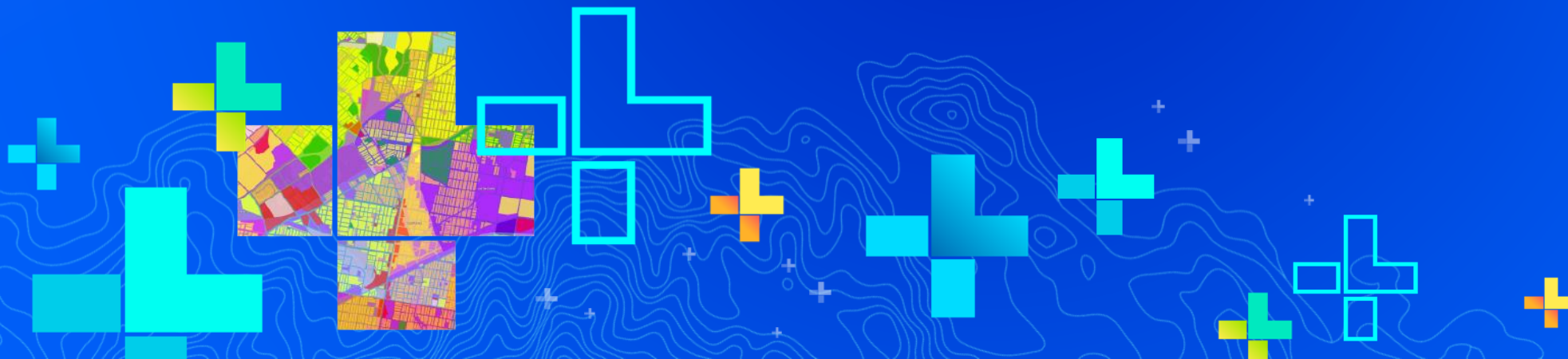




# ArcGIS Pro: Creating High Quality Map Labels

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SEE  
WHAT  
OTHERS  
CAN'T



# Presentation Overview

- Introduction
- Point labeling
- Polygon labeling
- Line labeling
- **Demo – Placement styles**
- Street labeling
- **Demo – Managing label density and conflict resolution**
- Fitting strategies
- **Demo – Fitting strategies**
- Summary and Questions



# The Maplex Label Engine

The high quality labeling engine in ArcGIS Pro

- **How does this relate to ArcMap?**
  - It's the same version of Maplex
  - Same labeling capability
  - Only the user interface is different

*Maplex is the default label engine in ArcGIS Pro*



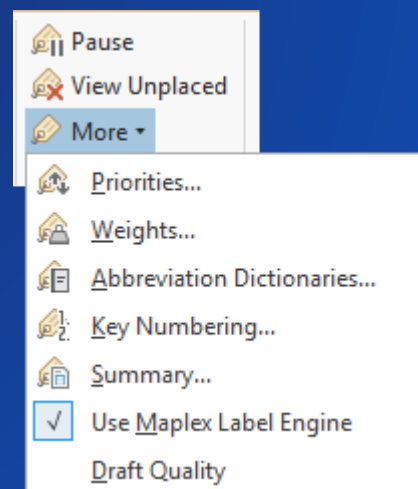
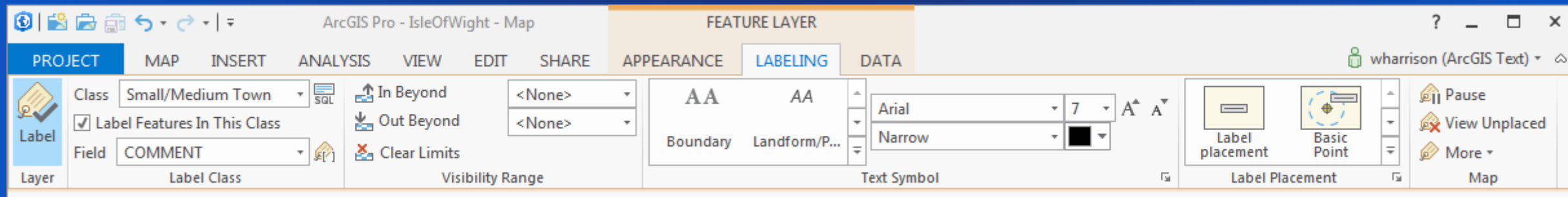
# Types of Text

- **What are Labels?**
  - Dynamically placed text by a label engine
  - Change of content or map refresh generates new locations
- **What is Annotation?**
  - Stored text – two types – standard and feature-linked
  - Editable



# Labeling Ribbon

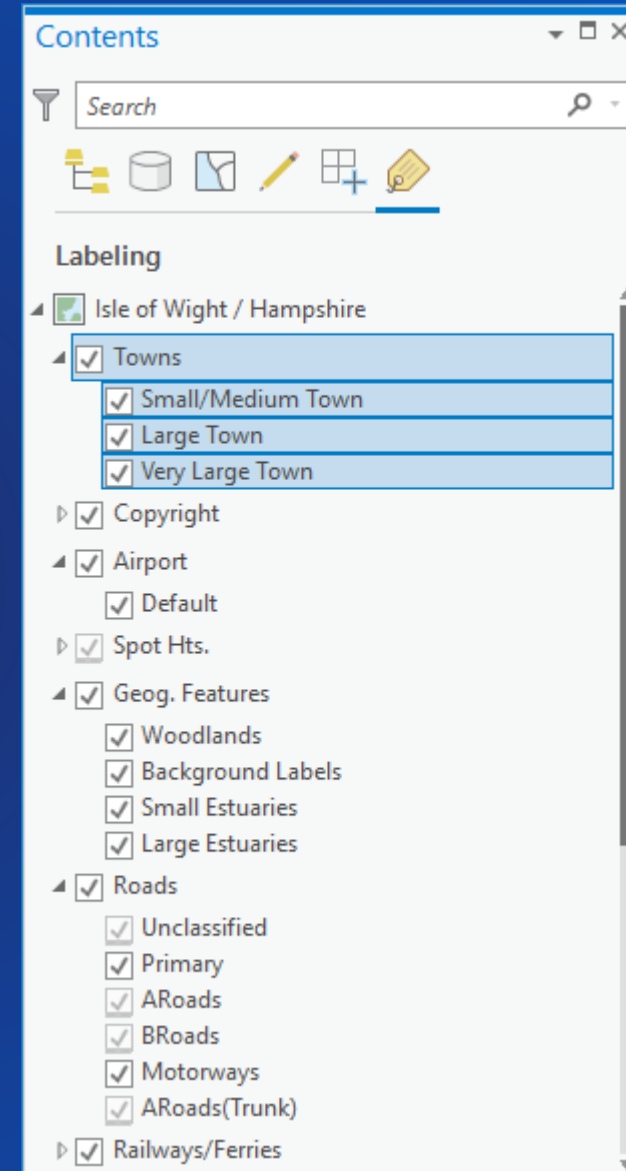
Access to the frequently used label class properties



# Labeling View of the Contents pane

Best place to select and manage your labels classes

- View label classes
- Add, remove or rename a label class
- Copy and paste
- Reorder
- Multi-select workflow

