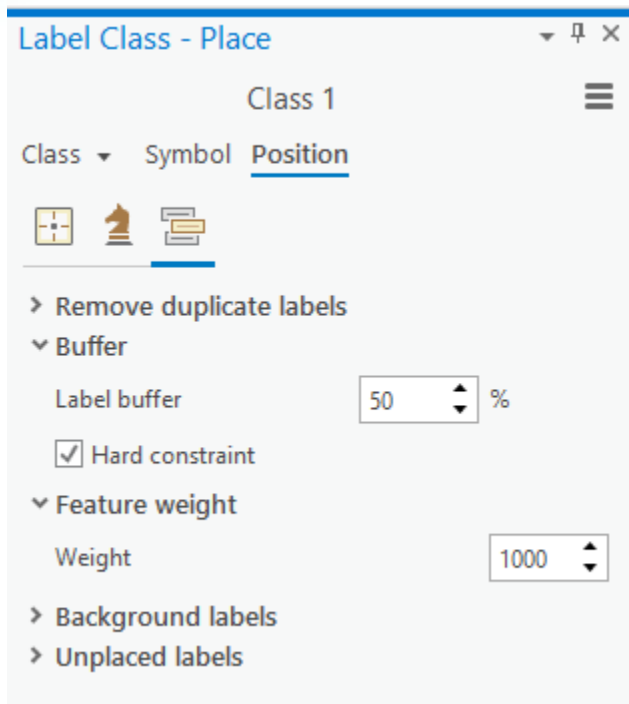
Some labeling situations can create crowded areas where labels are placed too close to each other. Crowded labeling can decrease the readability of a map, especially when it becomes unclear which features are being labeled. You can increase the clarity of such maps by specifying a buffer distance around each label in which no other labels will be placed. By increasing the buffer size, a larger amount of white space is created around labels, making it easier to distinguish one label from another.

Note: Refer to ArcGIS Pro Help for more information about [specifying a label buffer distance](https://bit.ly/2ETZZWW) (<https://bit.ly/2ETZZWW>).

- h At the top of the Label Class pane, under the Position tab, click the Conflict Resolution button .
- i Expand the Buffer section, set Label Buffer to **50%**, and check the Hard Constraint box.

When the Hard Constraint option is used, the buffer is respected regardless of available space. The Hard Constraint option results in well-spaced labels but also in the possibility of unplaced labels (labels that could not be placed on the map due to conflicts or because there is not enough space for the labels due to map scale).

- j Expand the Feature Weight section and type a Weight value of **1000**.



Feature weights are used to assign relative importance to features. The feature weights are ranked on a scale of 1-1000. Setting a value of 1000 will keep labels from other features away from the Place layer name labels.

- k Close the Label Class pane.

Note: The label settings take effect immediately.

- l Save your project.

You have now refined the label settings for a point feature.

Tips and Tricks: Label the largest and most important features first to help you place the dominant feature labels where you want them. Then you can label additional features.

Next, we will look at labeling polygons. There are three polygon features that you will label in this map: water bodies, parks, and areas of interest. Each has its own unique characteristics, so you will look at them independently.

Step 7: Label water feature polygons

You have been introduced to many labeling options for point features in ArcGIS Pro. Many of these options are the same for polygon features; however, the application may be different. In this step, you will learn some basic procedures, suggestions, and tips and tricks so that you can explore further on your own.

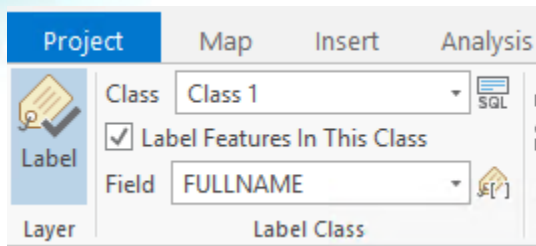
- a In the Contents pane, select the Waterbody layer and turn on the labels.

Hint: With the Waterbody layer selected in the Contents pane, from the Labeling tab, in the Layer group, click Label to turn labels on. The Label button should turn blue to indicate that the layer's labels are turned on.



There are multiple water body polygon features in the map. You can examine the ribbon to see the label settings.

- b From the Labeling tab, in the Label Class group, ensure that Class is set to Class 1 and that Field is set to FULLNAME to label the features in this class.



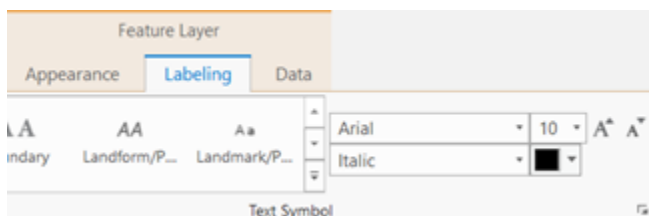
The FULLNAME field in the layer attribute table contains the full name of the different waterbody features.

Hint: You can open the attribute table for the Waterbody layer to view the field information.

The options in the Text Symbol group are a subset of the options available in the Label Class pane on the Symbol tab. When you make a change in one, it is reflected in the other. Likewise, the options in the Label Placement group are a subset of the options in the Label Class pane on the Position tab. The Text Symbol and Label Placement groups provide quick access to common label options.

- c In the Text Symbol group, change the font to Arial and the font style to Italic.

Note: You can also change the label font in the Label Class pane by clicking the Symbol tab and expanding the Appearance section, as you did previously.

