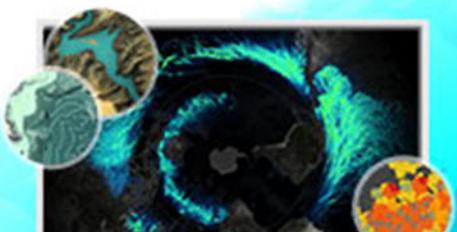


Exercise

Labeling a Map

Section 4 Exercise 1

05/2018



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 screenshots you see in the course materials.

Time to complete

Approximately 60-65 minutes.

Software requirements

ArcGIS Pro 2.1

Introduction

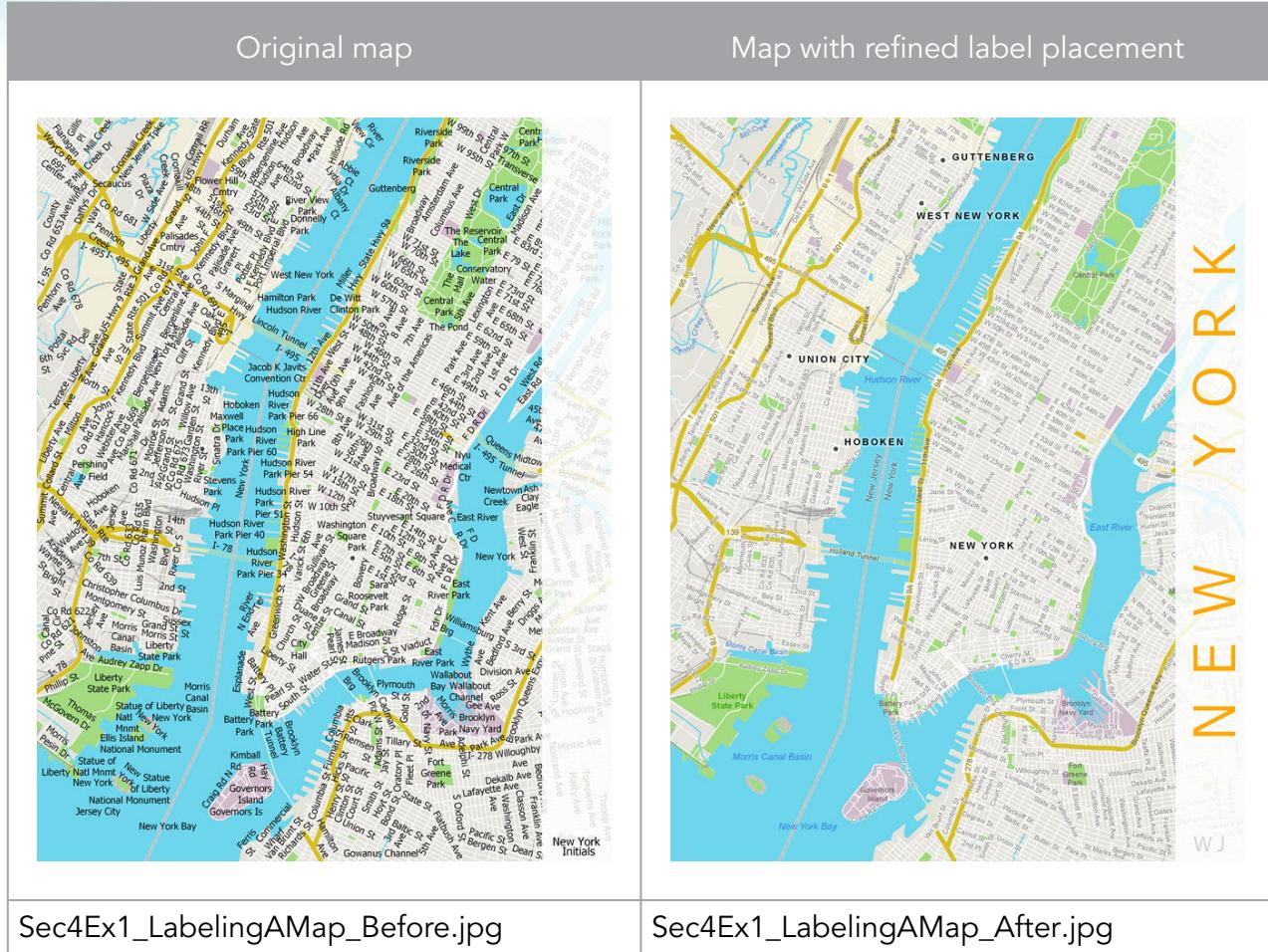
Almost all maps have [labels](https://bit.ly/2qnGhNN) (<https://bit.ly/2qnGhNN>) on them. That fact alone makes labeling a very important piece of mapmaking and is why learning about labeling is key. At its core, the text helps convey information that other elements like points, lines, and areas cannot.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

Extending beyond the map, the text in the marginalia should be considered in the overall construction of a map. Whether that be text in a title, a legend, or an app interface, that text is just as important as text placed in the map.

What will you learn?

In this exercise, you will learn how to use ArcGIS Pro 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 doesn't 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, you might want to make another version with your own styling when you feel comfortable with the concepts and software functionality.

Step 1: Download the exercise files

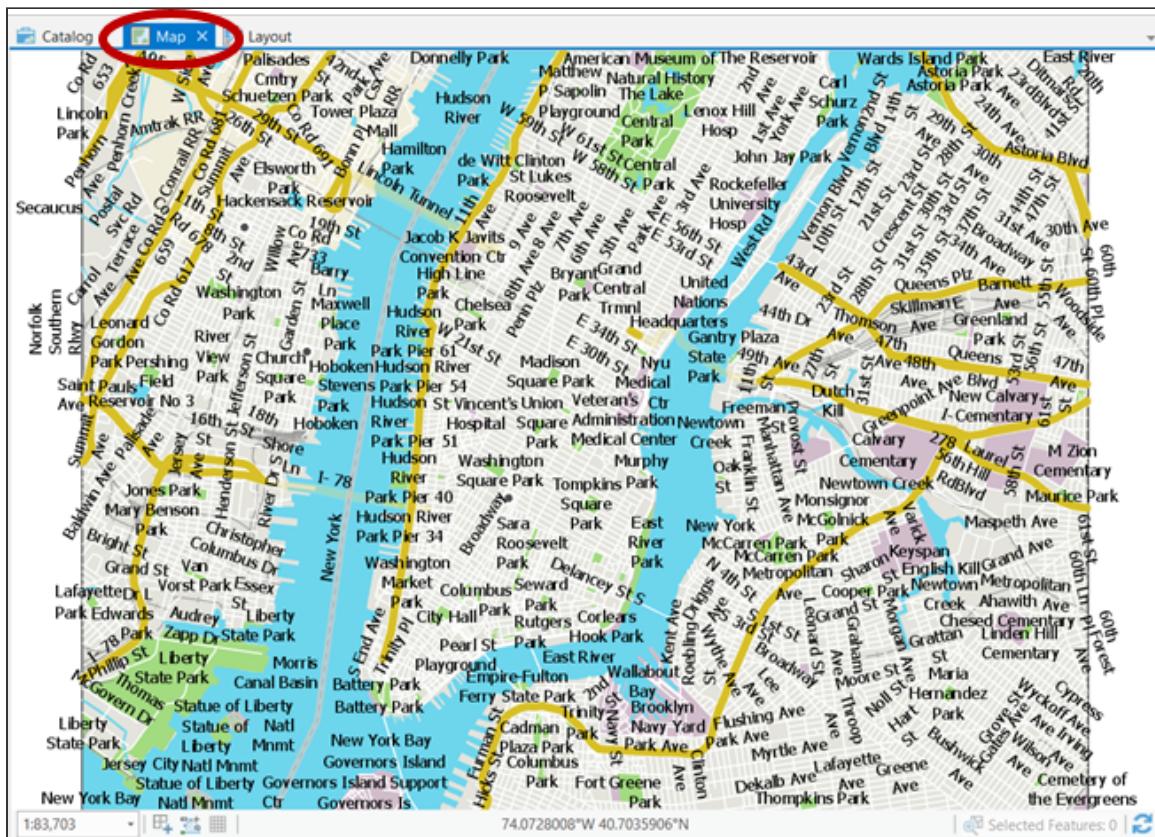
In this step, you will download the exercise files.

- Open a new web browser tab or window.
- Go to <https://bit.ly/2IEEk7a>, and download the exercise ZIP file.

- 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

- a If necessary, start ArcGIS Pro and sign in using the credentials provided at the start of this course (username includes _cart).
- b From the main ArcGIS Pro start page, click Open Another Project, and browse to the Sec4Ex1_LabelingAMap.ppkx project package file that you saved on your computer.
- c At the top of the map window, if necessary, click the Map tab.



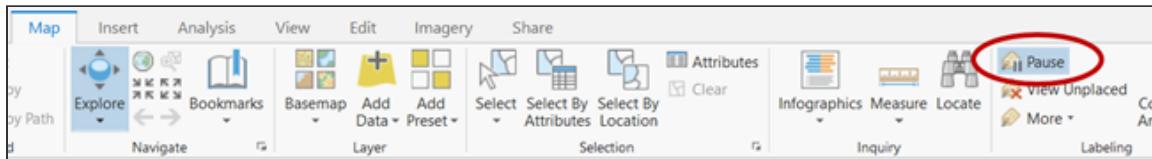
The project opens a street map of New York City. It contains several layers that have been stylized, which are now ready to be labeled.

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

- d From the Project tab, click Save As and type a name for your project, such as **Sec4Ex1_LabelingAMap_<yourfirstandlastname>.aprxF**.

- e Save the file to the folder on your computer where you are saving your work.

You will see the map label with all 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 drawing of labels when you open a map.

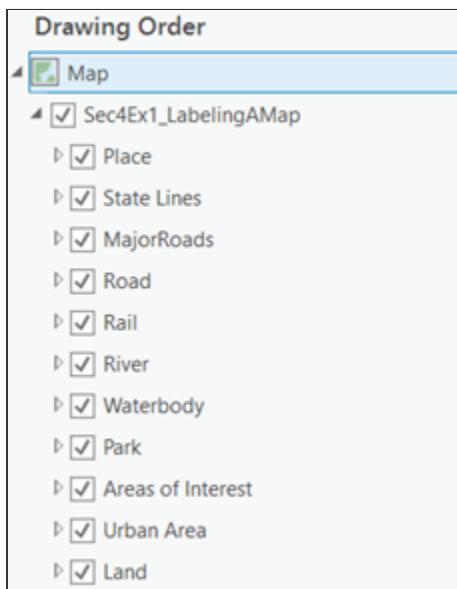


- f From the Map tab, in the Labeling group, turn the Pause tool on to suspend labeling in the current map.

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

- g Turn the Pause tool off to redraw the labels (this may take a minute).

- h 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.

- i Select the Place layer.

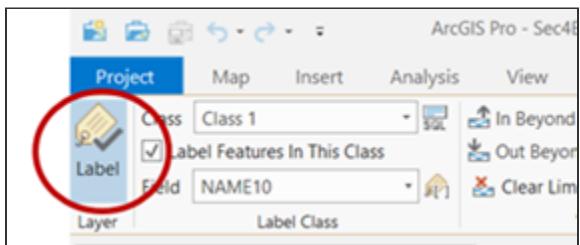
- j On the ribbon, click the Labeling tab for the selected feature layer.

This tab and the Label Class pane (which will be examined in the next step) will be the focus of 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 advanced settings.

You will now turn off the labels for all layers.

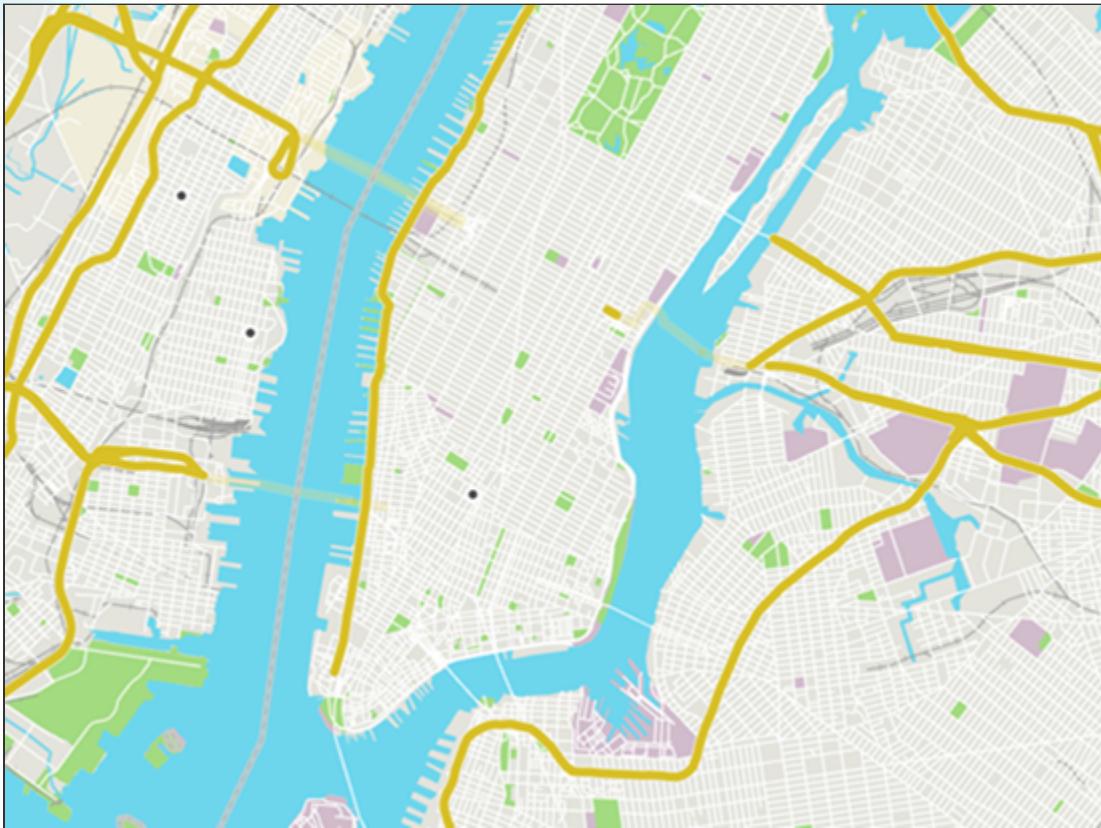
- k** In the Contents pane, with the Place layer selected, click the Label button to turn off the labels.