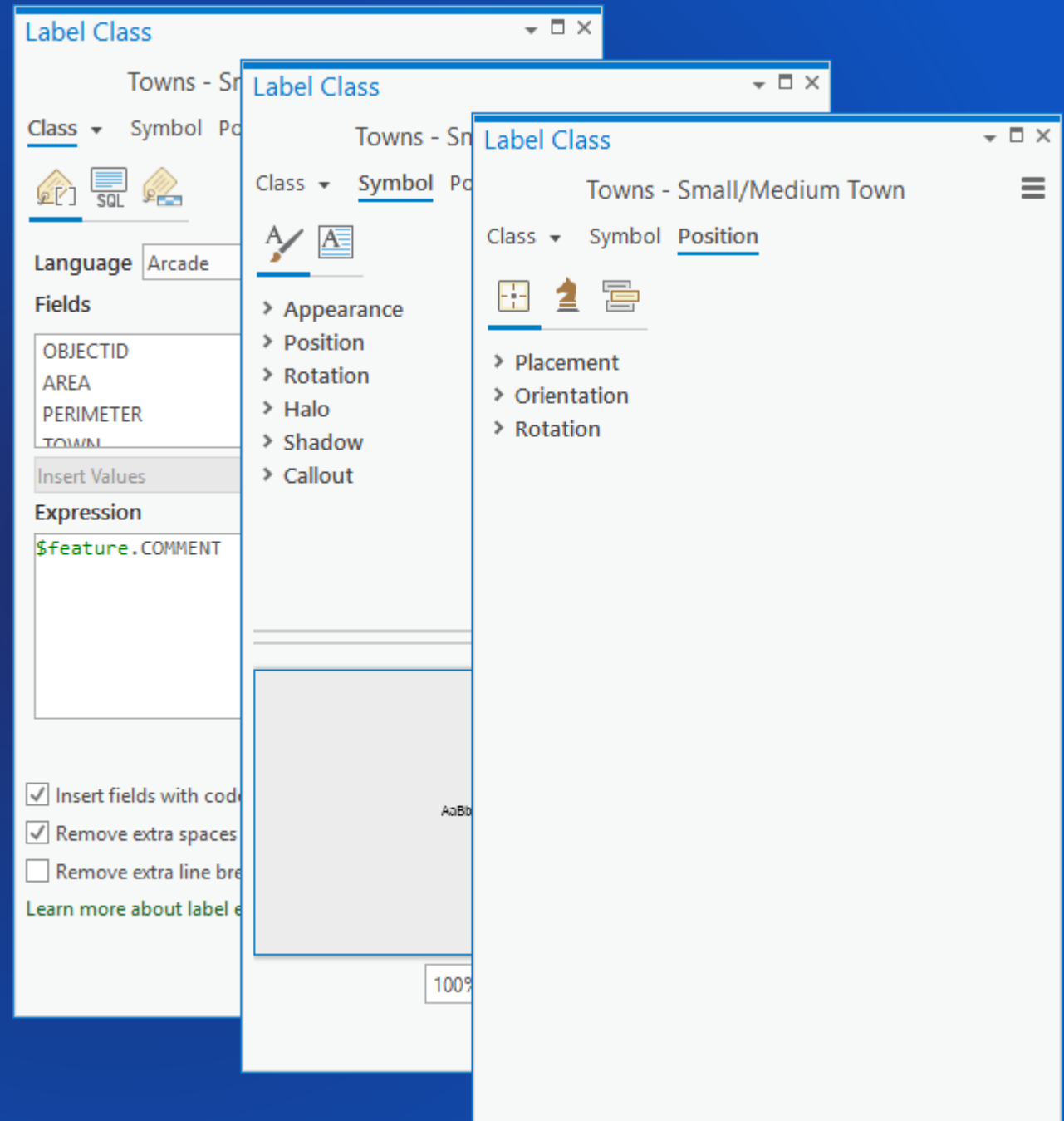




# Label Class Pane

## Detailed properties

- Label expression
    - specifies how to extract the label text from the feature attribution
  - SQL query
    - defines the set of features to label
  - Scale range
    - Visibility range of labels
- Text symbol
  - properties that control how the text is displayed
- Placement properties
  - Properties for positioning the label relative to the feature



# Feature Weights

Control the label-to-feature overlap on the map

- Maplex weighting is based on values from 0 – 1000
  - zero weight allows full overlap
  - Range 1 to 999 is the main ranking
    - *Tip: use the whole range to get the best results*
  - 1000 is a special value – it represents a set of barrier features
- Polygons also have a boundary weight

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 Layer - Label Class	Feature Weight	Polygon Boundary Weight
Towns - Small/Medium Town	100	N/A
Towns - Large Town	0	N/A
Towns - Very Large Town	0	N/A
Copyright - Default	0	N/A
Airport - Default	0	N/A
Spot Hts. - Default	20	N/A
Geog. Features - Woodlands	0	N/A
Geog. Features - Background Labels	0	N/A
Geog. Features - Small Estuaries	0	N/A
Geog. Features - Large Estuaries	0	N/A
Roads - Unclassified	20	N/A
Roads - Primary	50	N/A
Roads - ARoads	40	N/A

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

OK Cancel Apply



# Feature Weights (*continued*)

A couple of best practice guidelines...

- Take note when weighting the interior of a large polygon
  - Labels will try to avoid the weighted interior
  - Large background polygons may not need an interior weight
  - Maybe only the boundary needed a weight?
- If a label class is 'checked off' and it has a feature weight, it is still active
  - No labels produced, but the features are still added to the label engine
  - It represents a set of barrier features
  - Labels will try to avoid the barrier features
- Label Summary dialog is useful

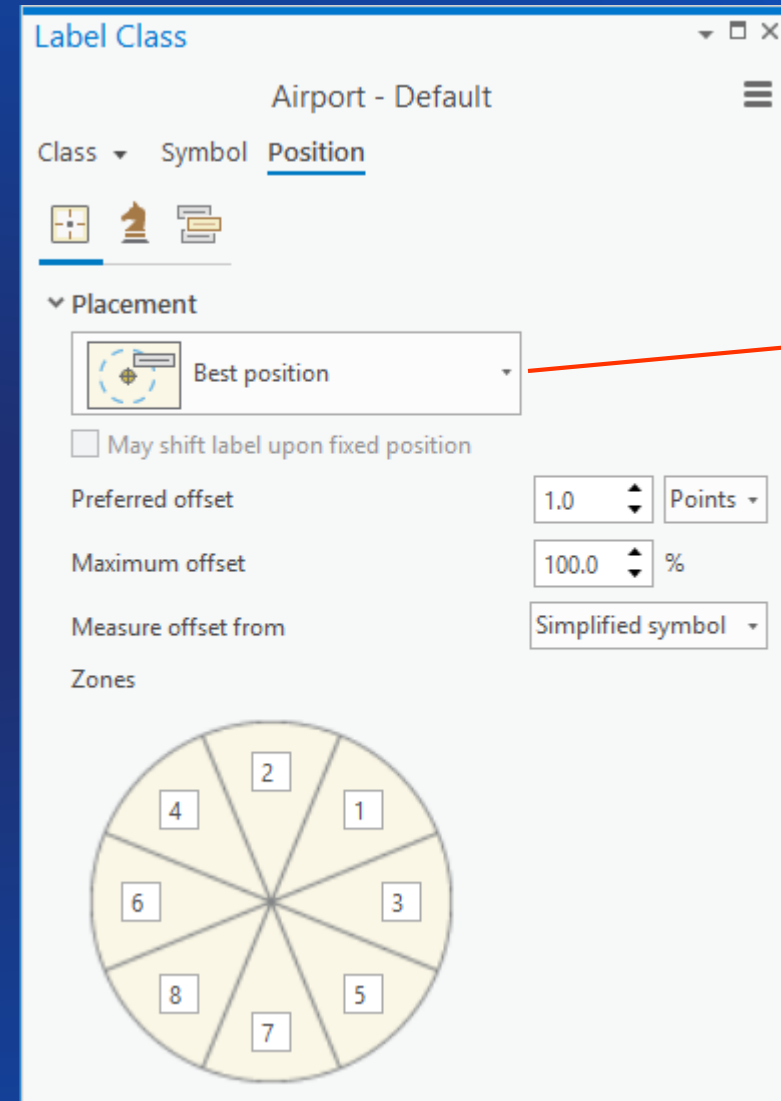


# Point Labeling



# Point Labeling

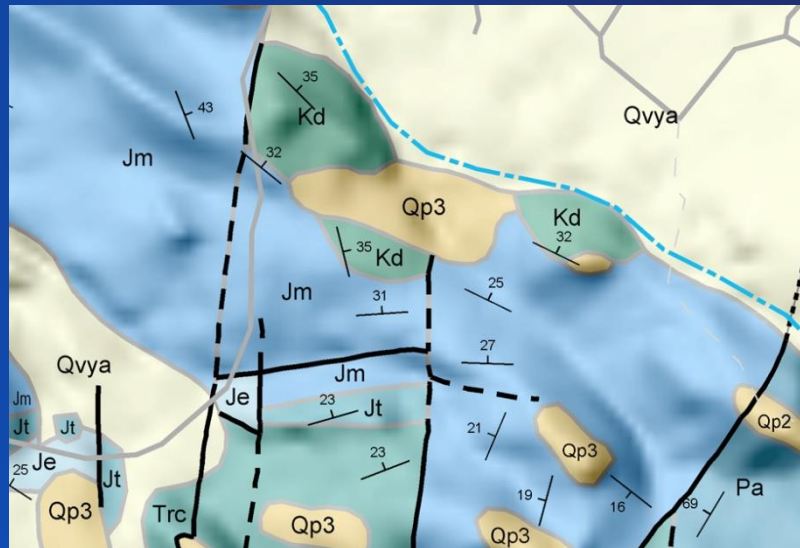
- **Default positioning is best position**
  - Control over which zone is preferred
  - Cartographic preference often top right
  - Zone grid (1- 8 preference, 0 to block)
- **Fixed positions**
  - Centered on the point
  - Cardinal positions around the point



# Point Label Rotation

Angle the label using an attribute in the data




- Select the field or use an expression to set the angle
- Select the alignment
  - Horizontal, Straight or Perpendicular