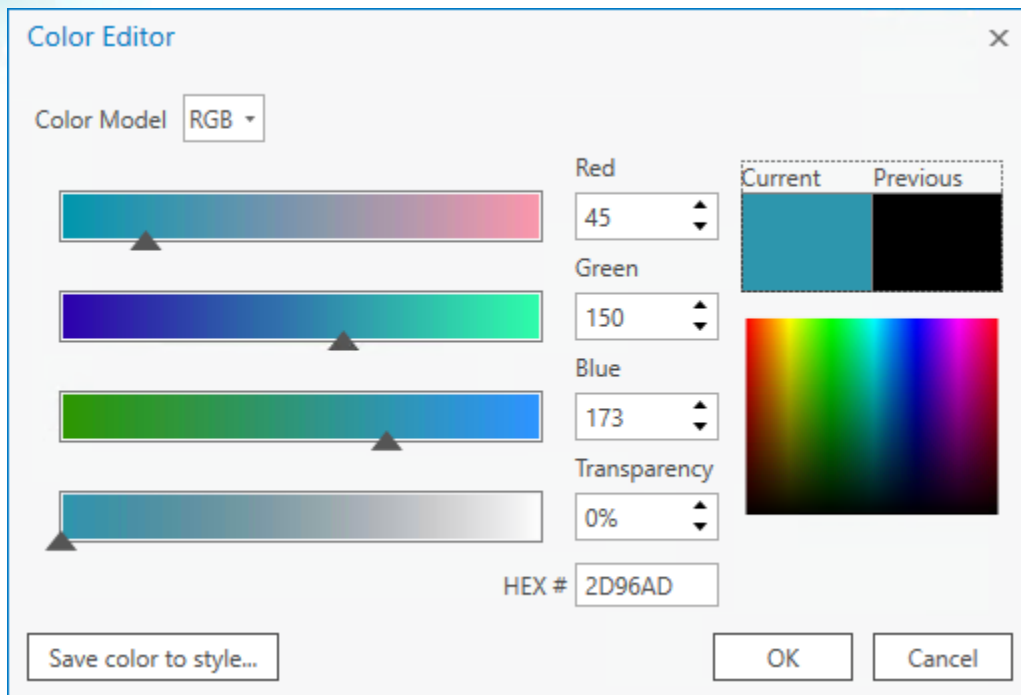


Tips and Tricks: Italics and serifs are frequently used when labeling water features to imitate the motion of those features. However, do not be afraid to try something else.

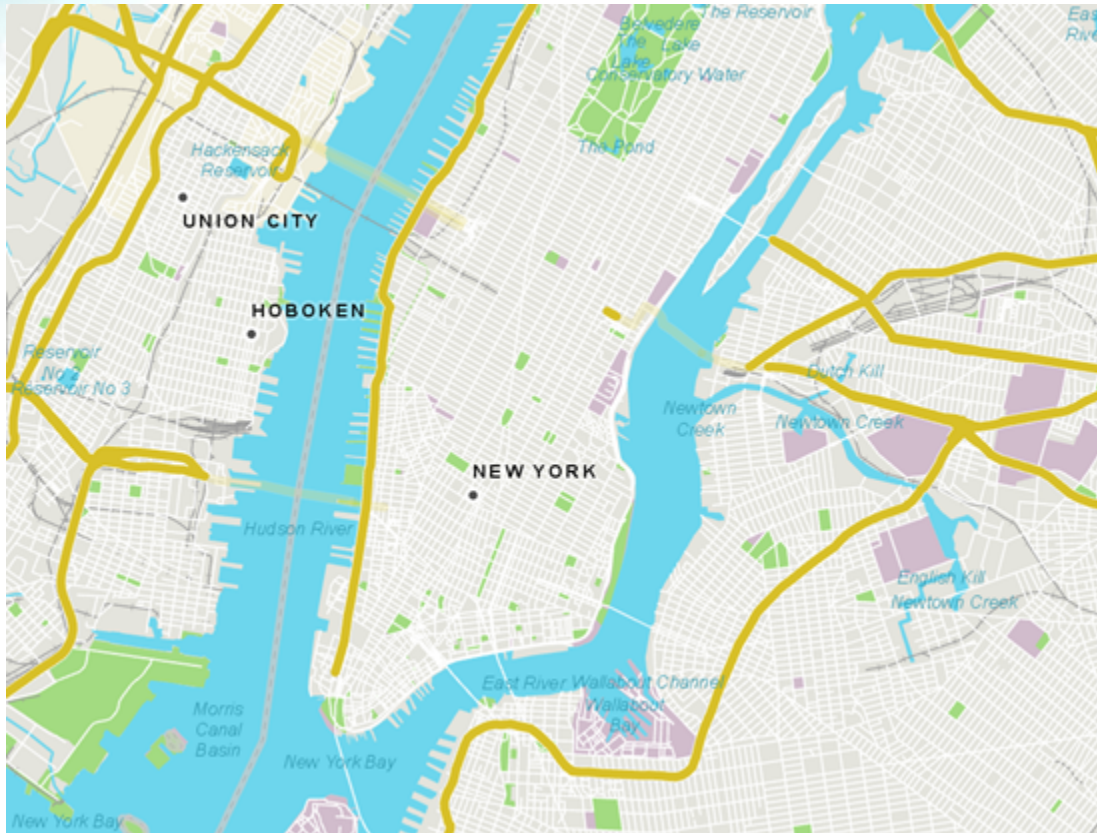
Next, you will change the color of the font to more closely tie it to the feature.

- d In the Text Symbol group, click the Color down arrow, and then click Color Properties to open the Color Editor.
- e Update the color model to the following values:

- Red: **45**
- Green: **150**
- Blue: **173**




- f Click OK to close the Color Editor.