Note: The Label button is a toggle button and will be blue if the labels are on. Click the Label button again to turn labels off.

- l** One by one, select each layer in the Contents pane and click the Label button to turn labeling off for the layer.

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



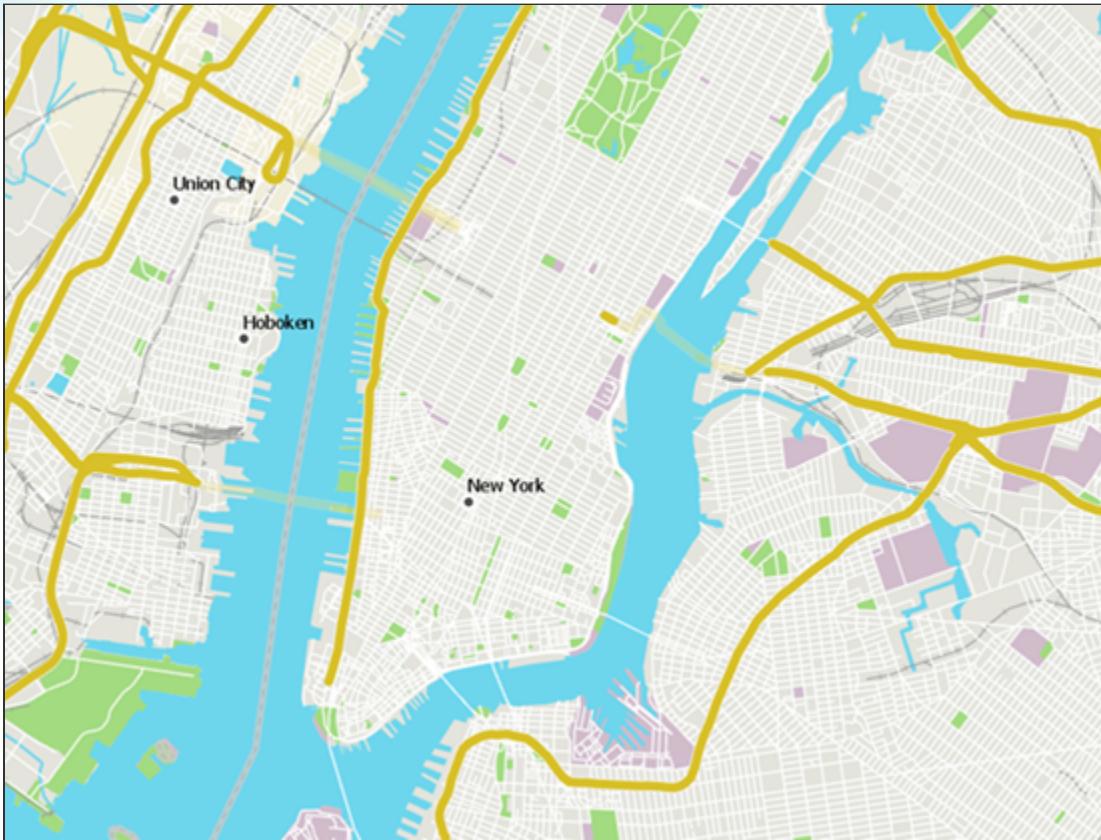
You will use a combination of the Contents pane, Label Class Properties pane, and the Labeling ribbon to refine the label placement for each feature. You will start with the Place labels (a point feature class). A feature class is a collection of geographic features that share the same spatial representation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

Step 3: 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 and turn on the labels for this feature class.

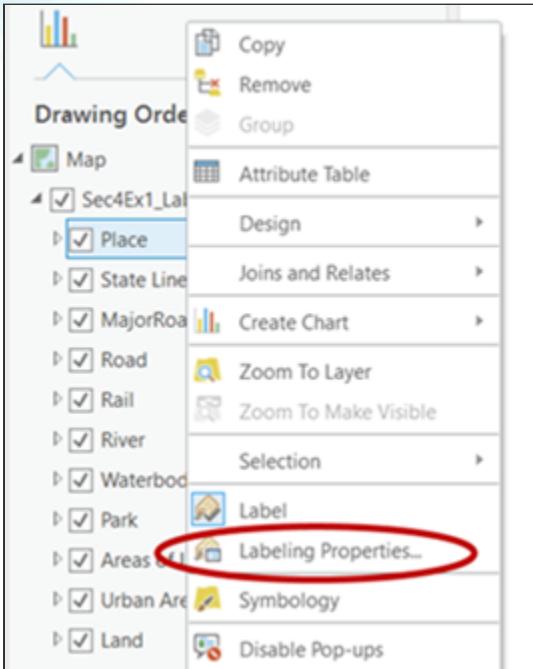
Hint: Remember that the Label button is located on the ribbon and will be blue when labels are turned on.



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.

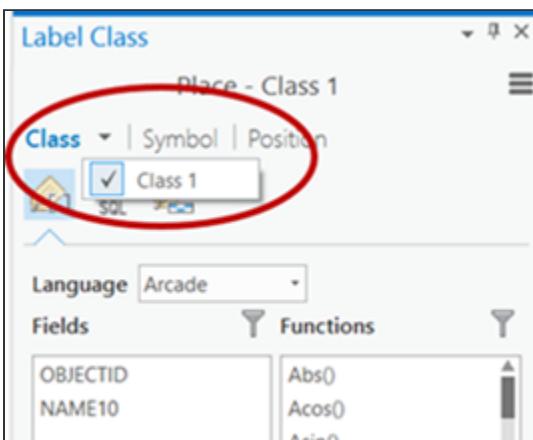
- b In the Contents pane, right-click the Place layer and choose Labeling Properties from the drop-down list.



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 the Label Class pane, if 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 Place feature class has one label class; the arrow next to the Class tab opens a drop-down list that lists all label classes for this feature class.



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

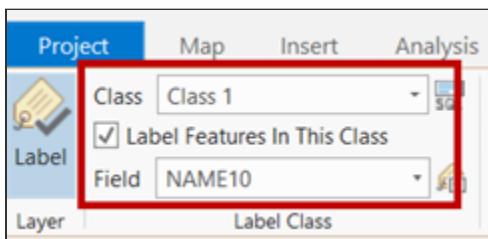
- c At the top of the Label Class pane, click the Symbol tab to see stylistic attributes that you can adjust for the label.
- d At the top of the Label Class pane, click the Position tab to see the label placement attributes that you can adjust. If you are familiar with Esri Maplex for ArcGIS and ArcMap, the options on this tab will be familiar to you; if not, exciting times ahead!

Now let's look at how you can use these attributes to adjust the style and placement of your labels.

Step 4: Modify point feature label appearance

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

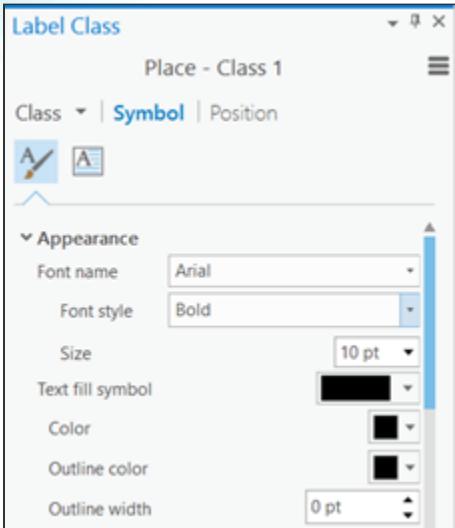
- a From the Labeling tab, in the Label Class group, ensure that Class 1 is the class being labeled and that the field is NAME10. NAME10 is the field in the layer attribute table that contains the city names.



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, from the Symbol tab, expand the Appearance section and change the font to Arial, 10 point, and Bold.
- c Confirm that the Color is set to Black, and click Apply.

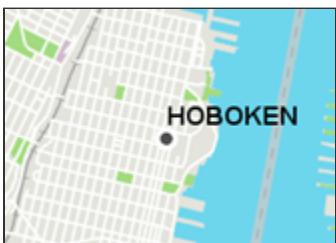
Note: *Outline Width is 0*, so *Outline Color* has no effect.



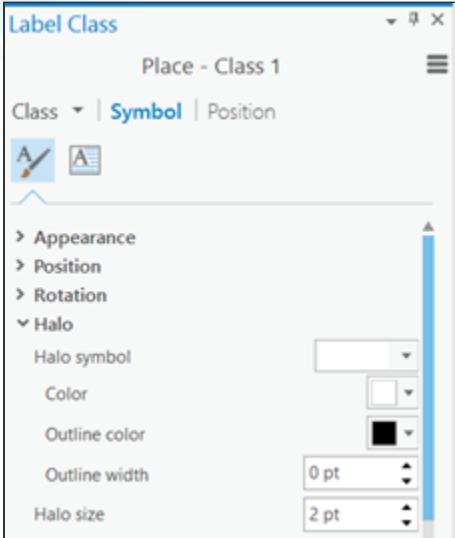
Tips and Tricks: When labeling, limit the number of fonts used. More than two is generally excessive. You can play with variations in font size, color, italics, and boldness to differentiate items.

- d In the Label Class pane, scroll down to explore the options in the Text Case field. Select a value, and click Apply to see the effect.
- e 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.



- f In the Label Class pane, from the Symbol tab, expand the Halo section.
- g For Halo Symbol, select the White Fill polygon symbol and apply a Halo Size of 2 points.



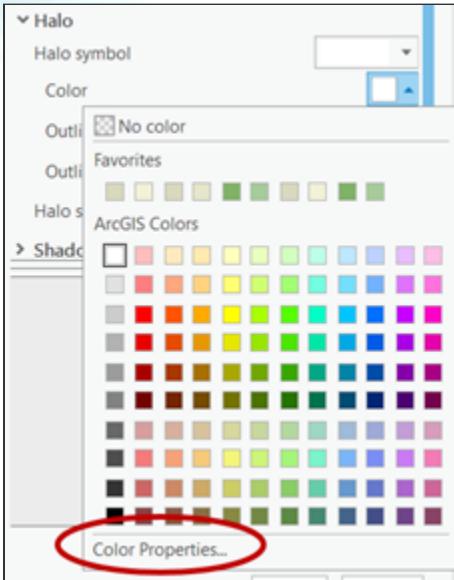
- (h) When you are finished, at the bottom of the Label Class pane, click Apply.



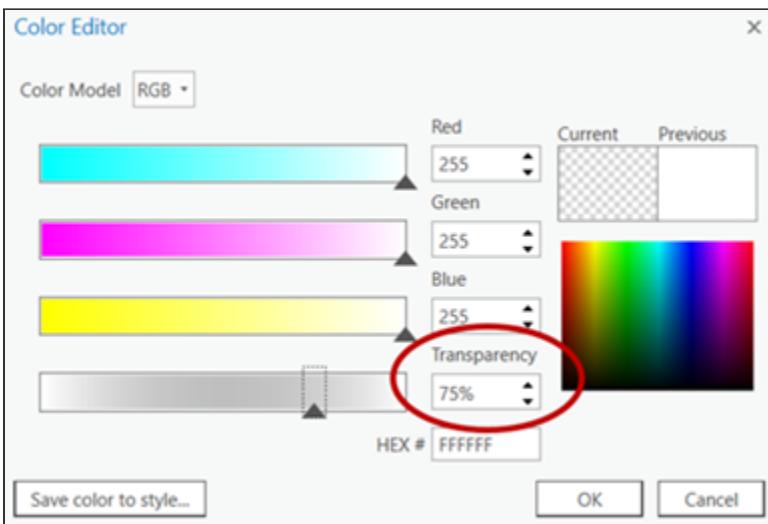
Tips and Tricks: Halos are great for helping a label stand out. ArcGIS Pro also provides a transparency option. Halos are generally needed less on water area features, as there are not many features in the water competing with the label.

You will now adjust the halo transparency.

- (i) For Color, click the white color chip to open the color palette.



- j At the bottom of the color palette, click Color Properties to open the Color Editor window.
- k Change Transparency to 75%, and click OK.

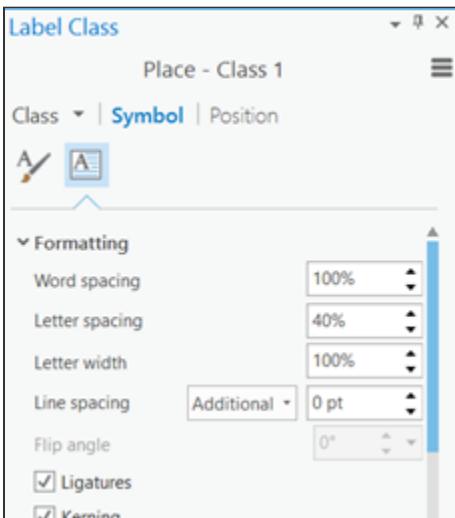


- l Click Apply to see the changes in your map labels.
The label halos are more subtle now.