Label Class

Minor Geologic Formations - Default


Class ▾ Symbol Position

➤ Placement

➤ Orientation

▼ Rotation

Rotation field Azimuth ▾ 

Additional rotation 90° ▾

Rotation type Geographic ▾

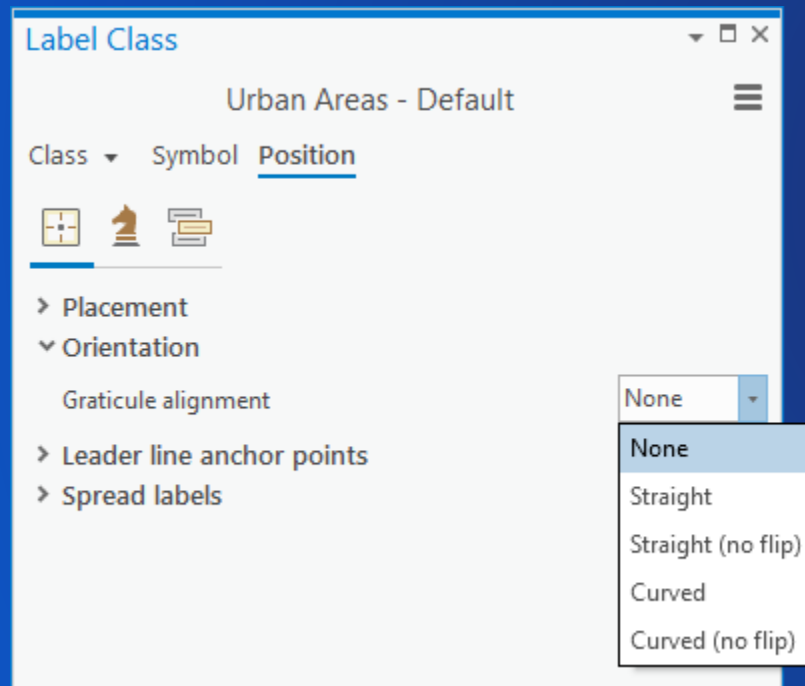
Alignment type Horizontal ▾

☒ Keep label upright (may flip)

# Label Orientation

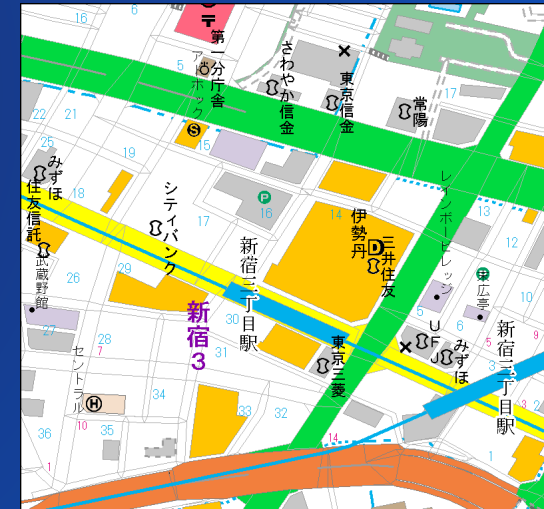
Applies to any label with a horizontal style

- Graticule alignment



- Vertical text placement

- East Asian languages
- Font must have vertical text metrics



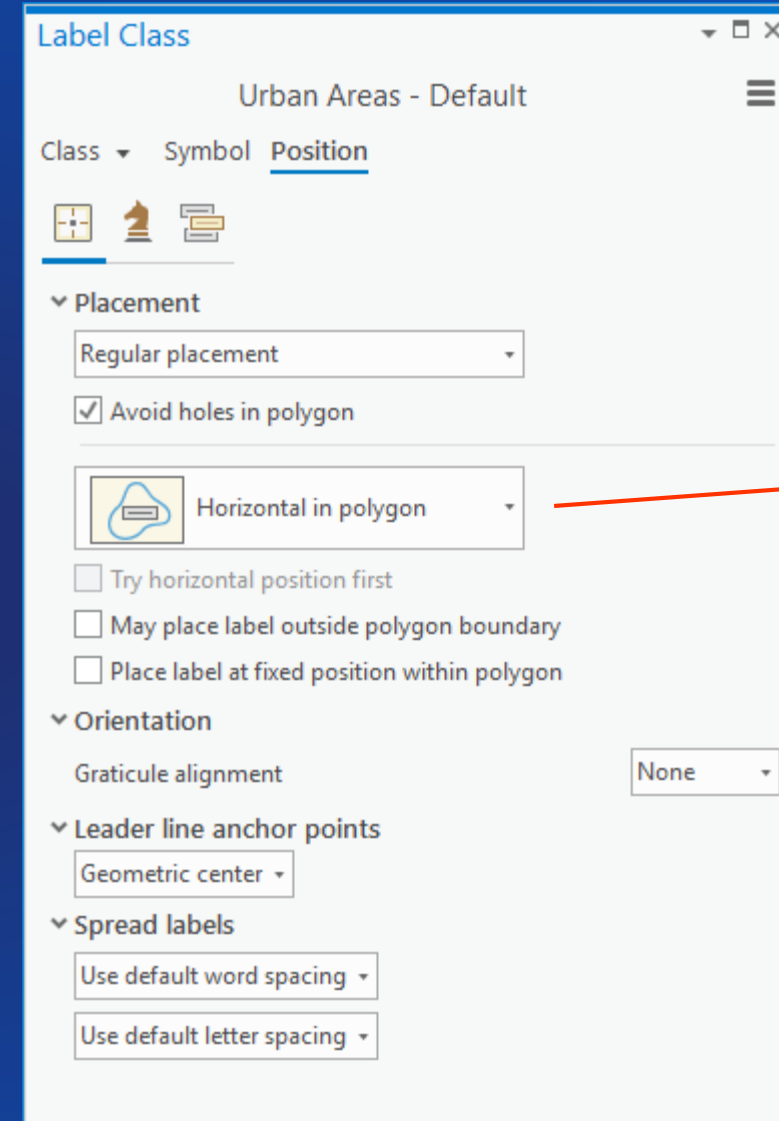
# Polygon Labeling





# Polygon Labeling

- Placement methods
  - Centered or offset
  - Various orientations (horz, straight, curved)
  - Straight and curved good for spatial extent
- Feature Types
  - Regular placement
  - Land parcel placement
    - **\*only useful if you have building footprints**
  - River placement
  - Boundary placement



# Polygon Boundary Labeling

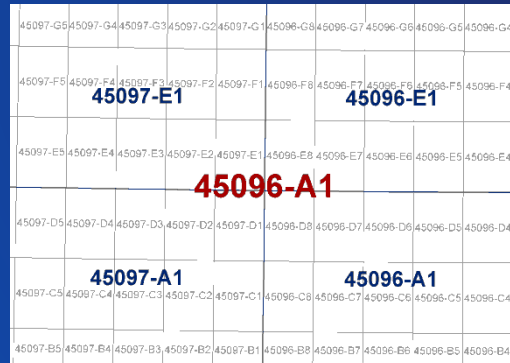
Adjacent polygons are labeled at their boundary

- Internally generates boundary line
- Option to repeat labels at a interval
- Single sided boundaries and holes are optionally labeled



# Fixed Position Within a Polygon

- Place label at fixed position within polygon
  - Specify internal zones
  - Refers to the unclipped polygon
- Best with rectangular features



## ▼ Placement

Regular placement ▼

☒ Avoid holes in polygon



Horizontal in polygon ▼

☐ Try horizontal position first

☐ May place label outside polygon boundary

☒ Place label at fixed position within polygon

Preferred offset

1.0

Points ▼

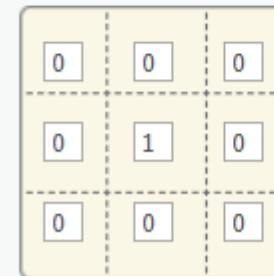
Maximum offset

100.0

%

☐ Measure offset from the feature geometry

Internal zones



Preference: 0 = Blocked, 1 = Highest, 9 = Lowest

# Fixed Position Outside of the Polygon


- Similar to placing a label around a point
  - Specify external zones
- May place label outside of the polygon
  - Mixed size features such as lakes
- Often used with a leader line style

▼ Placement

Regular placement ▼

☒ Avoid holes in polygon

---

 Horizontal in polygon ▼

☐ Try horizontal position first

☒ May place label outside polygon boundary

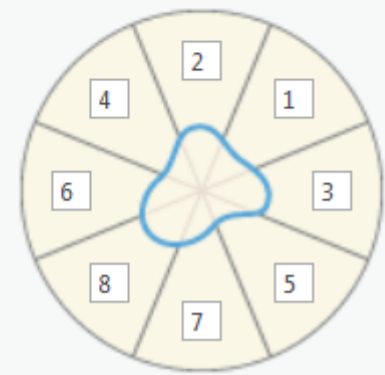
☐ Place label at fixed position within polygon