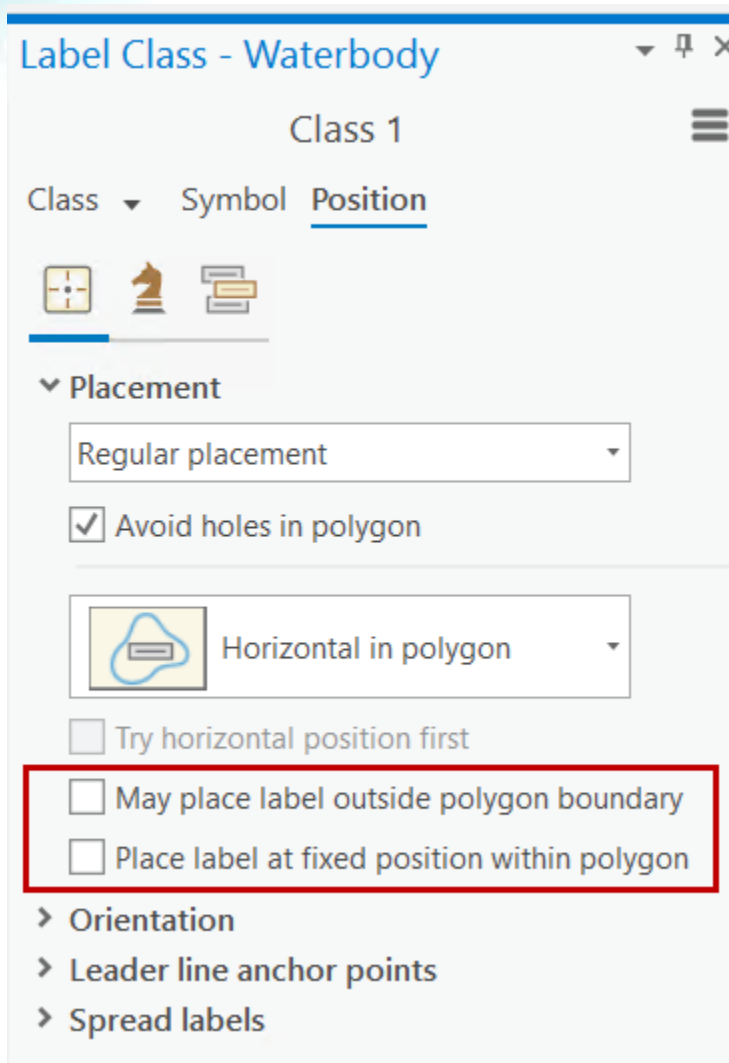



The blue label color is slightly darker than the blue feature color. This slight color variation helps the label stand out from the feature but still look related to it.

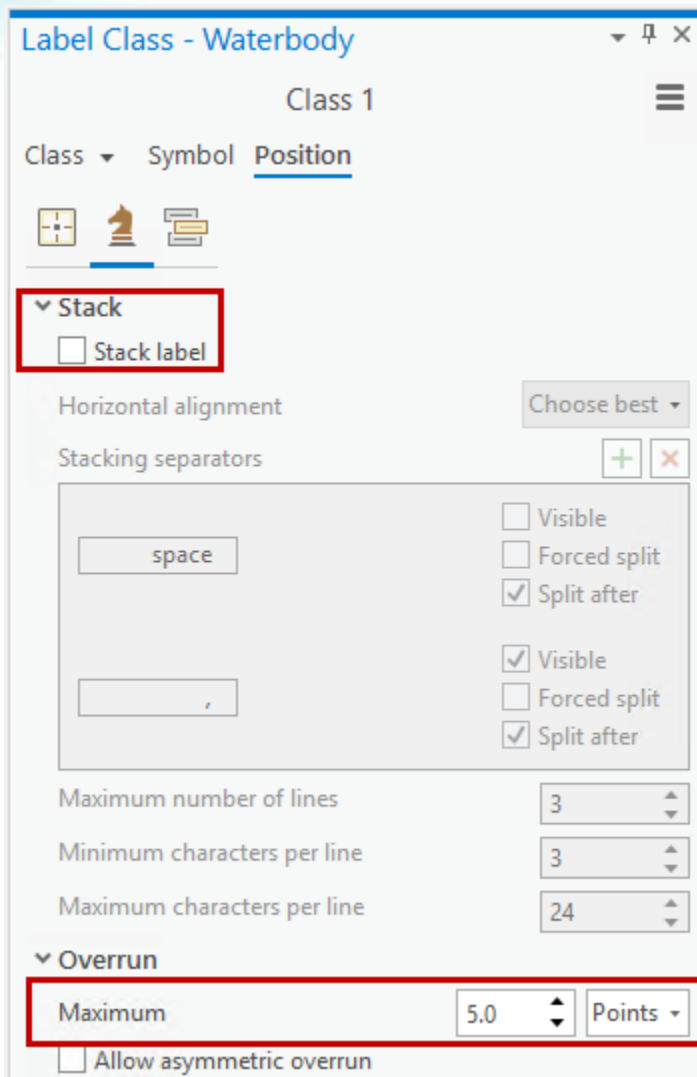
Tips and Tricks: Relating the color of the font to the feature is a great way to simplify communication and prevent confusion.

This layer has many smaller features labeled, so you will clean it up a bit.


- g** In the Contents pane, select the Waterbody layer, and then right-click the layer and choose Labeling Properties to open the Label Class pane.
- h** In the Label Class pane, from the Position tab, click the Position button  and expand the Placement section.
- i** If necessary, uncheck the May Place Label Outside Polygon Boundary and Place Label At Fixed Position Within Polygon boxes.