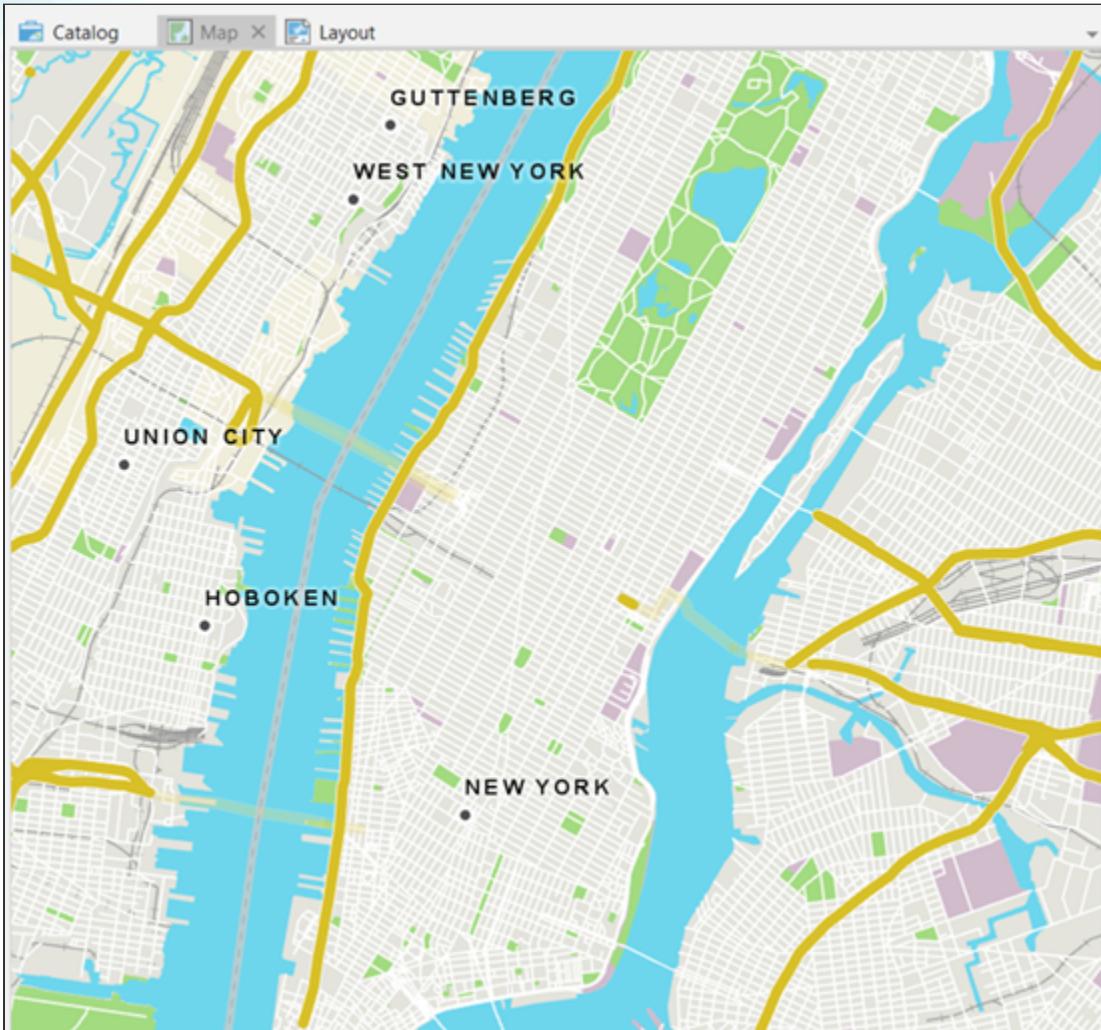


- m In the Label Class pane, under the Symbol tab, click the Formatting button.

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.



- n Expand the Formatting section, change Letter Spacing to **40%**, and click Apply. You can also try other values to see their effects.



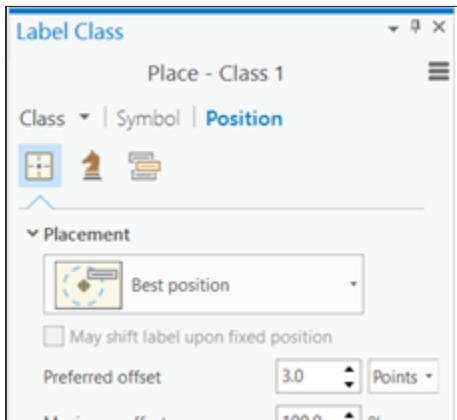
Step 5: Modify point feature label placement

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, and from the drop-down list, confirm that Best Position is selected.

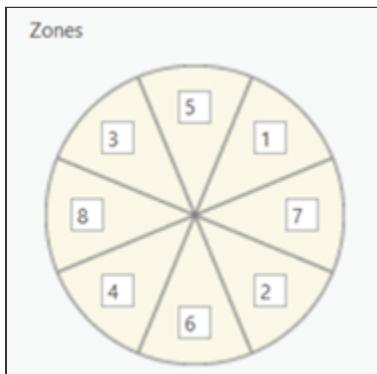
- c Increase the Preferred Offset value to **3.0** points.



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>).

- d In the Zones pie graphic, change the value order to **5, 1, 7, 2, 6, 4, 8, 3** (in clockwise order) by typing the values into the fields.



Updating these values will provide better label placement.

- e Under the Position tab, click the Fitting Strategy button

- f Expand the Stack section and uncheck the Stack Label box to turn off stacking.

Turning off this option will prevent the Maplex Label Engine 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. This 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.

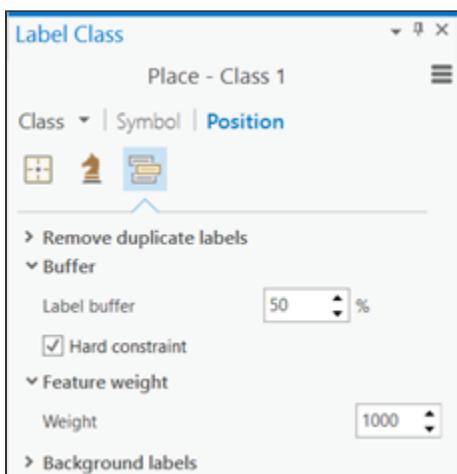
Note: Refer to ArcGIS Pro help for more information about specifying a label buffer distance (<https://bit.ly/2ETZZWW>).

- g Under the Position tab, click the Conflict Resolution button .
- h Expand the Buffer section, set Label Buffer to **50%**, and check the Hard Constraint box.

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

i Expand the Feature Weight section and provide 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 name labels.



- j When you are finished, close the Label Class pane, and save your map.

Note: The label settings take effect immediately.

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

Tips and Tricks: Label the largest, most important features first and then go on to the next features. This helps you place the dominant features where you want them.

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

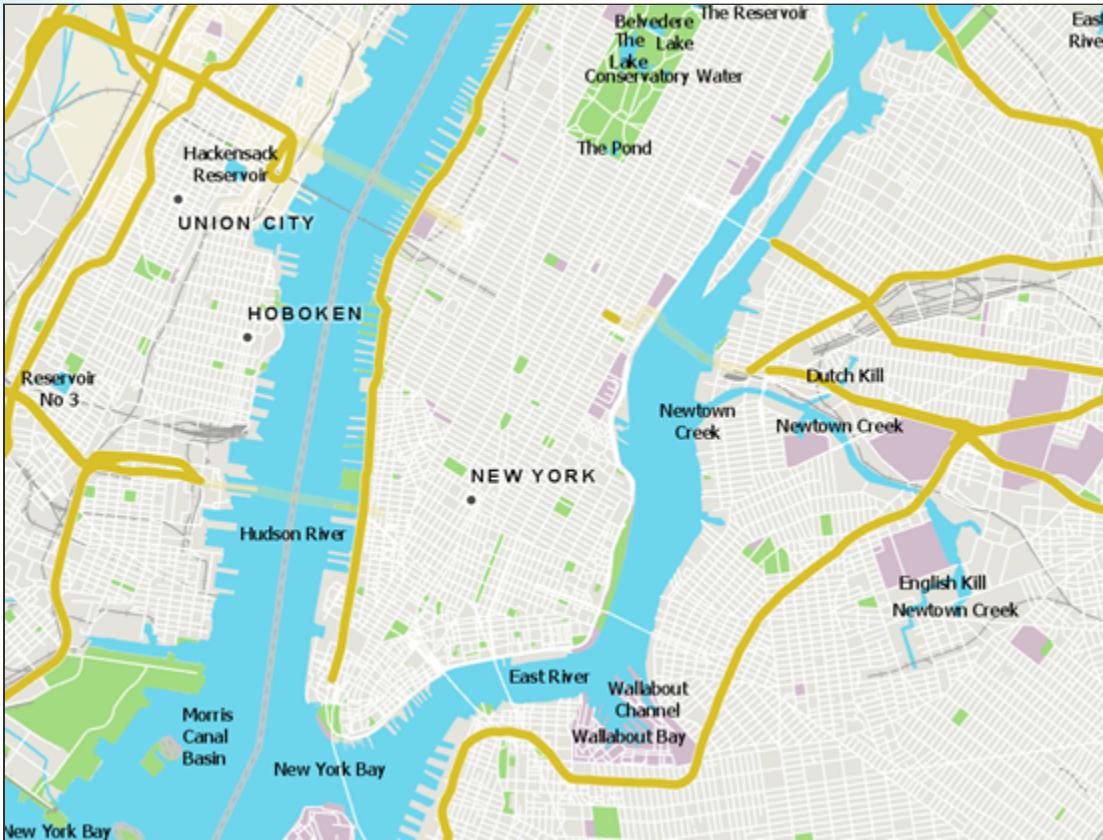
Step 6: Label water feature polygons

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

The Waterbody polygons represent water features in the map. Water features are often labeled with blue italic text using a serif font. This is a good starting point for your water feature polygon labels. You will learn some additional tips to enhance your map.

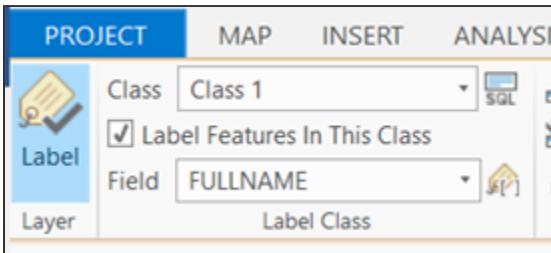
- a In the Contents pane, select the Waterbody layer and turn on the labels.

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 it is selected.



There are multiple waterbody 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.

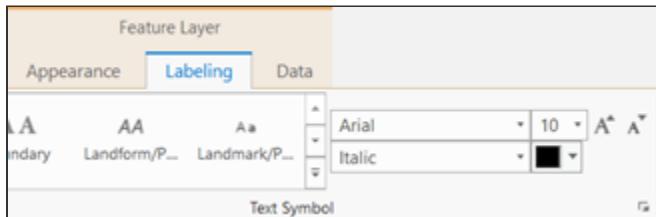


Hint: You can open the attribute table for the Waterbody layer to view the field information.

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

Hint: You can also change the label font in the Label Class pane > Symbol tab > Appearance section, as you did previously.

- d Change the font style to Italic.



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

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

- e In the Text Symbol group, click the Color down arrow and choose any blue color.

You can alternatively sample the color of the water feature and add black to it for the label. To save you sampling the color, it is: HEX #6DD6ED.

Note: To sample the color, you will need to use an application that has a color dropper tool.

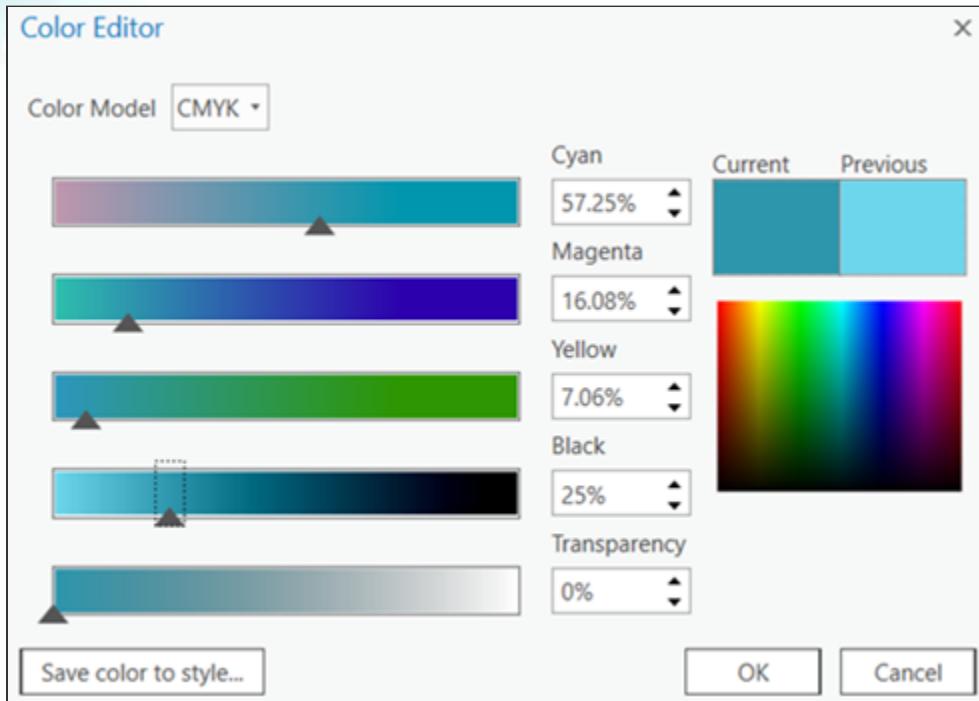
- f In the Text Symbol group, click the Color down arrow, and then click Color Properties to open the Color Editor.

- g For HEX #, type **6DD6ED** to change the blue to match the color of the water feature.