Preferred offset

Maximum offset  %

☐ Measure offset from the feature geometry

External zones

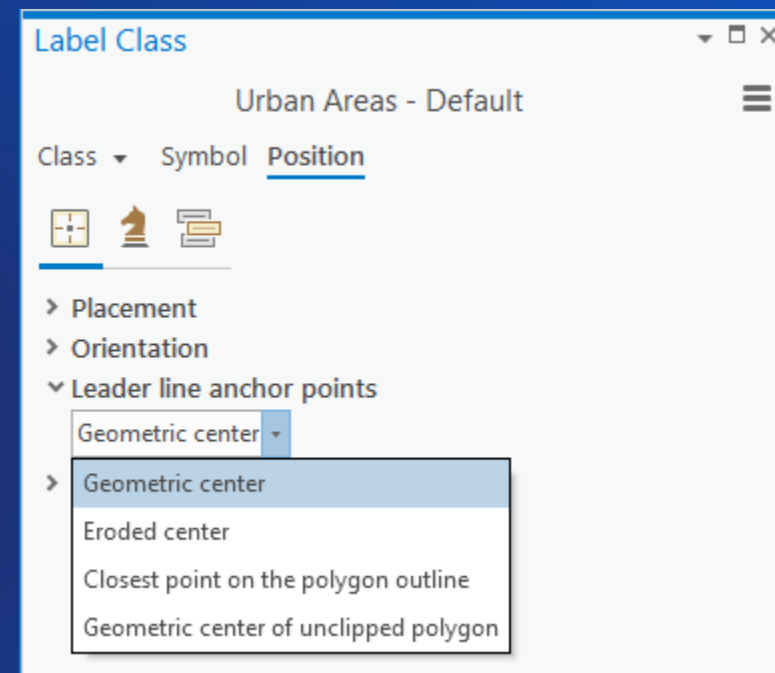
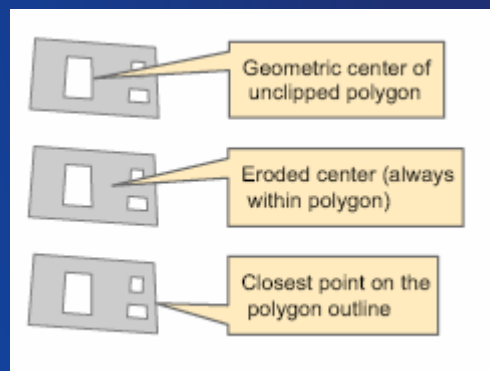


Preference: 0 = Blocked, 1 = Highest, 8 = Lowest

# Polygon Leader Anchor Points

Controls the position of the anchor point on the feature

- Closest point to polygon outline
- Anchor point within the polygon
  - Depends on complexity of polygon (holes)
  - Clipped or unclipped polygon



# Line Labeling

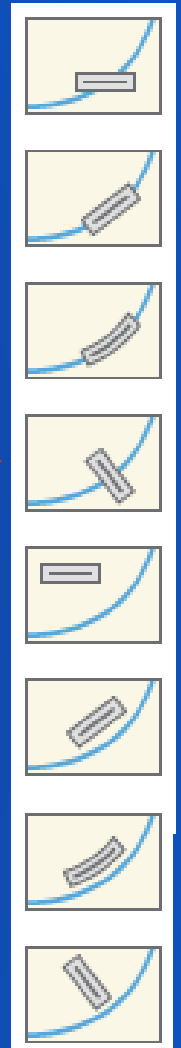
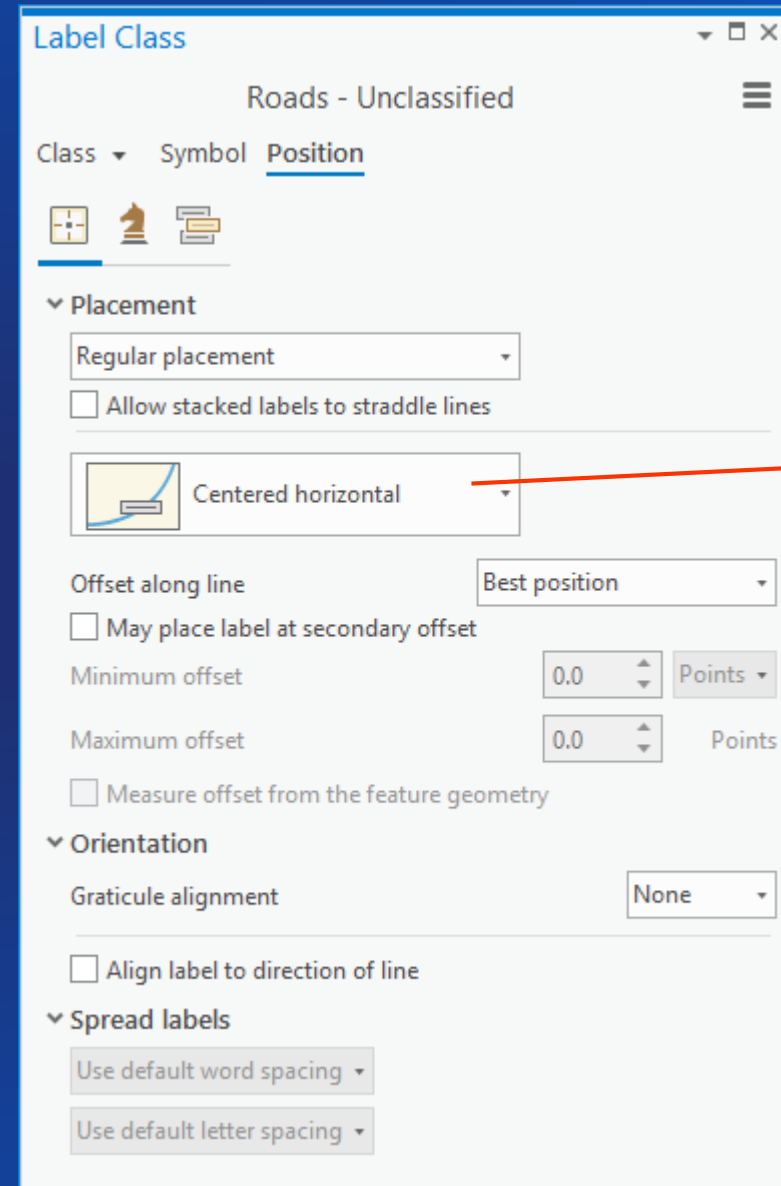




# Line Label Position

Options for placing a label on a line feature.

- Placement methods
  - Centered or offset
  - Various orientations
    - Horizontal, straight, curved, perpendicular
- Placement styles
  - Regular placement
  - Street placement
  - Street address placement
  - Contour placement
  - River placement



# Line Label Offset

- **Offset label from the line**
  - Preferred offset
  - Constrain the label to one side of the feature
  - Measure offset from geometry or symbol
- **Offset label along the line**
  - Default is best position along the line
    - Prefers central, smooth section
  - Fixed position
    - Offset distance
    - Measure to left, centre or right of label
    - Tolerance to give some freedom of movement