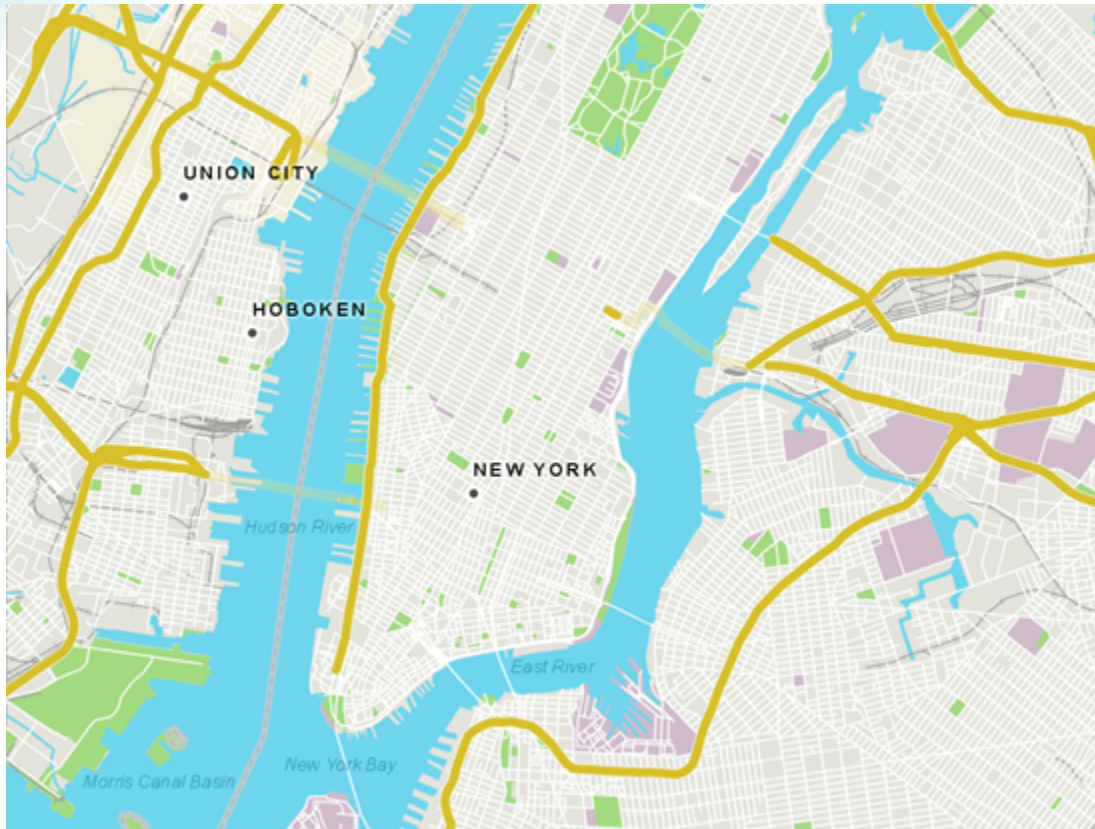


- j Click the Fitting Strategy button , expand the Stack section, and uncheck the Stack Label box.
- k Expand the Overrun section and update Maximum to **5** points to remove most of the small features being labeled.



For most polygon label placement styles, Maplex attempts to place the label inside the polygon. If the label is larger than the polygon, the label is not placed on the map. In this case, specifying a maximum overrun limit allows Maplex to utilize up to 5 points of free space outside the boundary of the polygon to place the label.

- i** Click the Conflict Resolution button  and expand the Remove Duplicate Labels section.
- m** Under Remove Duplicate Labels, from the drop-down list, choose Remove All.
- n** Close the Label Class pane and examine the map.



With the changes that you just made, you should now see labels on a few water bodies that are appropriate to the scale. (What is visible on your map will depend on the scale of the map, but it may include Morris Canal Basin, New York Bay, Hudson River, and the East River).

- Save your project.

Step 8: Label non-water polygon features

Based on what you have just learned about labeling polygon features, see if you can make similar adjustments to the labels for the Park and Areas Of Interest polygon feature layers. Do something that you feel works. You do not have to follow these steps exactly. When you are done, check back here to see if you got similar results. You can always follow the steps below, too.

The Park polygons represent larger parks in the map.

- a Turn on labels for the Park layer.

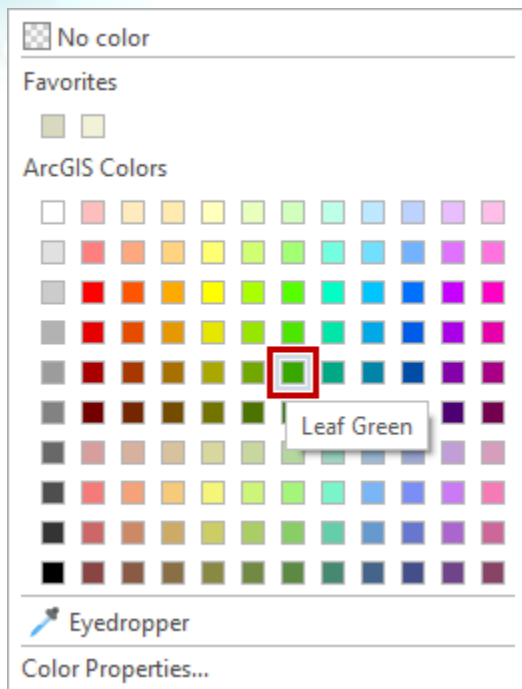


Note: The following steps for modifying the label placement for the Park polygon features are intentionally high-level. You were previously guided through most of these refinements; however, you should explore and experiment to determine what looks good to you.