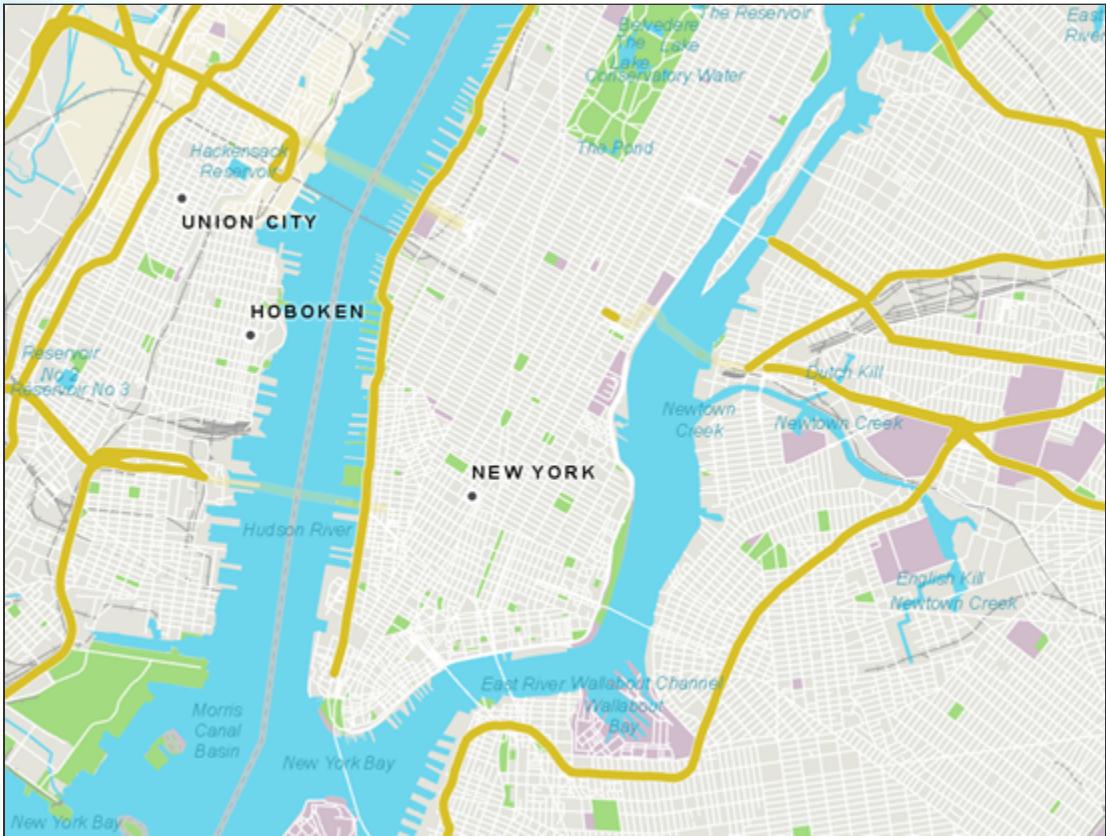
- h For Color Model, select CMYK from the drop-down list.

Note: For more information on color models (<https://bit.ly/2GP8WGS>), refer to ArcGIS Pro help.

- i Change the value of Black ("K" in the CMYK model) to **25%** to see how that looks.



- j Click OK to close the Color Editor.

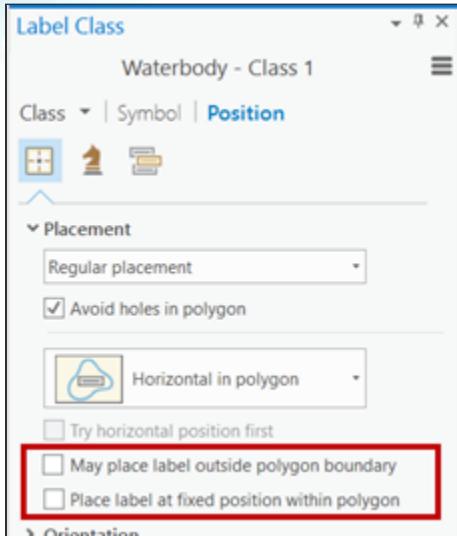


The slightly darker blue color provides just enough variation between the label color and the feature color. This is a quick way to help the label stand out from the feature but still look related to it.

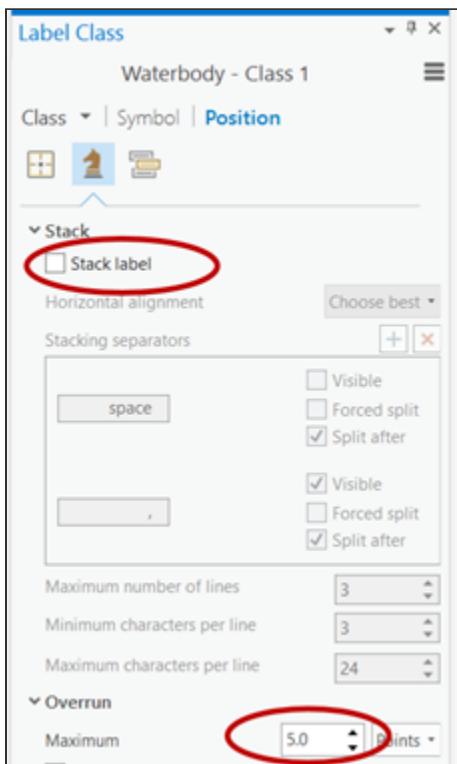
Tips and Tricks: Relating the color of the font to the feature is a great way to simplify communication and prevent confusion.

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

- k In the Contents pane, select the Waterbody layer, and then right-click and choose Labeling Properties to open the Label Class pane.
- l In the Label Class pane, from the Position tab, click the Position button and expand the Placement section.
- m Ensure that the May Place Label Outside Polygon Boundary and Place Label At Fixed Position Within Polygon boxes are unchecked.

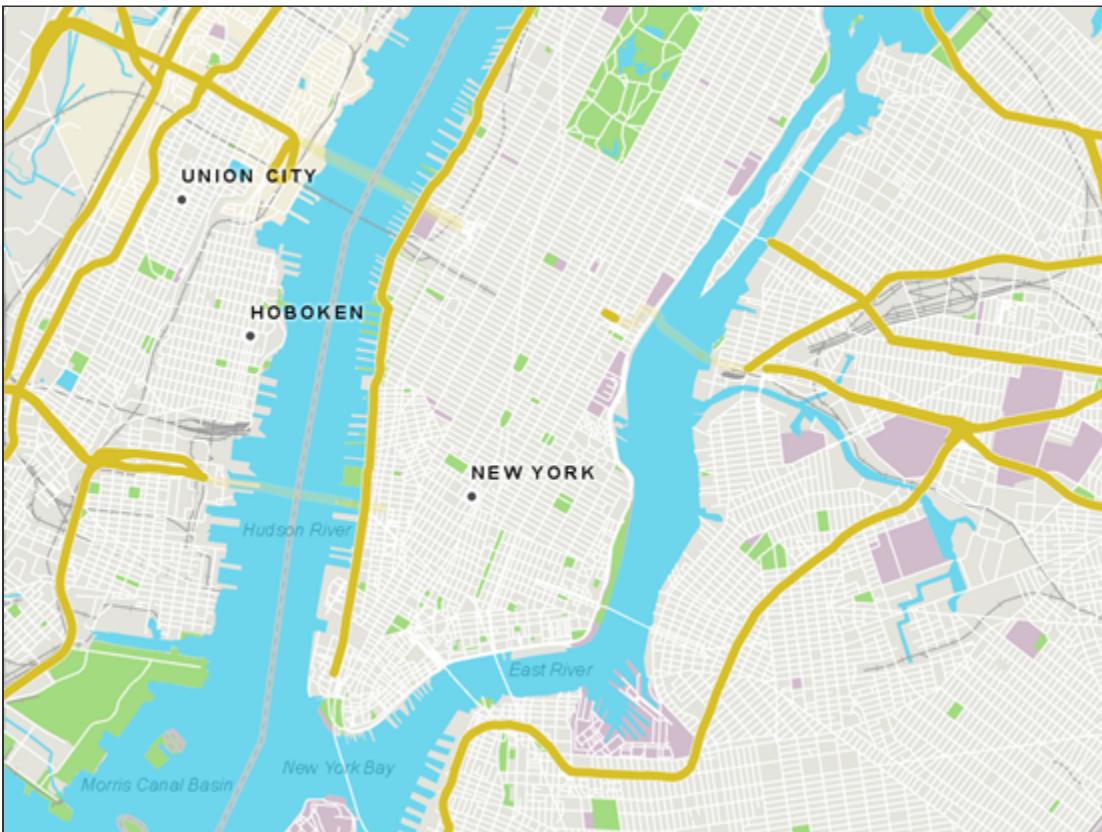


- n Click the Fitting Strategy button , expand the Stack section, and uncheck the Stack Label box.
- o Expand the Overrun section and update Maximum to 5 points to remove most of the small features being labeled.



For most polygon label placement styles, the Maplex Label Engine attempts to place the label inside a 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 the Maplex Label Engine to utilize up to 5 points of free space outside the boundary of the polygon to place the label.

- p Click the Conflict Resolution button , expand the Remove Duplicate Labels section, and choose Remove All from the drop-down list.
- q Close the Label Class pane and examine the map.



With the changes you just made, you should now see labels on a few waterbodies that are appropriate to the scale (including Morris Canal Basin, New York Bay, Hudson River, and the East River).

Step 7: 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 like you did to the Waterbody layer. Do something that you feel works. You don't have to follow

these steps exactly, unless you want to. 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.

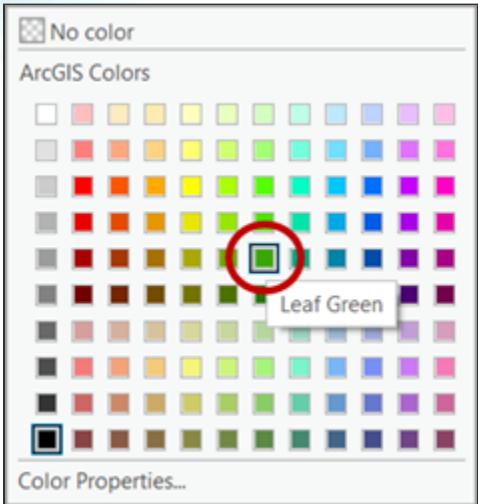


Note: The following steps for modifying the label placement for the Park polygon features are intentionally high-level. You were previously guided through most of these refinements; however, you should explore and experiment to determine what looks good to you.

- b Change the font to Arial, 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).



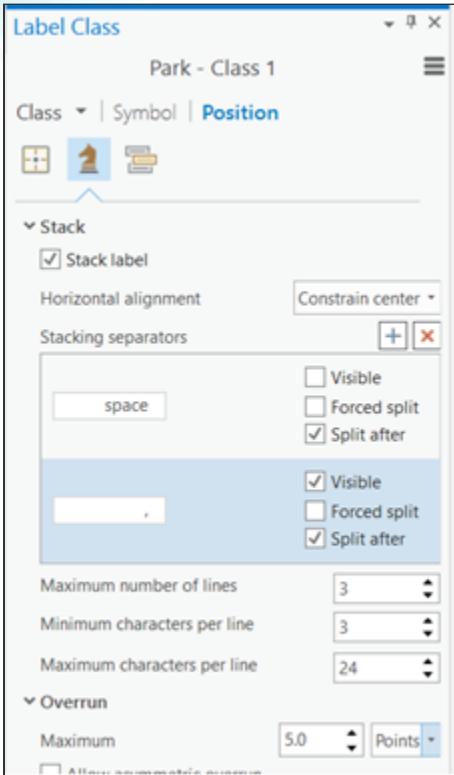
- d Open the Label Class pane for the Park layer.

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

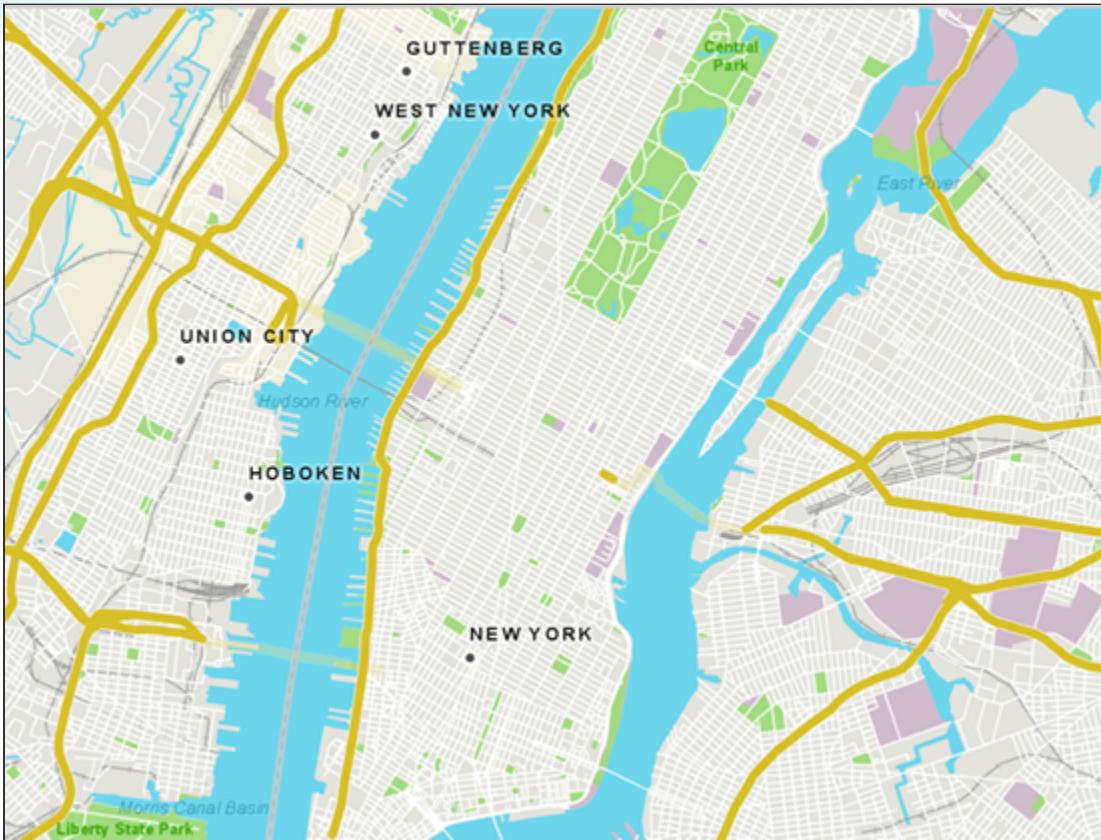
You won't add a halo this time, as the bold helps the label stand out.