Label Class

Roads - Unclassified


Class ▼ Symbol Position

☐ 🏰 📄

▼ Placement

Regular placement ▼

☐ Allow stacked labels to straddle lines

 Offset straight ▼

Primary offset 1.0 ▼ Points ▼

Constrain offset No constraint ▼

☐ Measure offset from the feature geometry

Offset along line Along line from start ▼

Measure to Center of label ▼

Distance 0.0 ▼ Percent ▼

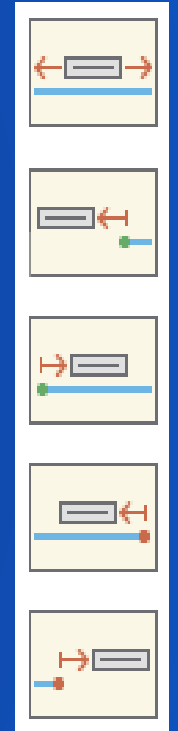
Tolerance (+\-) 0.0 ▼ Percent

☒ Use line direction

☒ May place label at secondary offset

Minimum offset 0.0 ▼ Points

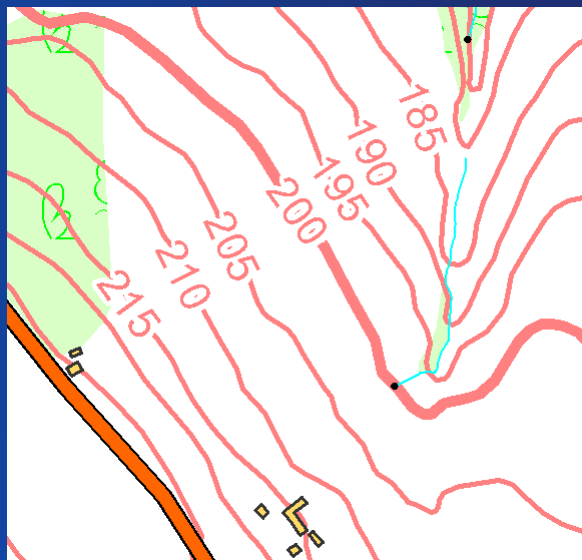
Maximum offset 0.0 ▼ Points



# Contour Placement

Features with a height attribute that represent terrain on the map




- Contour placement style
  - Page or Uphill alignment
  - Label laddering



Label Class

Contours - Default

Class ▼ Symbol Position

▼ Placement


Contour placement ▼

☐ Uphill label alignment

☒ Page label alignment

Maximum label angle (+/-) 90° ▼

☒ Place labels in ladders

 Centered straight ▼

☐ May place label at secondary offset

Minimum offset 0.0 ▼ Points ▼

Maximum offset 0.0 ▼ Points

☐ Measure offset from the feature geometry



# Placement Styles Demo



# Street Labeling

Best practices for handling dense street maps

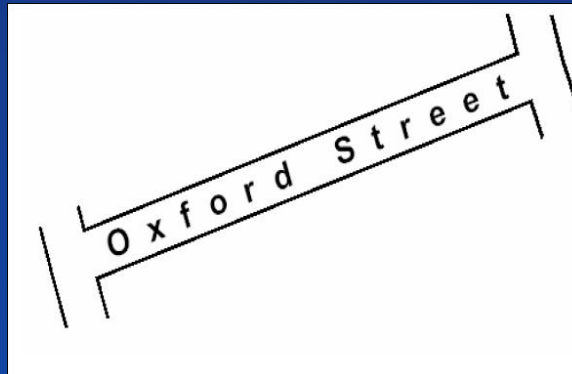
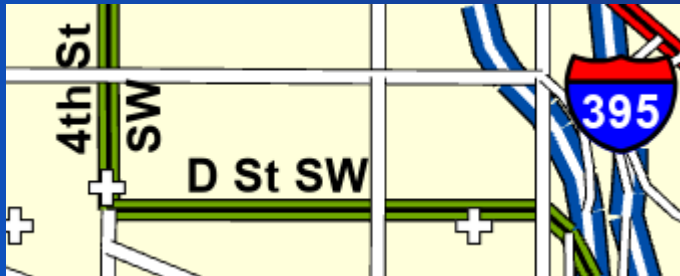


# Street Placement

Where you categorize a line as a street feature

- **Street placement style**

- **Different placement methods**
  - label is placed inside a cased symbol (European style)
  - label is offset from the line symbol (North American style)
- **Automatically spread words and/or characters**
- **End of street clearance**
- **Special rules for line connection**



▼ Placement

Street placement ▼

☐ May place label horizontal and centered on the street


☐ Reduce the leading of stacked labels that overrun the end of the street

☐ May place primary name under street ending when label is stacked

End of street clearance

Minimum 0 pt %

Preferred 0 pt %

 Offset curved ▼

Primary offset 1.0 Points ▼

☐ Measure offset from the feature geometry

☒ May place label at secondary offset

Minimum offset 0.0 Points

Maximum offset 1.0 Points



# Conflict Resolution: Label Density



# Label Density – Line Layers

## Conflict resolution tab




- **Line connection**
  - Connected features
  - Per feature, per part, per segment
- **Remove duplicate labels**
- **Repeat**
  - Road maps
  - Interval
  - preferences
- **Buffer**
- **Minimum feature size**



Label Class

Roads - Unclassified

Class ▼ Symbol Position

› Remove duplicate labels

▼ Repeat

Minimum interval 0.0 Map units ▼

☒ Prefer label near map border

Clearance 0.0 Map units

☒ Prefer label near junction

Clearance 0.0 Map units

› Buffer

▼ Minimum feature size

Minimum for labeling 0.0 Map units ▼

▼ Line connection

☒ Connect features

Unambiguous ▼

› Feature weight

› Background labels

› Unplaced labels

# Label Density – Polygon Layers




## Conflict resolution tab

- Remove duplicate labels
- Repeat
- Buffer
- Minimum feature size
  - Perimeter or area
- Label largest part