- b Change the font to Arial and set it to Bold to make the font stand out a little more, but then drop the size to 9 point.

You want to choose a color for the labels to visually represent parks.

- c For font color, from the color palette, choose Leaf Green (column 7, row 5).



- d Open the Label Class pane for the Park layer.

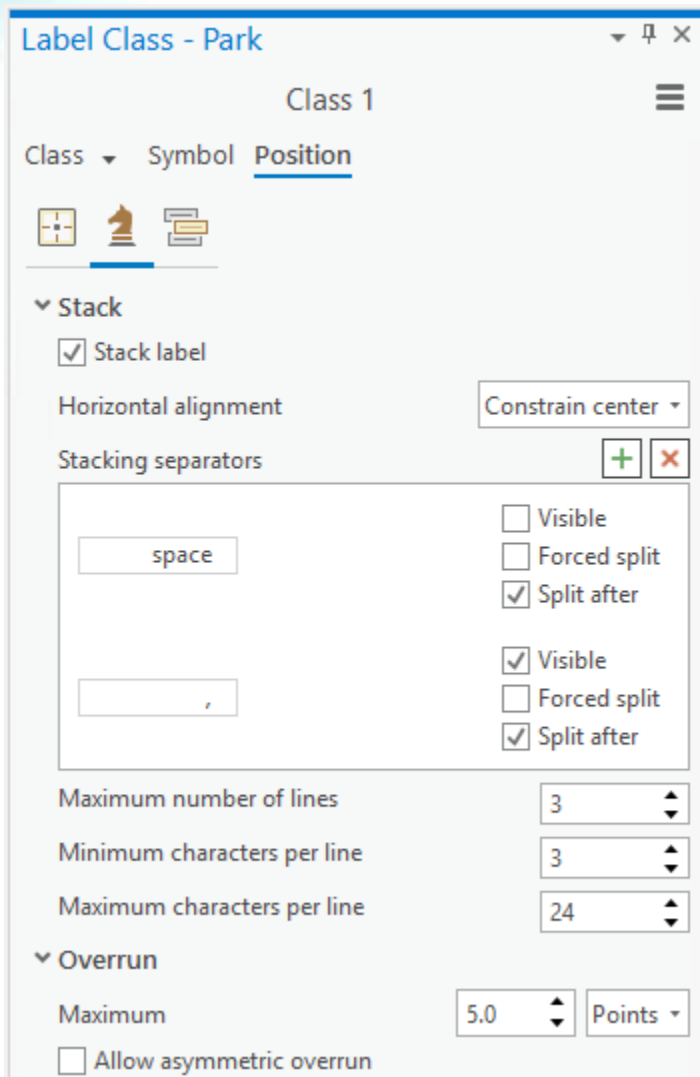
Hint: In the Contents pane, right-click the layer name and choose Labeling Properties.

You will not add a halo this time, as the bold helps the label stand out.

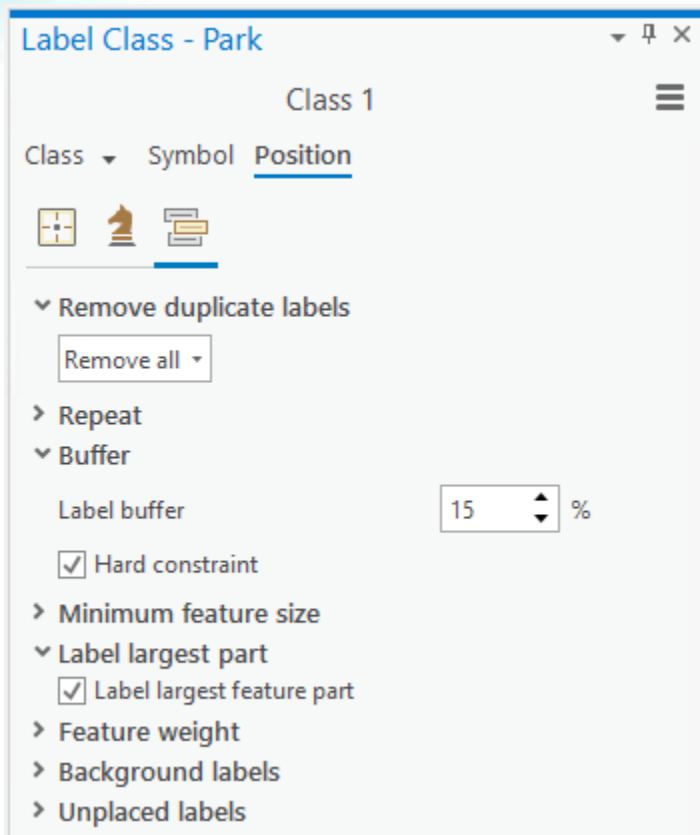
- e From the Position tab, ensure that the May Place Label Outside Polygon Boundary and Place Label At Fixed Position Within Polygon boxes are unchecked.
- f If necessary, turn on the option to stack the labels, and then set the horizontal alignment to Constrain Center.
- g Set the overrun maximum to **5** points.

Recall that the maximum overrun is the distance that a label can extend beyond a polygon feature.