- e From the Position tab, ensure that the May Place Label Outside Polygon Boundary and Place Label At Fixed Position Within Polygon boxes are not checked.
- f If necessary, turn on the option to stack the labels, and 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 Set Remove Duplicate Labels to Remove All.
- i Turn on the Hard Constraint buffer.
- j Turn on the Label Largest Feature Part option.
- k Close the Label Class pane.



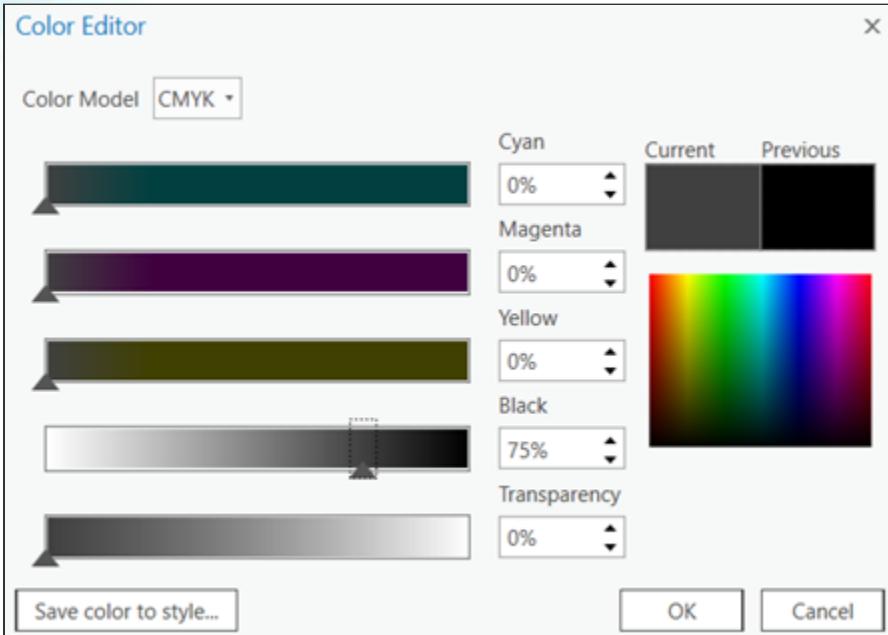
Next, you will experiment with the Areas Of Interest feature class labels.

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.

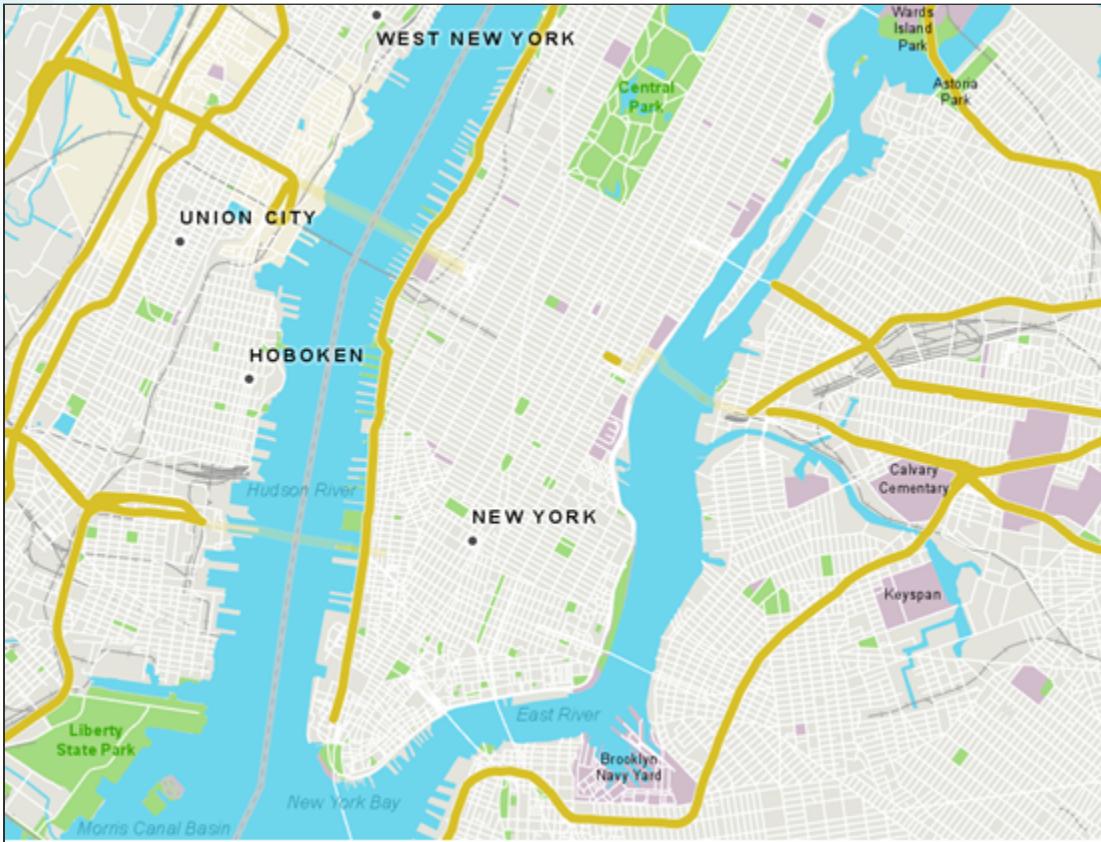
- 1 Turn on labels for the Areas Of Interest layer.
- 2 Because these features are less important than many others in the map, set the font to Arial, 8 point, and Regular.

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

- 3 With Black selected as the font color, in the Color Editor window, ensure that the CMYK Color Model is selected.
- 4 Change the value of Cyan, Magenta, and Yellow to **0%** and the value of Black to **75%**, and then click OK.



- p Open the Label Class pane for the Areas Of Interest layer, and 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, if necessary.
 - 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.



q When you are finished, save your map.

Next, you will explore labeling of line features.

Step 8: 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.

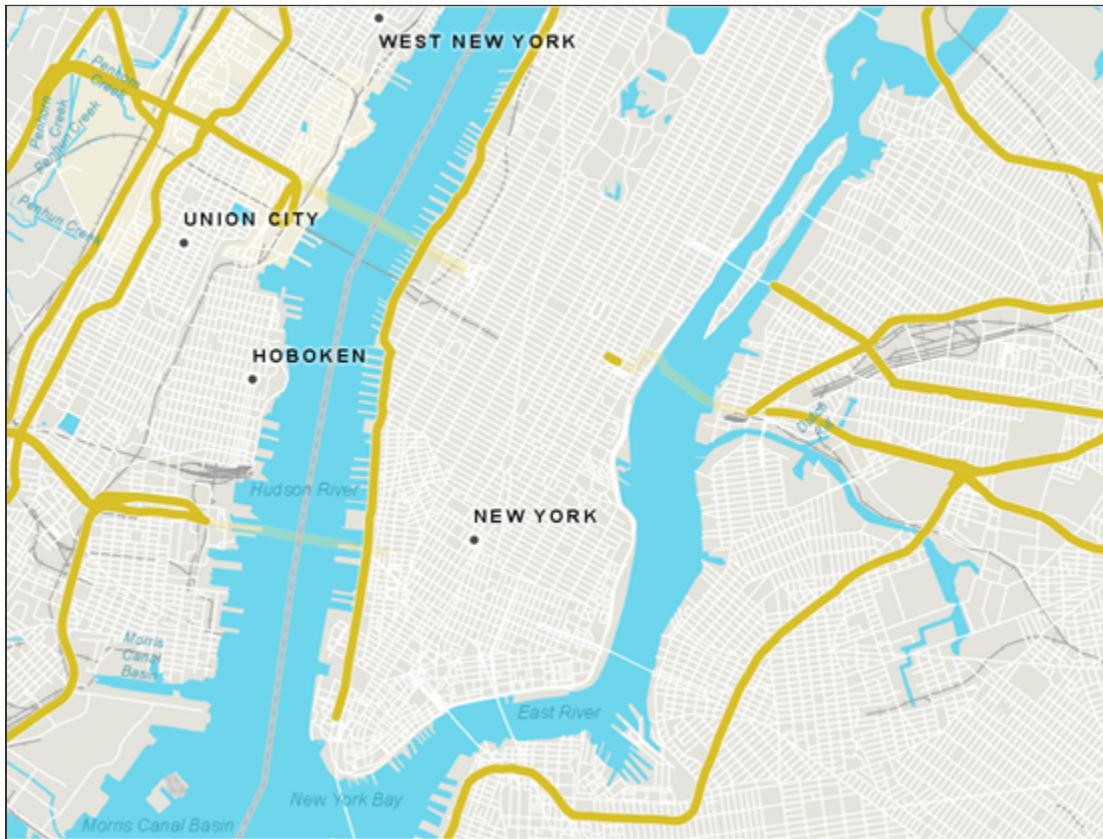
The intention again is not to create an identical map, but to learn about the various settings and control you have over the labels in your map. High-level instructions will again be provided, allowing you to experiment and explore the various settings.

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

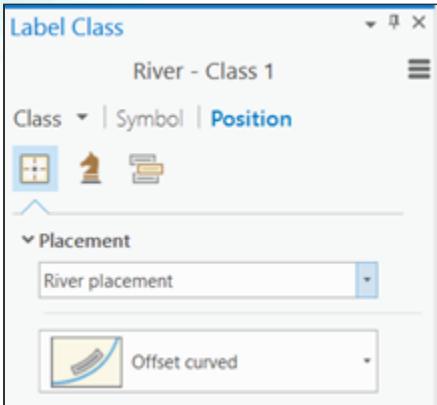
Rivers are special features that have curves and tight bends that are not easily labeled without seeming cramped. You can use the various label placement options to label the rivers in your map in a visually pleasing manner.

- a Turn on labels for the River layer.
- b For font color, use the same color that you used for the Waterbody feature class (HEX **#6DD6ED** as the starting point, then switch to CMYK and set the Black value to **25%**).
- c Make the font Arial, Regular, and 8 point, as these features are less important in this map.

Note: Water features are often italic, so if you'd like, you can use italics for this text symbol (<https://bit.ly/2GNbGUY>) and match what you did with the waterbodies.



- d In the Label Class pane for the River layer, set the following option:
 - Set the Placement of the class to River Placement with the Offset Curved option



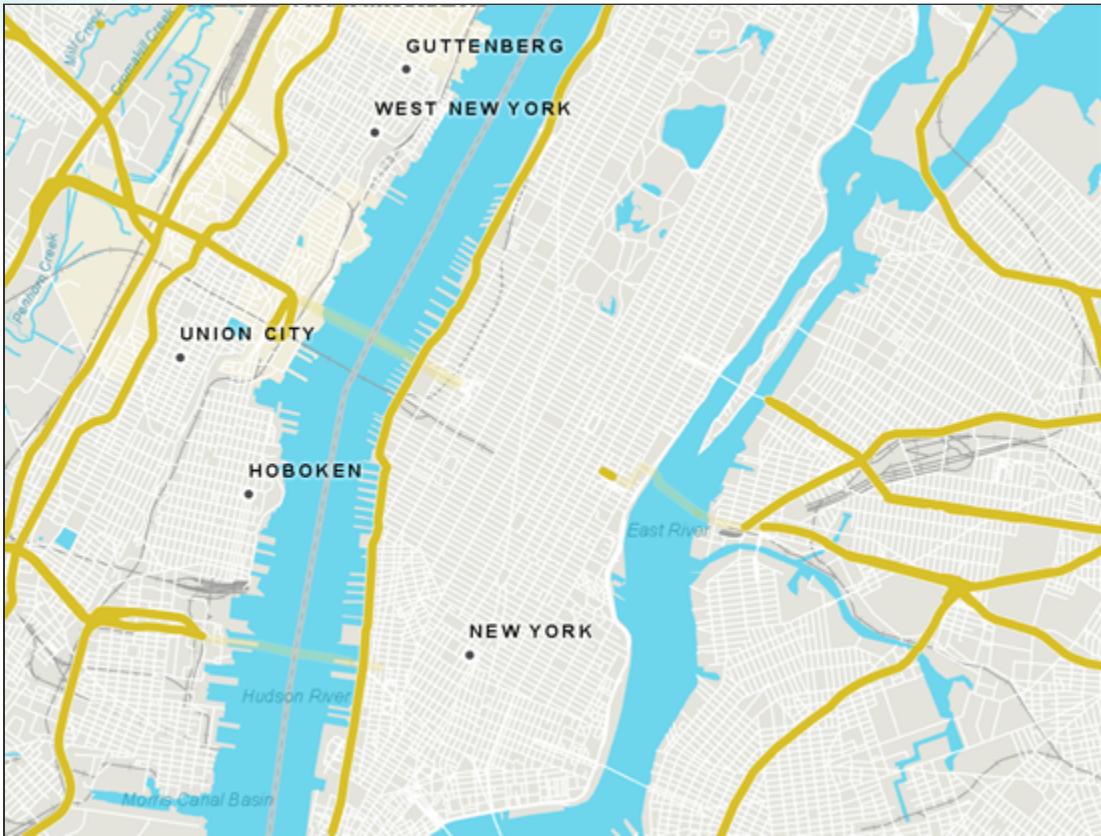
The Maplex Label Engine River Placement style generalizes the turns of a river and places the label following that smoother line.