Label Class ▼ 📌 ✕

Water Areas - Default ☰

Class ▼ Symbol Position

› Remove duplicate labels

› Repeat

› Buffer

▼ Minimum feature size

Perimeter ▼ 0.0 ▲▼ Map units ▼

▼ Label largest part

☒ Label largest feature part

› Feature weight

› Background labels

› Unplaced labels

# Label Density – Point Layers




## Conflict resolution tab

- Remove duplicate labels
- Buffer

Label Class

Institutes - Default

Class Symbol Position



Remove duplicate labels

Do not remove

Buffer

Label buffer15 %

☐ Hard constraint

Feature weight

Background labels

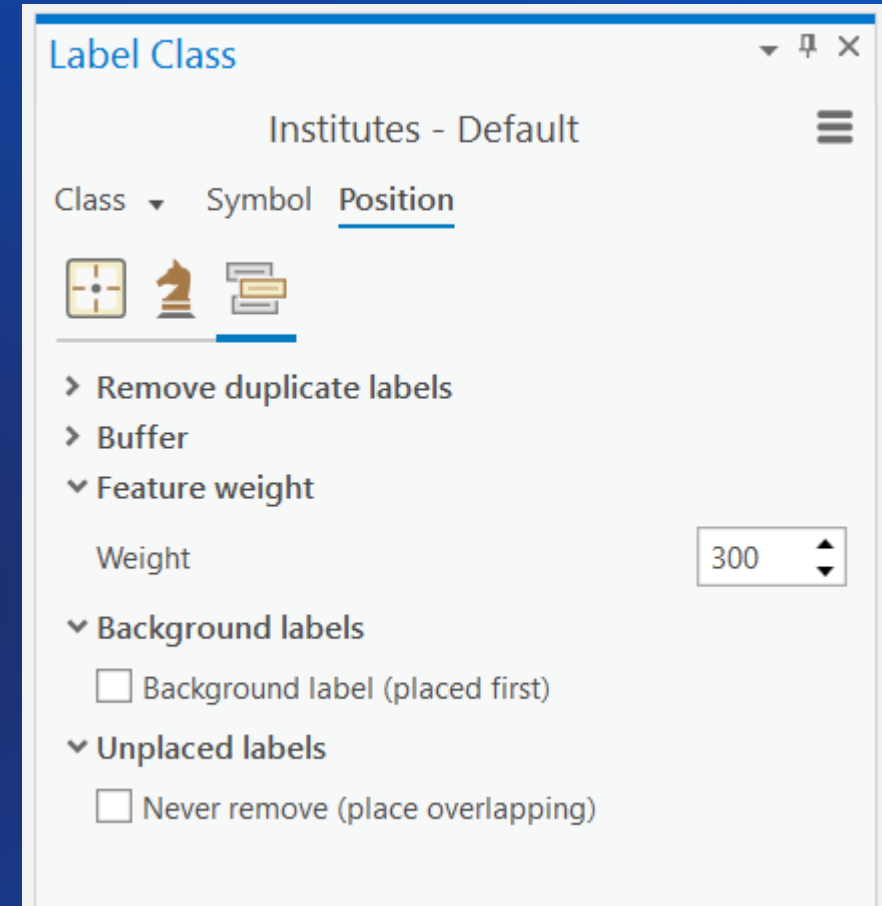
Unplaced labels

# Conflict Resolution: Unplaced Labels



# Conflict Resolution

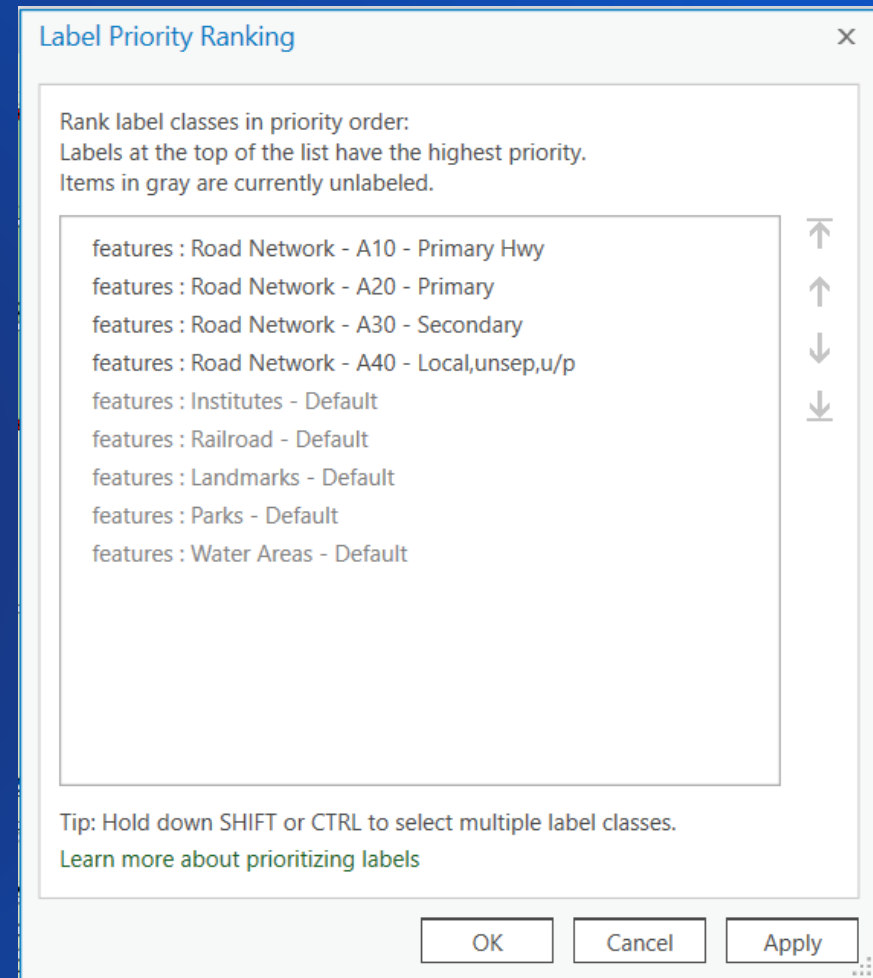
- **Background labels**
  - transparent text symbols!
- **Additional access to the feature weights**
- **Unplaced labels - Never remove**
  - Forces the placement of the label...
  - ...you will get overlap 😞
  - Last resort.





# Label Priority

- Rank your label classes in order of their relative importance on the map
- UI shows all label classes in the map
- Controls the label placement order
- Also serves as the deletion priority for conflict resolution
  - If two labels are in conflict it's the one that has the higher priority that will win





# Label Density Demo

Quality control on your maps

# Placement Strategies

Getting the tricky labels onto your map



# Label Stacking

Automatic stacking of text onto multiple lines

- **Stacking Separators**

- User defined separators
  - Defaults are space and comma

Cardiff  
Bay

- Visible or not

- Forced split

- Split before or after

Senghenydd  
Road

- **Horizontal alignment**

- Choose best

- Fixed (left, right or centered)

- **Limits**

- Number of lines

- Number of characters per line

North  
Llanbradach  
Park

Label Class

Roads - Unclassified

Class ▼ Symbol Position

Stack

☒ Stack label

Horizontal alignment Choose best

Stacking separators

space	<input checked="" type="checkbox"/> Visible
	<input type="checkbox"/> Forced split
	<input checked="" type="checkbox"/> Split after
-	<input checked="" type="checkbox"/> Visible
	<input type="checkbox"/> Forced split
	<input checked="" type="checkbox"/> Split after
,	<input checked="" type="checkbox"/> Visible
	<input type="checkbox"/> Forced split
	<input checked="" type="checkbox"/> Split after

Maximum number of lines 2

Minimum characters per line 2

Maximum characters per line 80

Control the horizontal alignment

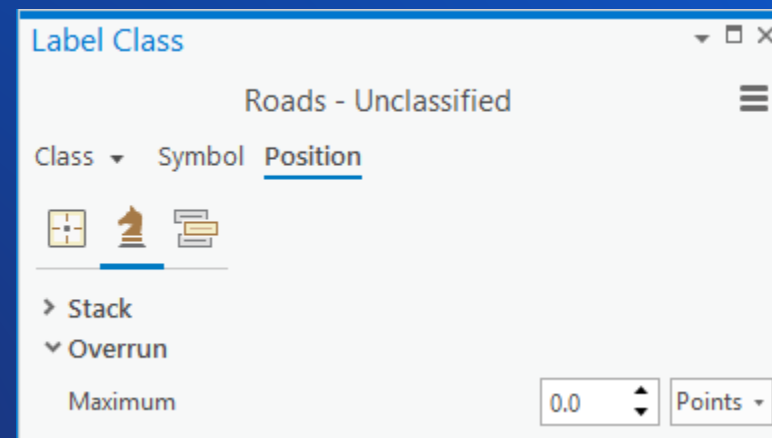
Add new character

Control the line break

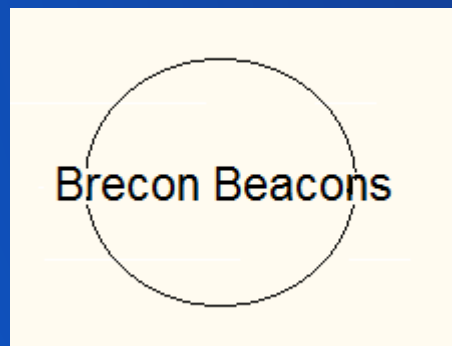
# Label Overrun

Label is allowed to overrun the feature extent

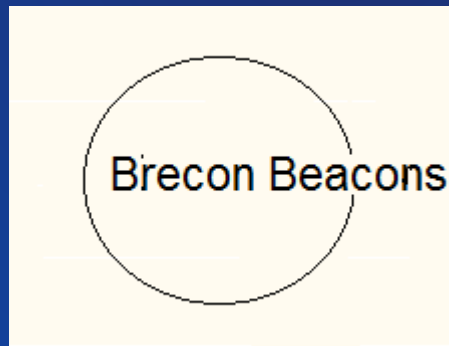
- Lines



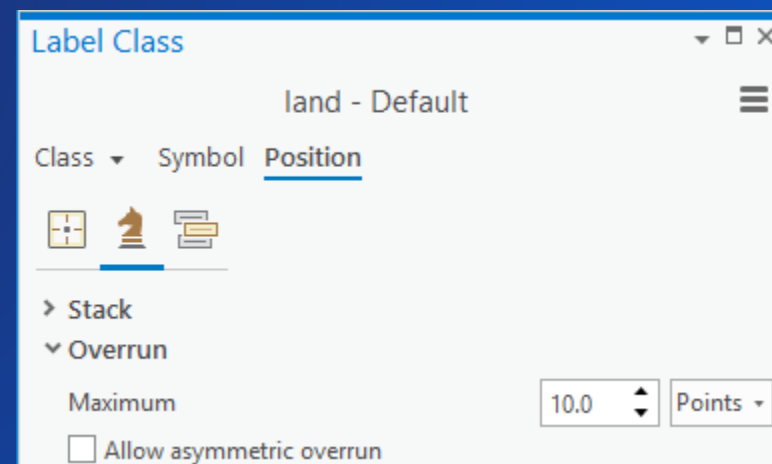
- Polygons



Symmetric overrun



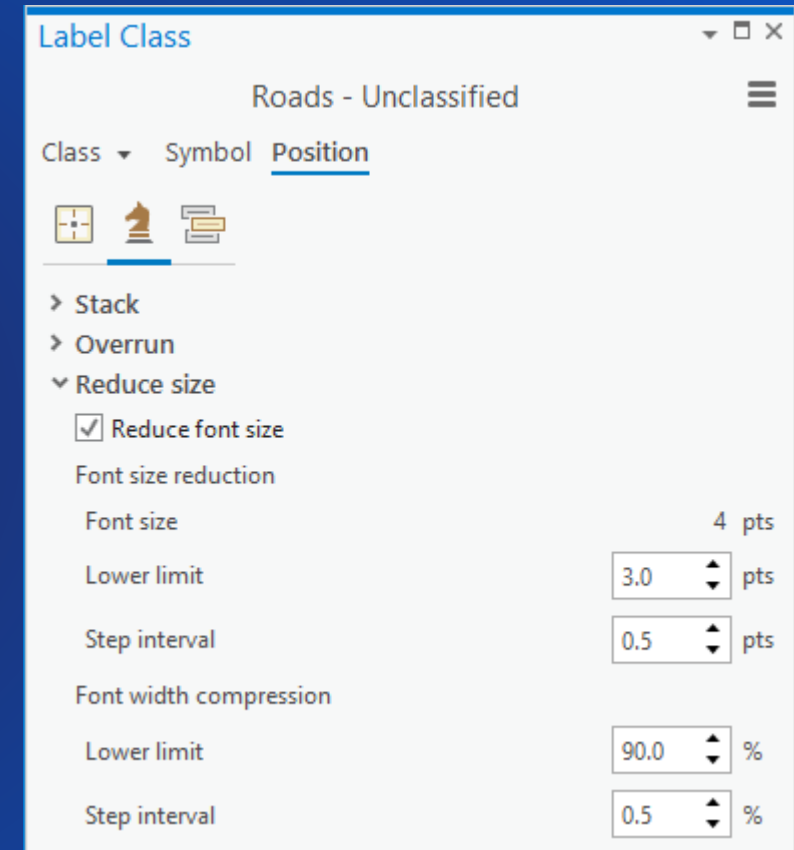
Asymmetric overrun



# Label Reduction

Label is reduced in size or width to fit on the map

- **Font size reduction**
  - Reduce label in size in stepped intervals
    - e.g 10pt to 6pt in 0.5 pt intervals
- **Font width compression**
  - Reduce label in width in stepped intervals
    - e.g 100% to 90% in 0.5% intervals





# Abbreviation Strategies




Using shortened versions of your label to allow it to place

- **Alternate text**
  - Field of expression
- **Abbreviation Dictionary**
  - Ending, keyword, translation
- **Truncation**

Label Class

Airport - Default

Class ▾ Symbol Position


> Stack

> Reduce size

▼ Abbreviate

☒ Use abbreviation strategies

☐ Alternate expression

Field None ▾ 

Abbreviation

Dictionary None ▾

☐ Truncation

Minimum word length 1 ▴ ▾

Marker character .