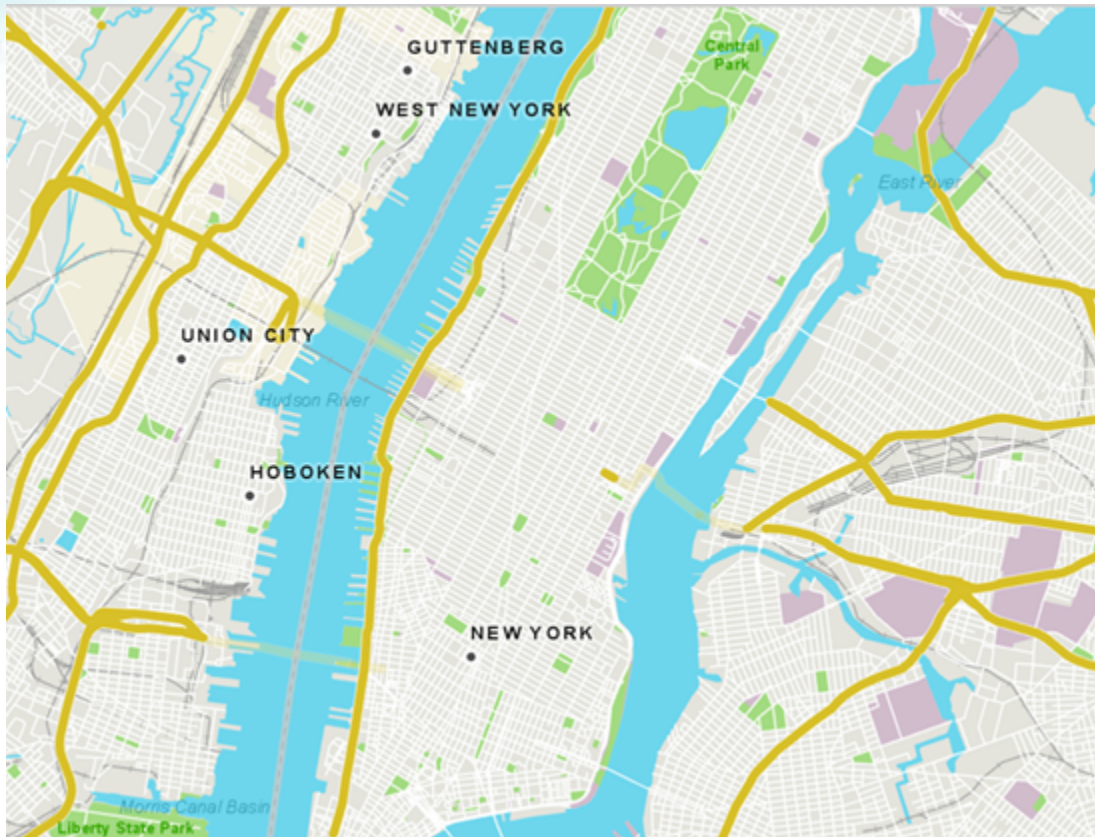
- h If necessary, uncheck the Allow Asymmetric Overrun option.



- i Set Remove Duplicate Labels to Remove All.
- j Turn on the Hard Constraint buffer.
- k Turn on the Label Largest Feature Part option.



1 Close the Label Class pane.



Next, you will experiment with the Areas Of Interest feature class labels.

The Areas Of Interest polygons represent things like museums, monuments, cemeteries, and smaller parks in the map. You will label these differently than the Park features, as they are less prominent.

m Turn on labels for the Areas Of Interest layer.

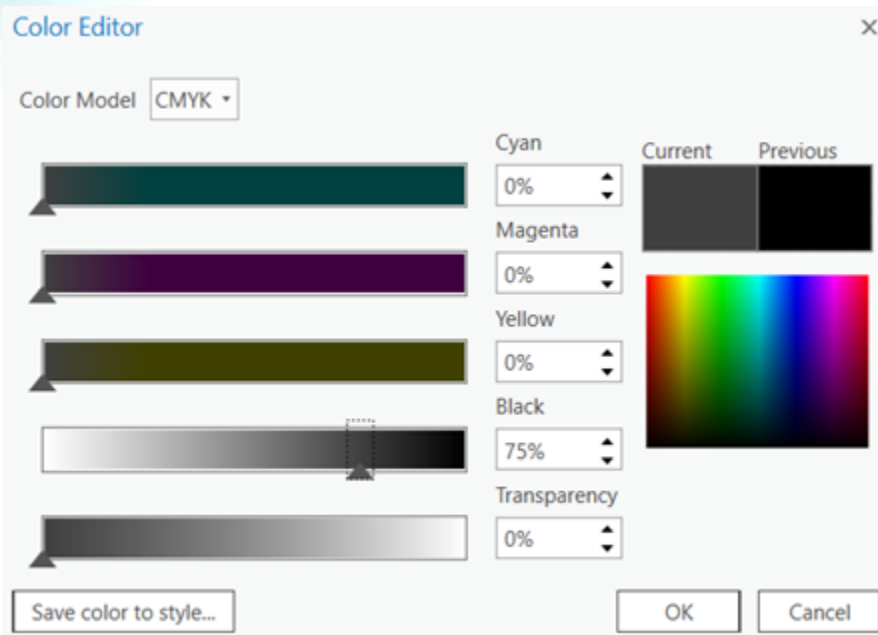
These features are less important than some of the other features in the map, so you should adjust the text symbol appropriately.

n Set the font to Arial, the font style to Regular, and the font size to 8 point.

Tips and Tricks: You can probably label with an even smaller-size font than you realize—even 6-point sizing works with a lot of font types.

o Verify that the text color is black, and then open the Color Editor and, if necessary, change the color model to CMYK.

p Change the Cyan, Magenta, and Yellow values to **0%** and the Black value to **75%**.