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

e Continue setting parameters as follows:

- Set the Primary Offset to **3** points.
- Do not stack the labels.
- Set the Overrun Maximum to **5** points.
- Remove all duplicate labels.
- Set the Label Buffer to **15%**, and turn on the Hard Constraint option.

f Take a 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.



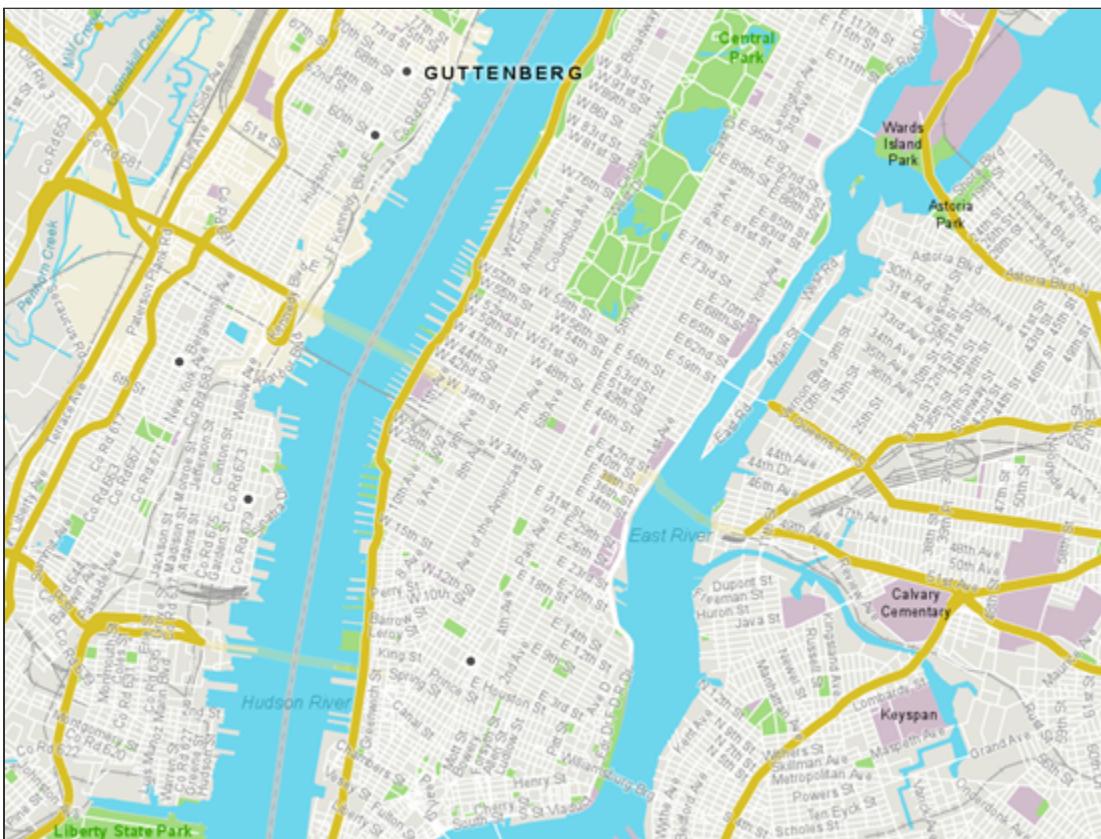
Now let's look at road line features. There are two road feature classes in this map: MajorRoads and Road. You will adjust the Road feature class first. The Road feature class contains streets and roads that are not major roads. These roads are less important than the major roads, and because there are 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/2JB0dDZ>).

- (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 ensures placement of the label on the feature at the midpoint of the label and along the curve of the line feature.

- Do not stack the labels.
- 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.



- j When you are finished, save your map.

Next, we will look at labeling state border line features.

Step 9: Create label classes

In this map, the state border line runs through the Hudson River and shows the boundary between the states of New York and New Jersey.

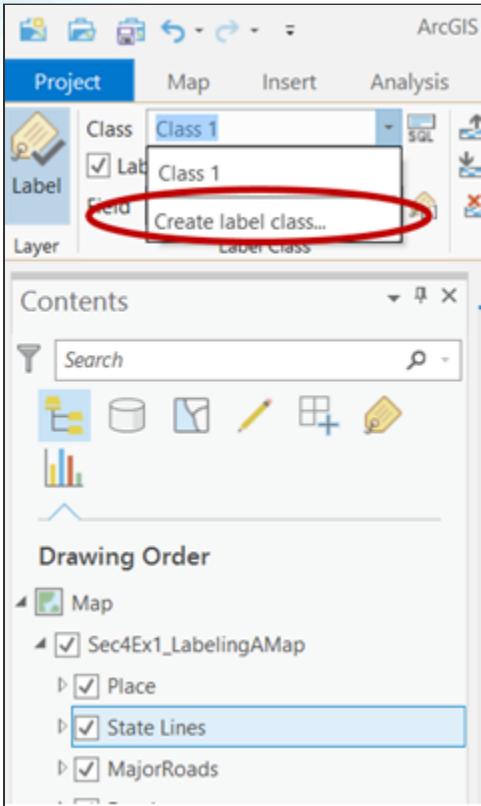
- a In the Contents pane, select the State Lines layer and turn on the labels.

There is a single line feature running through the Hudson River representing the border between the two states in the map. You want to give the line a unique label to indicate which side of the line is the state of New York and which side is the state of New Jersey. You can use label classes to specify different labeling properties for features within the same layer.

Label classes can be used to restrict labels to certain features or to specify different label fields, symbols, scale ranges, label priorities, and sets of label placement options for different groups of labels. Up to this point, you have been working with a single label class for each layer. In this step, you will create two label classes, one for each of the state name labels associated with the state line feature.

From the Labeling tab, in the Label Class group, for Class, you can see that Class 1 already exists and the LEFT_NAME10 field value is being used for the New York label in the map.

- b Click the arrow to the right of the Class field, and choose Create Label Class from the drop-down list.



- c In the Create New Label Class dialog box, for the name, type **Left** and click OK.

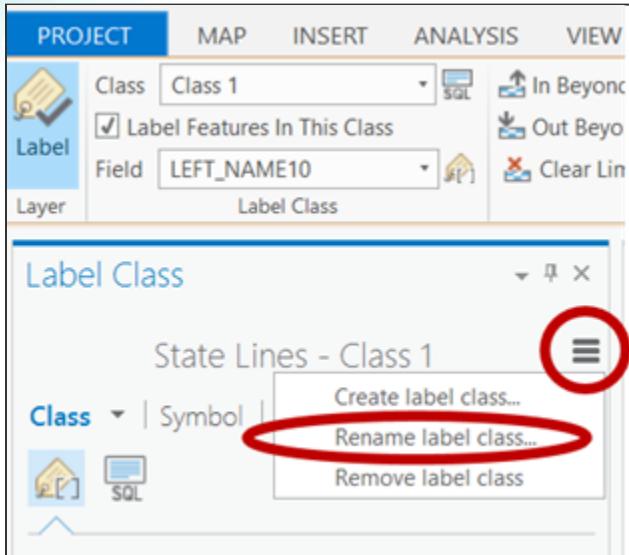
This is the class that will be used for the New York label.

Now when you click the Class drop-down list, there are two classes listed: the original Class 1 and the new Left class.

You will change the name of the Class 1 class to represent the New Jersey label.

- d With Class set to Class 1, in the Label Class pane, click the menu button and choose Rename Label Class.

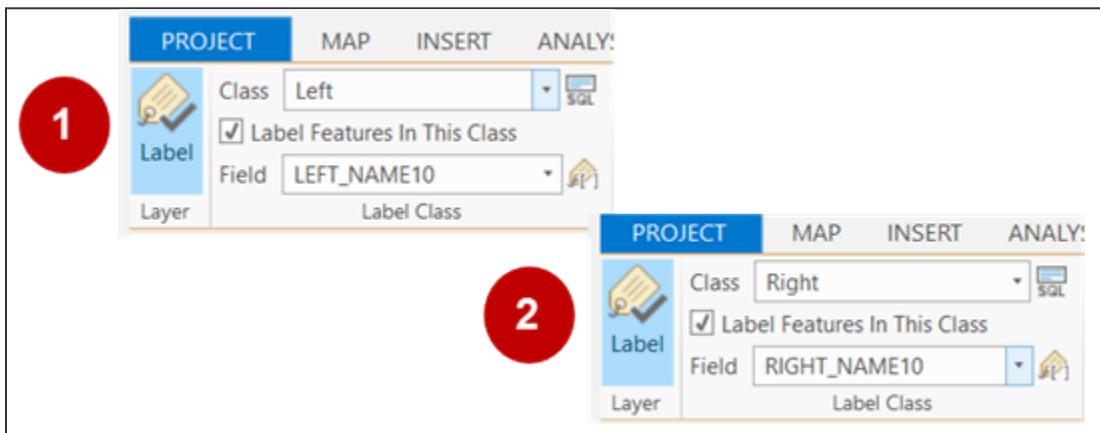
Note: Be sure that the Class tab is selected.



- e Name the new label class **Right** and click OK.

This is the class that will be used for the New Jersey label.

You now have two label classes, a State Lines - Left label class and a State Lines - Right label class.



- f From the Labeling tab, in the Label Class group, ensure that the Left class is associated with the LEFT_NAME10 field and that the Right class is associated with the RIGHT_NAME10 field, as shown in the preceding graphic.
- g Select the Right class and change the text symbol font to Arial, 10 point, Regular, 60% gray, with a White halo of 1 point at 75% transparent.
- h In the Label Class pane, click Apply to see the changes in the map.

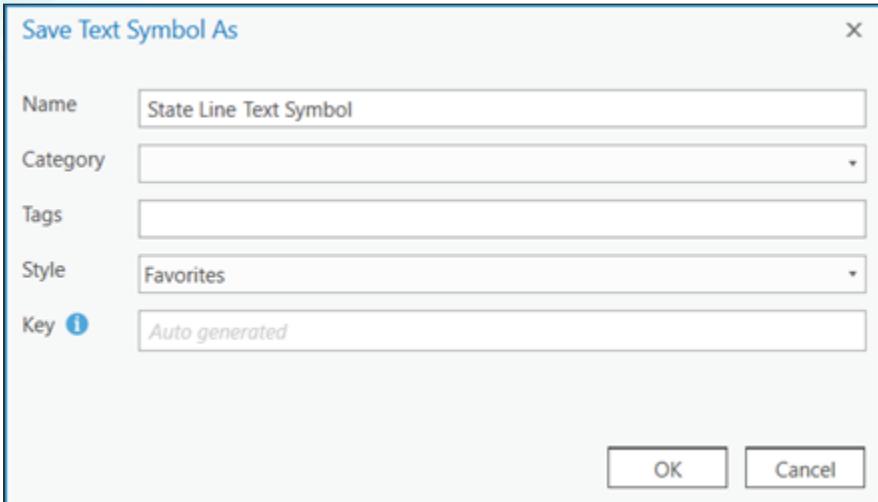


The New Jersey label (the Right class) reflects the changes. Instead of repeating these settings for the Left class, you can save the information in a style. Symbols can be optionally stored, managed, and saved for reuse in project resources called styles. Styles are databases that hold symbols, symbol primitives (like colors), and layout elements like north arrows and scale bars (<https://bit.ly/2HagNhw>).

Step 10: Save symbols to a style

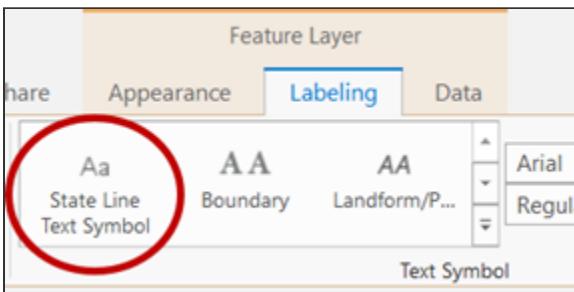
This is a good opportunity to save a symbol style for this text symbol, as you will want to mimic this in the other State Lines class.

- In the Label Class pane, from the Symbol tab, click the menu button and choose Save Symbol To Style.
- Complete the Save Text Symbol As dialog box as follows:
 - For Name, type **State Line Text Symbol**.
 - For Category, leave the field blank, as categories are optional.
 - For Tags, leave the field blank. Tags are optional, and ArcGIS Pro will automatically apply tags based on the graphic properties of the symbol.
 - For Style, accept the default.



- c Click OK to close the dialog box.

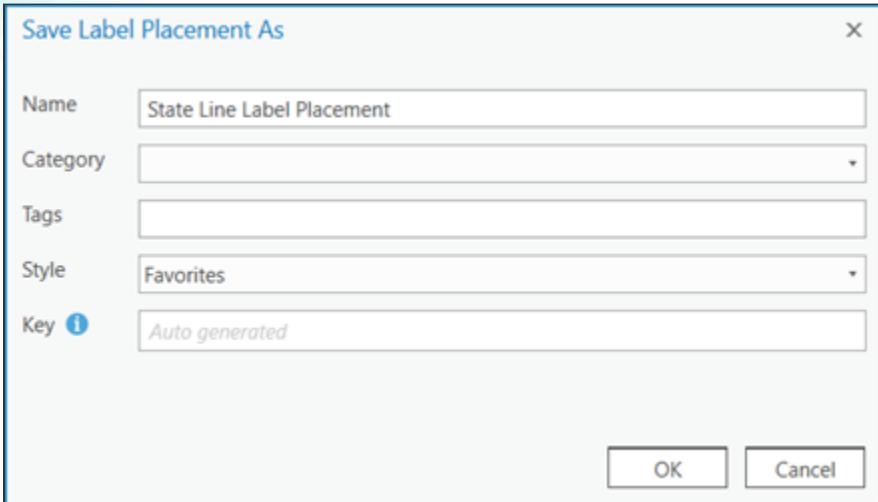
The new text symbol style appears in the Text Symbol group on the Labeling tab.