Characters to remove first aeiou

# Alternate Text

- Field
- Arcade script
  - E.g. if label contains 'College', 'School', 'Nursery' or 'University' then label with 'Sch.'

**Knowsley Park Centre for Learning, Serving  
Prescot, Whiston and the Wider Community**  
↓  
**Knowsley Park**

```
var eduSearchTerms = ["SCHOOL", "ACADEMY", "COLLEGIATE", "COLLEGE", "UNIVERSITY"]
var relSearchTerms = ["CHURCH", "MOSQUE", "SYNAGOGUE", "MONASTRY", "TEMPLE", "TABERNACLE", "WORSHIP"]

for (var i in eduSearchTerms)
{
  if(find(eduSearchTerms[i], upper($feature.Name2)) > -1)
    return "Edu."
}
for (var i in relSearchTerms)
{
  if(find(relSearchTerms[i], upper($feature.Name2)) > -1)
    return "Rel."
}

return $feature.Name2
```

# Label Abbreviations

Abbreviate label text using an label abbreviation dictionary

- **Ending**
  - Applies to the **last word** in the label
  - Street to St, Road to Rd, Avenue to Ave
- **Keyword**
  - Applies to **any word in the label except the last word**
  - South to S., Mountain to Mt.
- **Translation**
  - Simple substitution that applies to the **entire label text**
  - 'Postal Office' to P.O.
  - 'Unknown Road' to an empty string



# Label Abbreviations (continued)

Abbreviate label text using an label abbreviation dictionary

- Create a named dictionary
  - Create new
  - Import existing - See [KB 30494](#) for US streets example
- Share dictionaries
  - Available to any label class in your map
  - Can be shared as a .dic file

Abbreviation Dictionaries

Selected abbreviation dictionary: Streets Options ▾

New... Remove Rename...

Contents

Keyword	Abbreviation(s)	Type
street	St	Ending
road	Rd	Ending
place	Pl	Ending
the		Translation
pedestrian	Ped	Keyword
bridge	Brdg	Ending
lower	Lo	Keyword
upper	Up	Keyword
south	S	Keyword
north	N	Keyword
east	E	Keyword

Add row Remove row

Click on column header to sort table

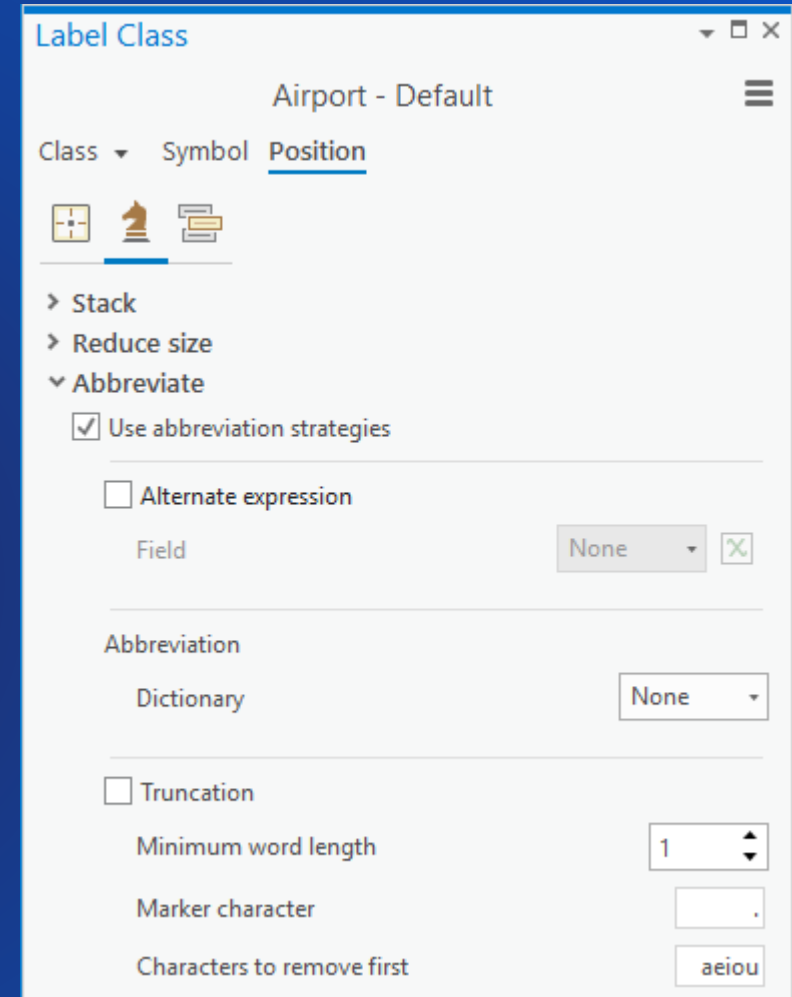
[Learn more about abbreviating labels](#)

OK Cancel Apply

# Label Truncation

Characters are automatically removed from the label text

- Another type of abbreviation
- Algorithm that removes characters
- Default is 'aeiou'
- Degrades readability
- Similar to 'tweet shortening'



The screenshot shows a software window titled "Label Class" with a standard Windows-style title bar (minimize, maximize, close buttons). The window has a menu bar with "Airport - Default" and a hamburger menu icon. Below the menu bar are three tabs: "Class", "Symbol", and "Position", with "Position" being the active tab. Under the "Position" tab, there are three icons: a grid, a chess knight, and a document. Below these icons are expandable sections: "Stack", "Reduce size", and "Abbreviate". The "Abbreviate" section is expanded, showing a checked checkbox for "Use abbreviation strategies". Below this is an unchecked checkbox for "Alternate expression". Under "Alternate expression" is a "Field" label followed by a dropdown menu set to "None" and a small "X" icon. Below the "Abbreviate" section is an "Abbreviation" section with a "Dictionary" label followed by a dropdown menu set to "None". Below the "Abbreviation" section is an unchecked checkbox for "Truncation". Under "Truncation" are three settings: "Minimum word length" with a numeric input set to "1", "Marker character" with a text input containing a period ".", and "Characters to remove first" with a text input containing "aeiou".

# Key Numbering

Creates a numbered list for the unlabeled labels

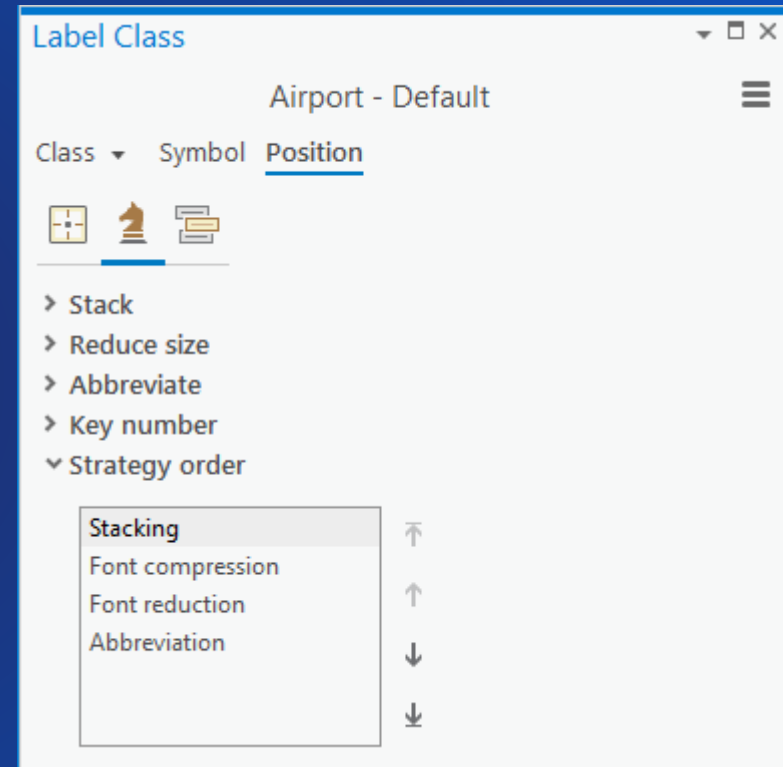
- Labels that don't fit are replaced with a number
- Label text then placed in a list
- Various options
  - Key numbering scheme
  - Size of the list etc