- q Click OK to close the Color Editor.
- r Open the Label Class pane for the Areas Of Interest layer, and then set the following parameters:
 - For Position, ensure that Placement is set to Regular Placement and uncheck the Avoid Holes In Polygon box.
 - Uncheck the May Place Label Outside Polygon Boundary and Place Label At Fixed Position Within Polygon boxes.
 - Turn on the Stack Label option and set Horizontal Alignment to Constrain Center.
 - Set the maximum overrun to **5** points.
 - Set Remove Duplicate Labels to Remove All.
 - Set the label buffer to **15%** and turn on the Hard Constraint option.
 - Turn on the Label Largest Feature Part option.



s Save your project.

Next, you will explore labeling of line features.

Step 9: Label line features

There are four line features that you will label in this map: rivers, roads, state lines, and major roads. First, we will look at labeling rivers.

The intention again is not to create an identical map but to learn about the various settings and control that you have over the labels in your map. High-level instructions will again be provided, allowing you to experiment and explore the various settings.

Note: You may want to turn off the Park and Areas Of Interest layers in the Contents pane. You can turn off a layer by unchecking the box to the left of the layer's name. Feel free to turn off all point labeling.

Rivers are special features that have curves and tight bends that are not easily labeled without seeming cramped. You can use the various label placement options to label the rivers in your map in a visually pleasing manner.

- a Turn on labels for the River layer.
- b For font color, use the same color that you used for the Waterbody feature class.

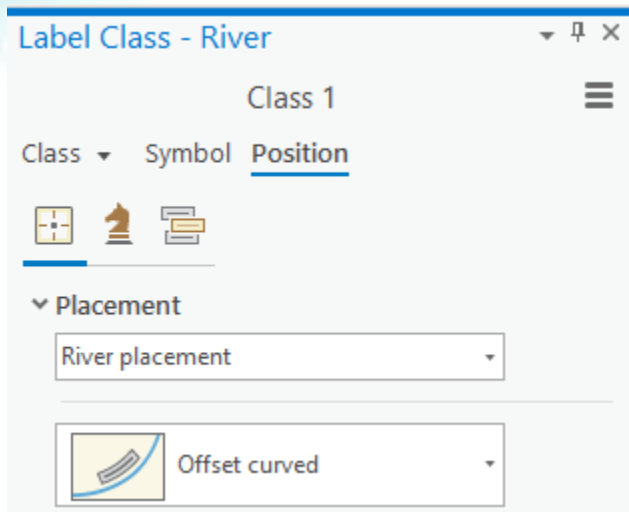
Hint: The values are Red - 45, Green - 150, and Blue - 173.

- c Make the font Arial, Regular, and 8 point, as these features are less important in this map.

Note: Water features are often labeled in italics. If you would like, you can use italics here to match what you did with the water bodies.



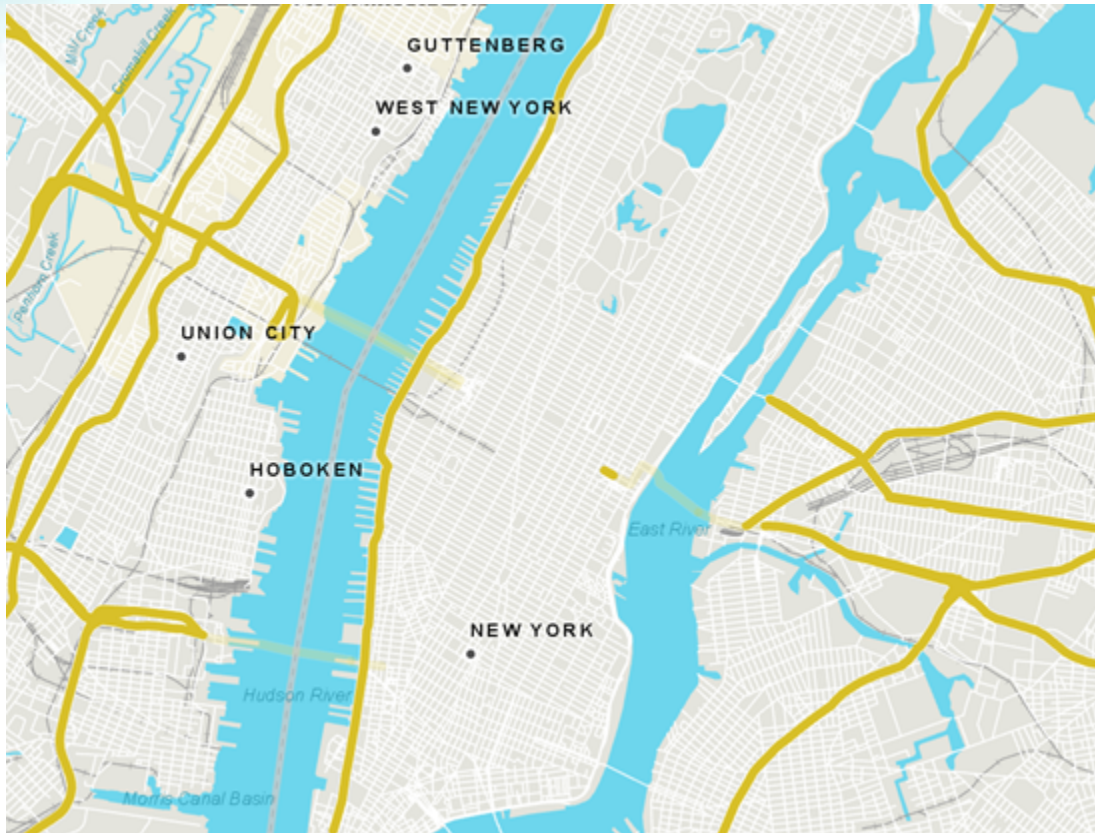
- d In the Label Class pane for the River layer, change Placement to River Placement with the Offset Curved option.