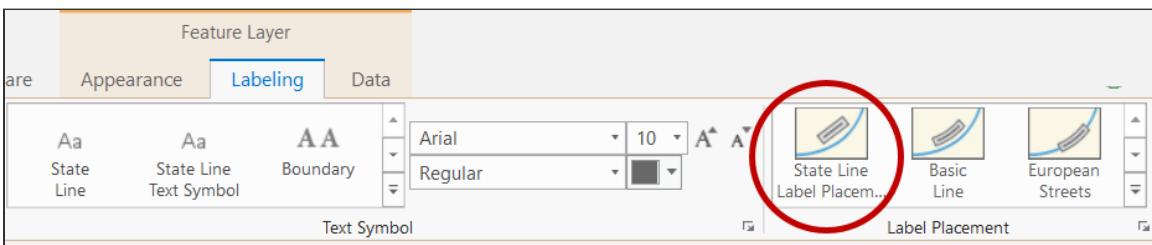
- d In the Label Class pane, on the Position tab for the State Lines - Right label class, set the following text symbol style parameters:

- Set a **3**-point primary offset.
- Constrain offset above line.
- Turn stack label off.
- Set maximum overrun to **0**.
- Remove all duplicate labels.

- e Save the label placement position to a style named **State Line Label Placement**.

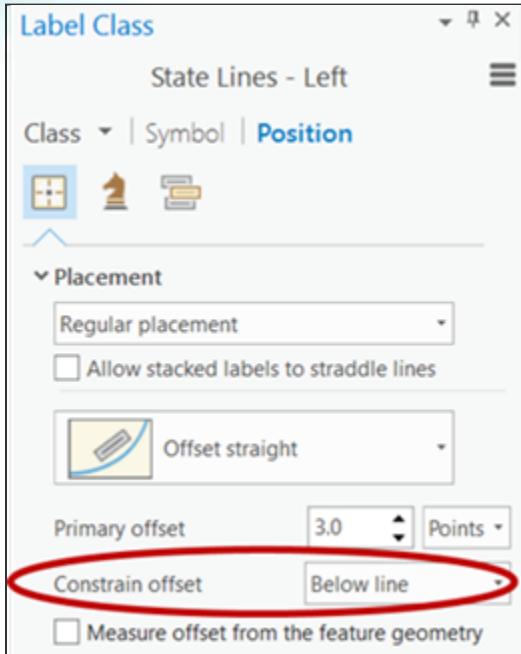


The style will appear in the ribbon in the Label Placement group.

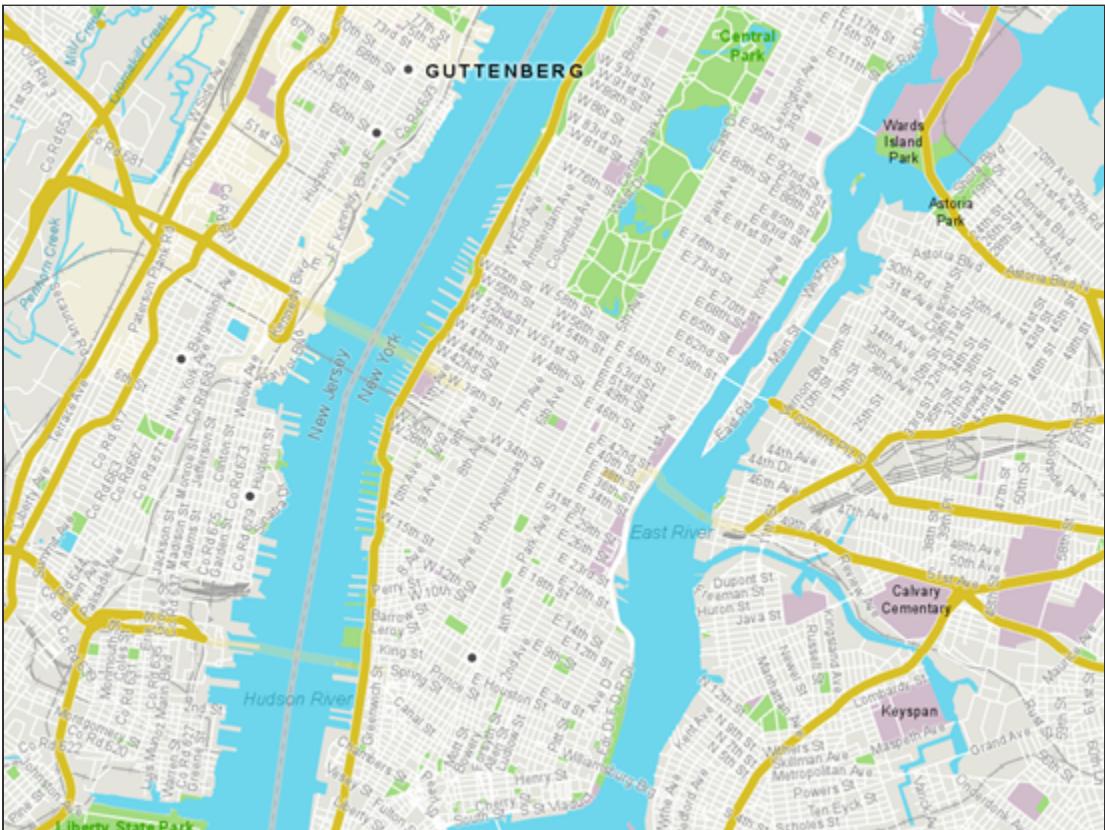


- f Now, with the Left label class selected, in the Label Placement group, choose the newly saved label style and newly saved label placement style.
- g In the Label Class pane, from the Position tab, change the Constrain Offset placement value to be Below Line.

This will ensure that the left label appears below the state line feature.



Now the state line labels resemble the following graphic.



Tips and Tricks: Having labels read in the same orientation along a boundary eases the readability.

Step 11: Use a query expression to label a subset of features

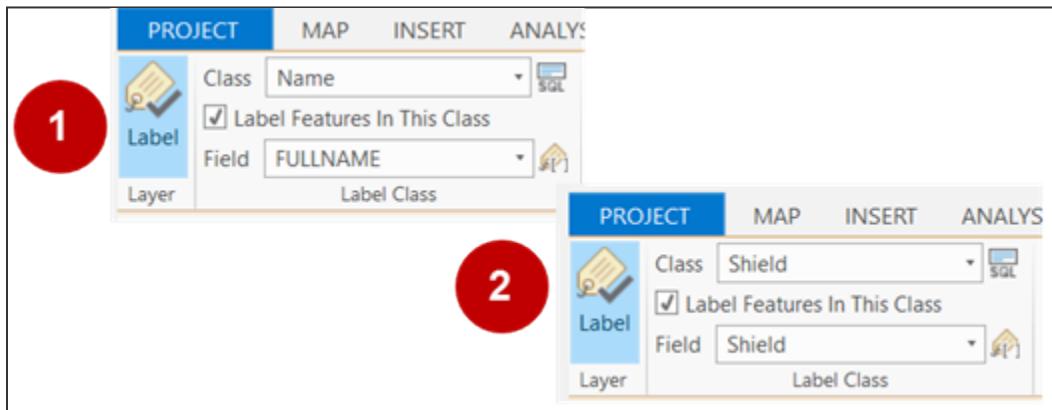
The MajorRoads feature class contains major roads, such as highways and other major thoroughfares. These line features include both a name, which is the name of the major road, and a shield, which is the highway shield number. Highway shields denote the number of a highway or major road (for example, I-495 or I-78 in this map). These signs are used for navigating routes.

Again, you will use two classes to specify the different labeling properties for this layer.

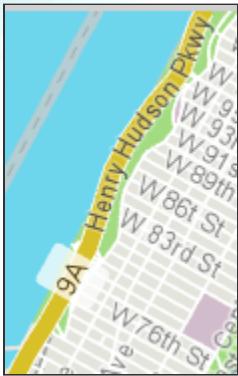
- In the Contents pane, turn on labels for the MajorRoads layer.
- Use the previous process to create two label classes.

Hint: Follow Step 9b - Step 9e to create the new label classes.

- Name one class **Name** and name the other class **Shield**.



The Name class should reference the FULLNAME field and the Shield class should reference the Shield field in the layer table.



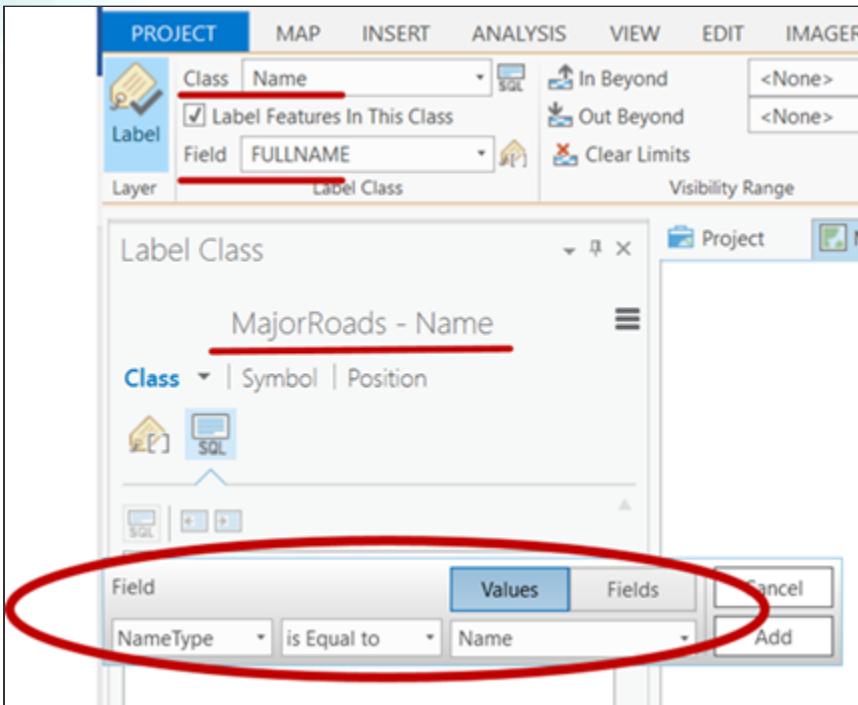
Example road with highway shield number.

SQL (Structured Query Language) query expressions provide an effective way to identify a subset of features that you want to label. You will write a SQL query for the MajorRoads features to separate road names and shield numbers so you can style the labels differently for each class.

Hint: Use the layer attribute table to see what you are querying. In the Contents pane, right-click the name of the layer and choose Attribute Table.

First, you will add the query expression for the road names.

- d Ensure that the Class is set to Name.
- e In the MajorRoads - Name Label Class pane, from the Class tab, click the SQL Query button.
- f Click Add Clause to begin building your query.
- g For the Name class SQL query, create the following query: NameType Is Equal To Name.

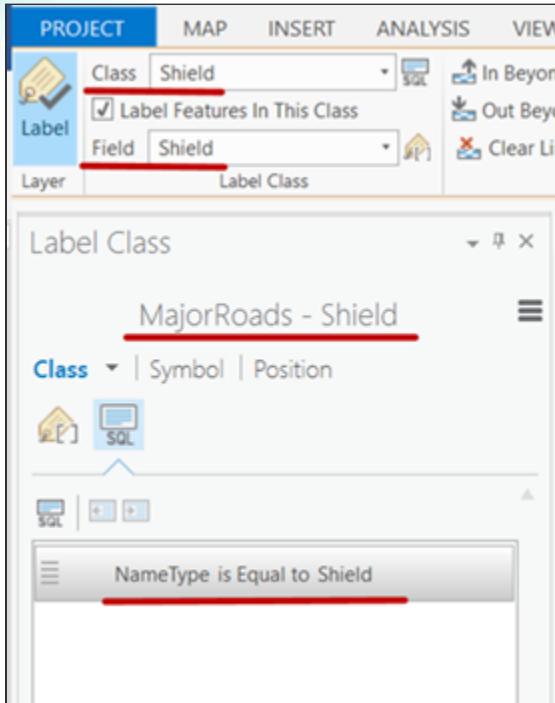


- h** Click Add, and then click Apply.

You will see the query added to the SQL expression pane. Now you'll do the same thing for the Shield label class.

Note: Because there are so many labels in the map, they may draw slowly. You can pause or turn off features you are labeling, if you'd like.

- i** In the Label Class group, change the Class to Shield to switch to the Shield label class.
- j** In the MajorRoads - Shield Label Class pane, from the Class tab, click the SQL Query button.
- k** Click Add Clause to begin building your query.
- l** For the Shield class SQL query, create the following query: NameType Is Equal To Shield.
- m** Click Add, and then click Apply.



Next, you will modify the label for each class.

Hint: Use the Class and Field values in the Label Class group to switch between the label classes. You can also use the Class drop-down list in the Label Class pane.