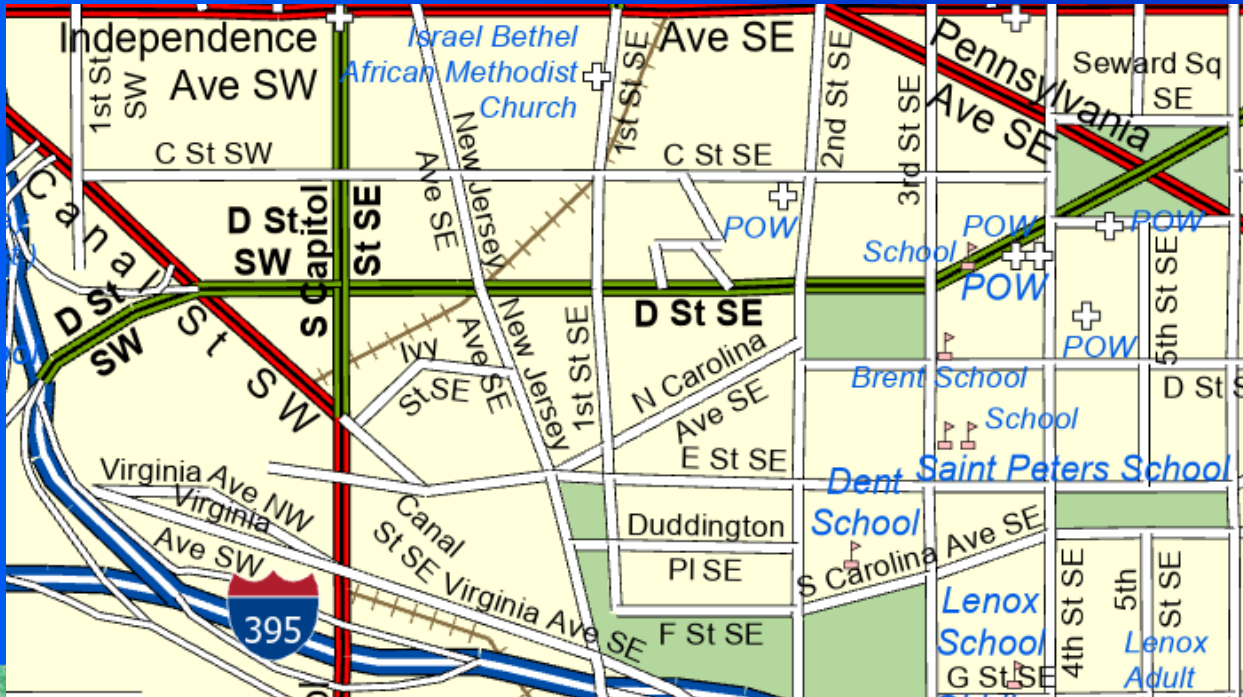




# Strategy Order

- Select the order in which fitting strategies are tried
- **Preference** as opposed to exact order





# Fitting Strategies Demo

Stacking, overrun, abbreviation strategies, font reduction, key numbering

# Maplex Help and Resources

- Help System
- Detailed explanations of placement options
- Step-by-step guidelines for common labeling tasks
- Labeling tutorial
- See Esri styles for examples of Maplex in use

## ArcGIS Pro

- Home
- Get Started
- Help
- Tool Reference
- Python
- SDK

Help / Maps and scenes / Author maps and scenes / Text / Place labels with the Maplex Label Engine / Label positions for lines

- > Label positions for points
- ✓ Label positions for lines
  - Labels for line features
  - Specify a line label position
  - Label using the Street placement style
  - Label using the Street address placement style**
  - Label using the Contour placement style
  - Label using the River placement style for line features
  - Offset line labels
  - Orient line labels to gratitudes or direction
  - Spread letters of a label along a line feature
- > Label positions for polygons

### Label using the Street address placement style

Street maps often show address ranges for the properties on each side of the street. Address range data is usually stored in Address from left, Address from right, Address to left, and Address to right fields. These can be concatenated into two labeling classes, Address to and Address from, with the two fields entered into a label in the format left/right (for example, 1/2). The slash (/) is used to force stacking, and the two numbers appear on either side of the street. If one label out of the stacked pair cannot be placed or is not present, the other label will still be placed in its correct position.

- [Learn more about creating label classes](#)
- [Learn more about stacking labels](#)

The Maplex Label Engine **Street address placement** style allows only one placement position for the label: **Centered straight**. You can set a **label offset** for address range labels to control their placement along the street relative to street junctions. You can also set a tolerance that will allow the label the freedom to move farther into the street in order to be placed.

The image below shows the streets labeled with their address ranges using the **Street address placement** style.



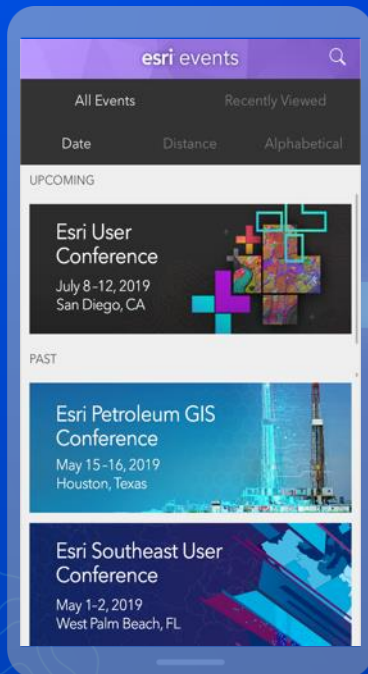
# Summary

- **Maplex is an advanced, high-quality, cartographic text placement engine**
- **Provides numerous placement properties and strategies to define the location of labels**
- **Generates clear, well placed labels, to make a better looking map!**

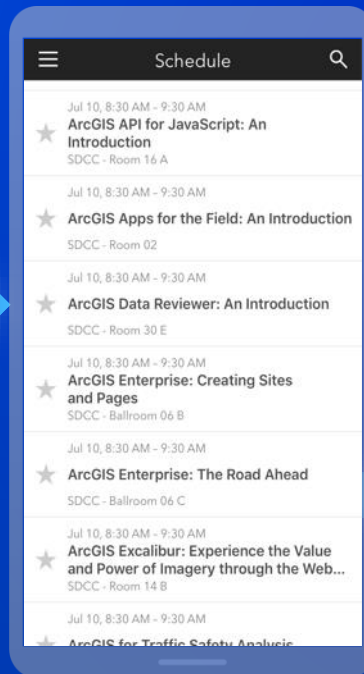


# Please Share Your Feedback in the App

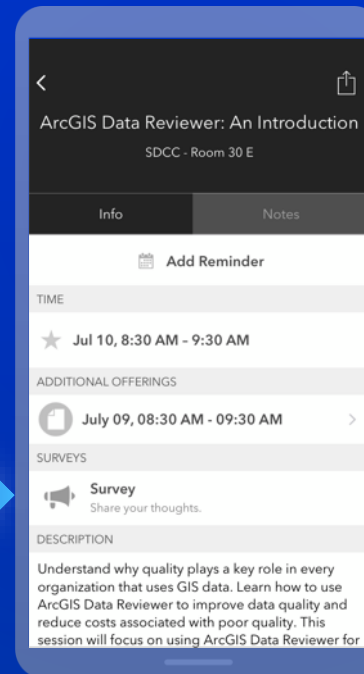
Download the Esri Events app and find your event



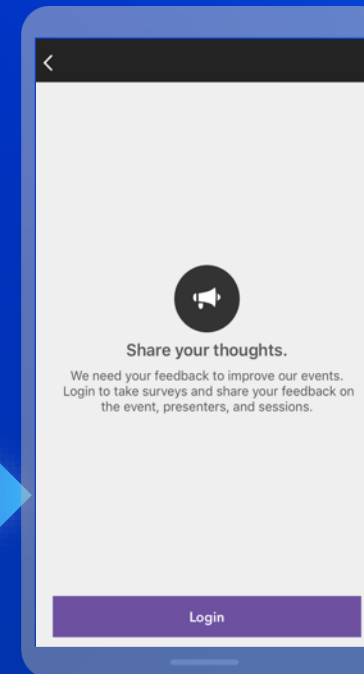
Select the session you attended



Scroll down to "Survey"



Log in to access the survey



Complete the survey and select "Submit"