The Maplex River Placement style generalizes the turns of a river and places the label following that smoother line.

Note: Refer to ArcGIS Pro Help for more information about [river label placement \(https://bit.ly/2JAICOr\)](https://bit.ly/2JAICOr).

- e In the Label Class pane, set the following additional parameters:
 - Set Primary Offset to **3** points.
 - Turn off the Stack Label option.
 - Set the overrun maximum to **5** points.
 - Remove all duplicate labels.
 - Set Label Buffer to **15%** and turn on the Hard Constraint option.
- f Look at the labeling of rivers, such as Penhorn Creek and Mill Creek on the northwestern side of the map, to see how the stylistic and label placement attributes are applied.



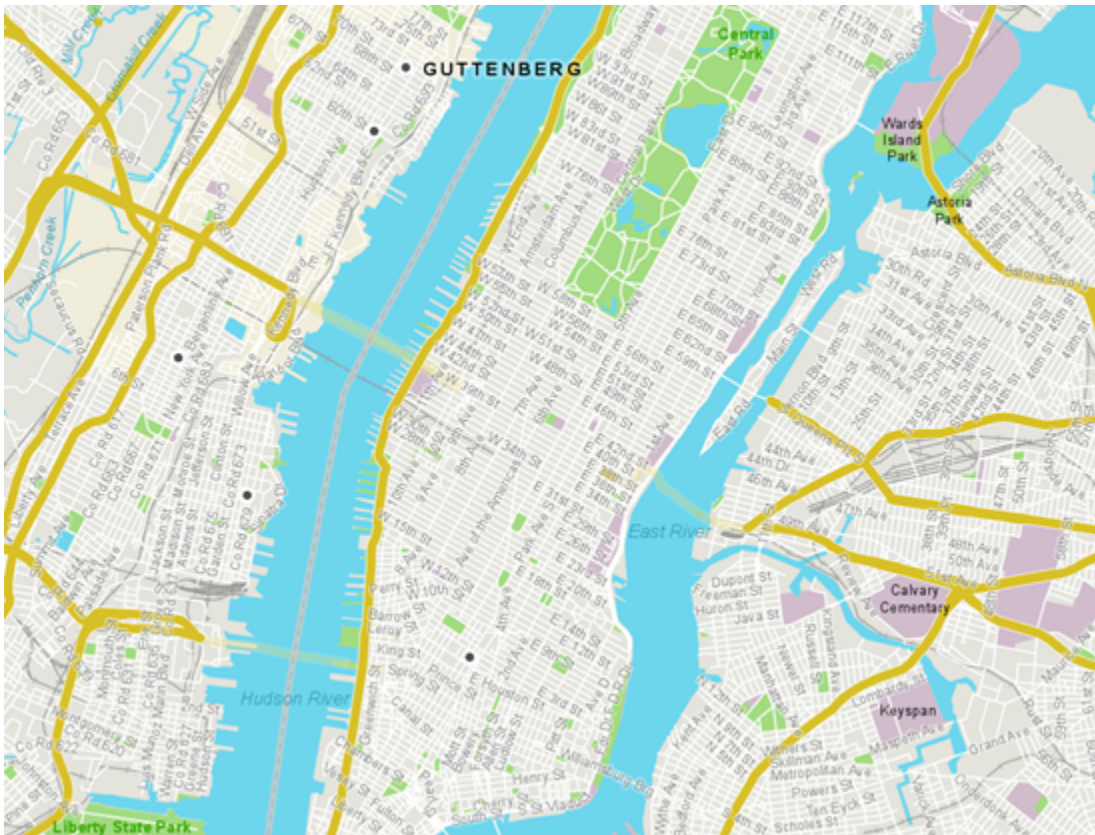
Now we will look at road line features. There are two road feature classes in this map: MajorRoads and Road. You will adjust the Road feature class first. The Road feature class contains streets and roads that are not major roads. These roads are less important than the major roads, and because there are many of them, they will not need to stand out as much.

Note: Refer to ArcGIS Pro Help for more information about street and road label placement (<https://bit.ly/2JBODDZ>).

- g** Turn labels on for the Road feature class.
- h** Set the font to Arial, **7.5** point, Regular, and a 50% gray color.
- i** In the Label Class pane, set the following options:
 - Add a white 1-point halo with **50%** transparency.
 - For label placement, use Street Placement with Centered Curved.

This setting ensures placement of the label on the feature at the midpoint of the label and along the curve of the line feature.

- Turn off the Stack Label option.
- Set the maximum overrun to **0**.
- Set Remove Duplicate Labels to Remove All.
- Add a label buffer of **15%** and turn on the Hard Constraint option.



Note: It may take a moment for the changes that you made to be reflected in the labels on the map.

- j** Save your project.
- k** If you are continuing to the next exercise now, leave ArcGIS Pro open.
- l** If you will continue to the next exercise at a later time, exit ArcGIS Pro.

In this exercise, you learned how to add and refine labels to points, lines, and polygons. You also got a chance to experiment with font style, size, and color and see how those properties

can contribute to creating visual hierarchy in the map. In the next exercise, you will learn some more advanced labeling techniques to refine the map even further.