- n Use the following information to format the MajorRoads - Name label class in the Label Class pane:

Class	Name	<input type="button" value="SQL"/>
<input checked="" type="checkbox"/> Label Features In This Class		
Field	FULLNAME	<input type="button" value="Symbol"/>
Label Class		

Symbol tab, General group	
Appearance	
Font Name	Arial
Font Style	Regular
Size	8 point
Color	 R: 78 G: 78 B: 78 (Gray 70%)
Halo	
Color	 HEX #: FFFFFF (white), Transparency: 75%
Halo Size	1 point
Position tab, Position group	
Placement	Street Placement, Centered Curved
Position tab, Fitting Strategy group	
Stack Label	Not checked
Position tab, Conflict Resolution group	
Label Buffer	15%
Hard Constraint	Checked

- Use the following information to format the MajorRoads - Shield label class in the Label Class pane:



Symbol tab, General group	
Appearance	
Font Name	Arial
Font Style	Regular
Size	8 point
Color	 Gold (HEX #D8C029), CMYK 55%K
Callout	Balloon
Balloon Symbol	White Fill
Color	 White 25% Transparency
Balloon Style	Rounded Rectangle
Left Margin	2 pt.
Right Margin	2 pt.
Top Margin	2 pt.
Bottom Margin	2 pt.
Position tab, Position group	
Placement	Regular Placement, Centered Straight
Offset Along Line	Best Position
Position tab, Conflict Resolution group	
Remove Duplicate Labels	Remove Within Fixed Distance
Search Radius	2 inches
Repeat - Minimum Interval	3 inches
Label Buffer	15%
Hard Constraint	Checked
Minimum Feature Size	0

At this point, your map should look something like the following graphic if you have used the specific information in the tables:



Tips and Tricks: It is fine not to label everything. Label features that help the map. The railway, for example, does not need a label in this map, nor do features that are too small.

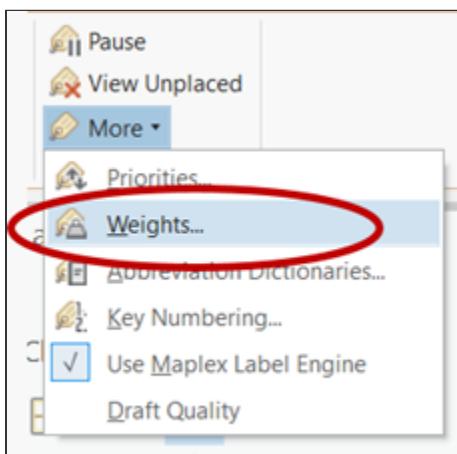
Step 12: Configure advanced settings

There are some advanced settings that will help refine the map display even more. The two that you will examine are label weights and label priorities.

Label weights let you control which labels will be placed when there are potential conflicts (overlaps) between features and labels. As you learned earlier, weights are ranked 0 to 1000. If you weight a feature at 1000, nothing will draw on it.

Note: Refer to ArcGIS Pro help for more information about label and feature weights (<https://bit.ly/2JDby8y>).

- a To work with weights, in the Contents pane, select the Place layer.
- b From the Labeling tab, in the Map group, click More, and then choose Weights.



- c In the Label Weight Ranking window, for the Place - Class 1 label class, the value in the Feature Weight column is set to 1000. Try changing the value to see the effect in areas where there are feature and label overlaps.

Label Weight Ranking

Weights let you control which labels will be placed when there are potential conflicts (overlaps) between features and labels. The feature weights are in the range 0 to 1000.

Feature Layers	Graphic Layers	Feature Weight	Polygon Boundary Weight
Feature Layer - Label Class			
Sec4Ex1_LabelingAMap : Place - Class 1		1000	N/A
Sec4Ex1_LabelingAMap : State Lines - Right		0	N/A
Sec4Ex1_LabelingAMap : State Lines - Left		0	N/A
Sec4Ex1_LabelingAMap : MajorRoads - Shield		0	N/A
Sec4Ex1_LabelingAMap : MajorRoads - Name		0	N/A
Sec4Ex1_LabelingAMap : Road - Class 1		0	N/A
Sec4Ex1_LabelingAMap : Rail - Class 1		0	N/A
Sec4Ex1_LabelingAMap : River - Class 1		0	N/A
Sec4Ex1_LabelingAMap : Waterbody - Class 1		0	0
Sec4Ex1_LabelingAMap : Park - Class 1		0	0
Sec4Ex1_LabelingAMap : Areas of Interest - Class 1		0	0
Sec4Ex1_LabelingAMap : Urban Area - Class 1		0	0
Sec4Ex1_LabelingAMap : Land - Class 1		0	1000

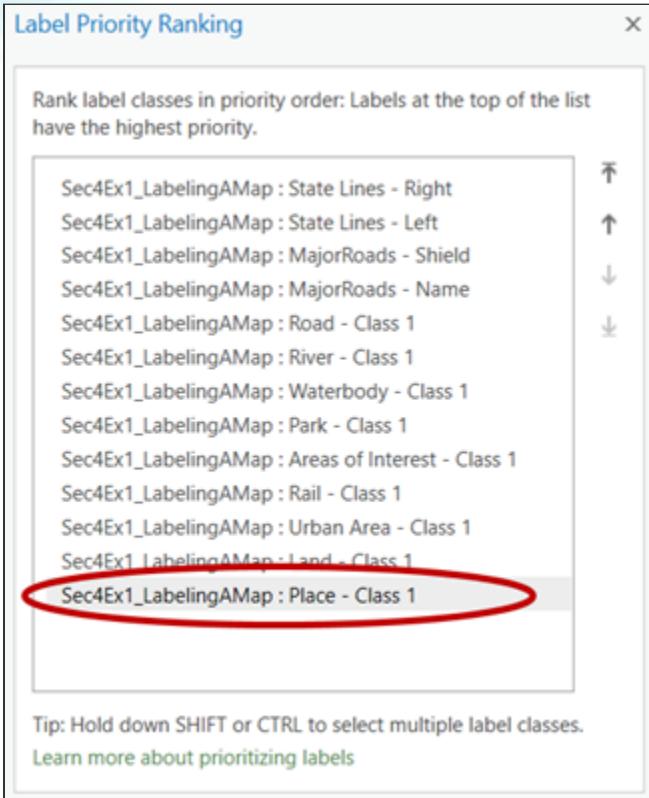
Click on column header to sort table.
[Learn more about weighting labels and features](#)

- d Click Apply and then click OK to see the weighting take effect (for example, if there were some labels on the place point, now there will be none).

Ultimately, the final positioning of labels on your map is dependent on label and feature weights. In addition, when working with weights, remember that when you allow labels to overlap some features, generally more labels will be placed on your map because the label engine has more room to place them.

You will now take a look at another advanced setting. Priorities allow you to suggest to the map which labels are the most important.

- e With the Place layer selected in the Contents pane, from the Labeling tab, in the Map group, click More, and then choose Priorities to open the Label Priority Ranking window.

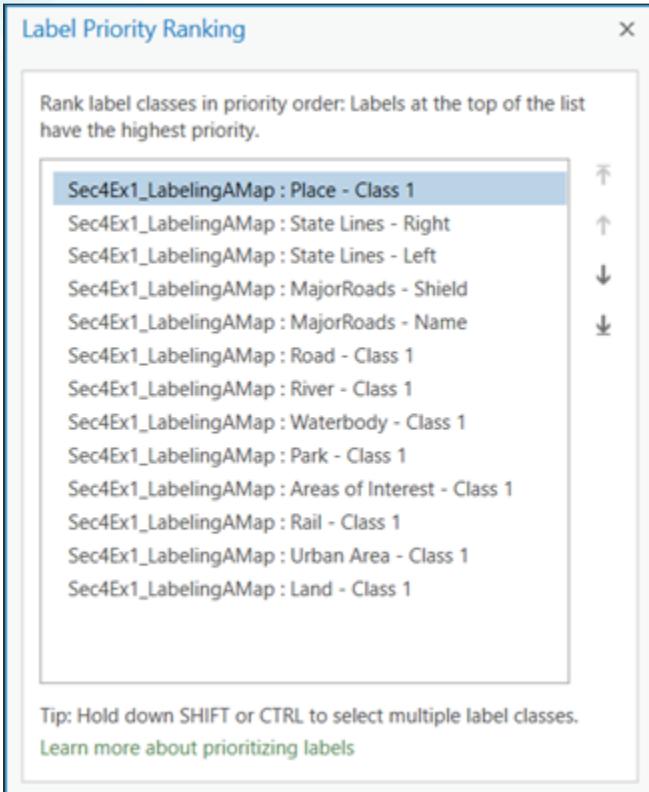


To move a label class, you will select it and then use the arrow keys on the right side of the window to move the label class up or down.

- f Click the Place - Class 1 label class once, and then click the Down arrow to move the label class to the bottom of the priority window.
- g Click Apply and then click OK.

It may take a moment for the map to redraw. Do you notice any changes? Labels associated with the Place class are now ranked as lowest priority.

- h Open the Label Priority Ranking window again.
- i Reorganize the order of the classes so that Place - Class 1 is at the top.
- j Put MajorRoads - Shield above the MajorRoads - Name, and both of these above Road.



- k Click Apply to see the changes take effect.
- l Click OK to close the window.

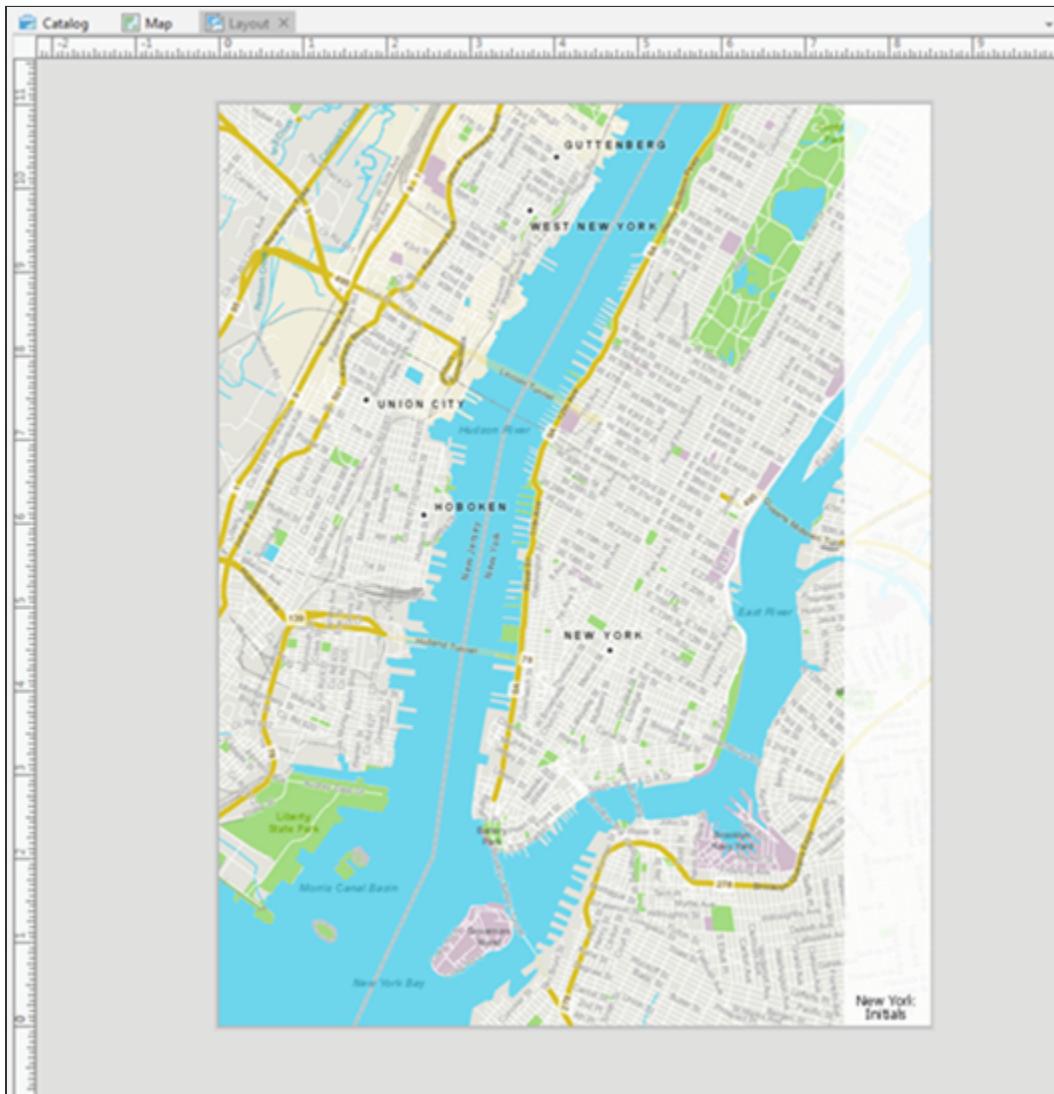


Step 13: Style labels in the map surround

The map surround (<https://bit.ly/2lHqeSK>) is another aspect of your map to consider when labeling.

The exercise project for this section includes a Layout view, where an extent has been set for you. A page layout (often referred to simply as a layout [<https://bit.ly/2HcT7ZH>]) is a collection of map elements organized on a virtual page designed for map printing.

- a At the top of the ArcGIS Pro window, click the Layout view tab.



You will give this map a title to describe its subject.

To the right of the map is a transparent white box. At the bottom, it says NEW YORK and Initials. Let's stylize the text so that it runs vertical.

- b Right-click the text that says "New York" and choose Properties from the drop-down list. The Format Text pane opens. Here, you can adjust text options, such as size and position.
- c Use the options in the Format Text pane and on the Format tab of the Text contextual tab to experiment with the text. Apply what you have learned, experiment a bit, and see if you can make it look like the example below.

The following example includes font in all caps, a large size, a 90-degree angle, and spaced-out letters. The font color is the same as the primary roads—orange with a white halo. This was done to unify the look and tie the labels to the map. You can add your initials or name to the page to finalize your layout. The guides can help you place the labels.



- d** When you are happy with the results, save your project, appending your name or the date to the name so you don't overwrite the original.
- e** Leave ArcGIS Pro open for the next exercise.

Conclusion

In this exercise, you had the opportunity to explore options for label appearance, placement, formatting, and sizing. We encourage you to continue experimenting on your own.

Use the Lesson Forum to post your questions, observations, and map examples.