Advanced Map Labeling using Maplex

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Presentation Overview

We'll be using ArcGIS Pro

- Introduction
  - Different types of text in ArcGIS - role of the Maplex Label Engine – labeling framework
- Position properties for lines
- Demo - Street labeling
- Position properties for points and polygons
- Label Fitting strategies
- Conflict resolution properties
- Demo - Maximizing text placement
- Converting labels to annotation
- Summary and Questions

Types of Text

- **What are Labels?**
  - Dynamically placed text by a label engine
  - Change of content or map refresh generates new text locations

- **What is Annotation?**
  - Stored text
  - Editable

Maplex Label Engine

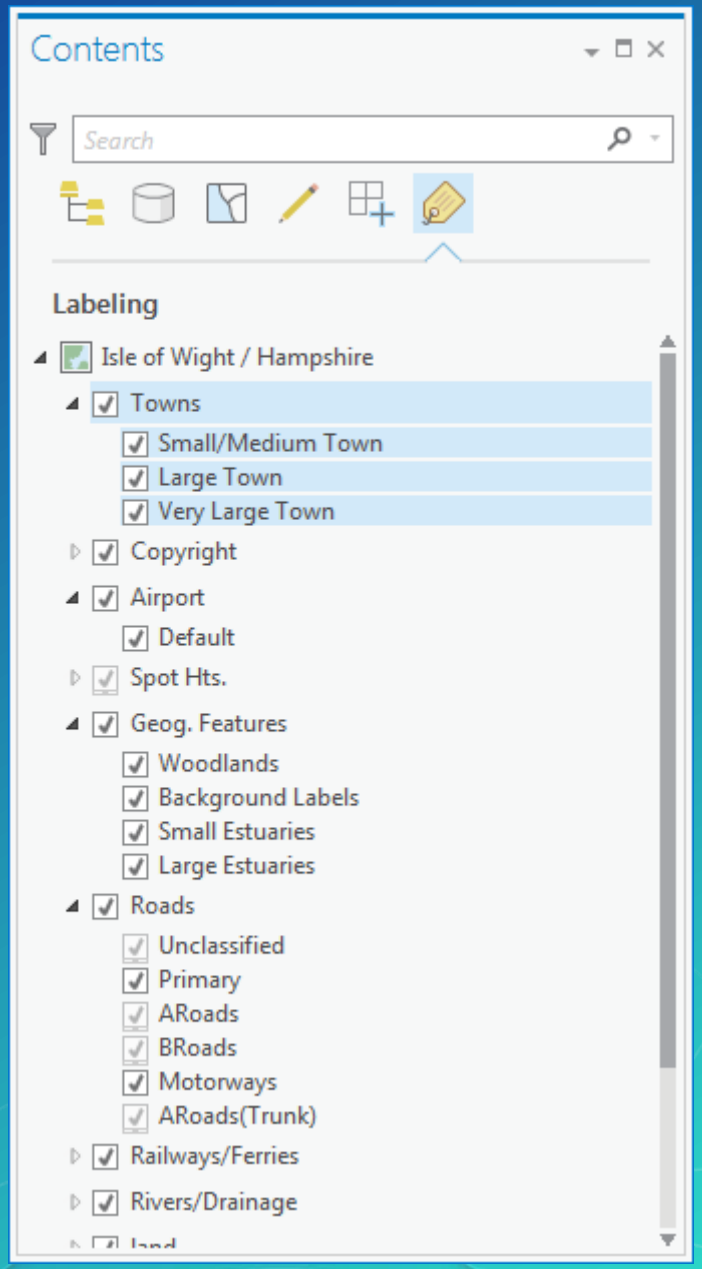
- Advanced high-quality cartographic text placement engine
- History
  - University research project
  - Independent product named Maplex
- Licensing
  - Started as an extension ‘Maplex for ArcGIS’
  - At 10.1 Maplex becomes part of core software
- Labeling Framework
  - Shared with standard label engine
  - Maplex is now the default label engine in ArcGIS Pro

Labeling in ArcGIS Pro

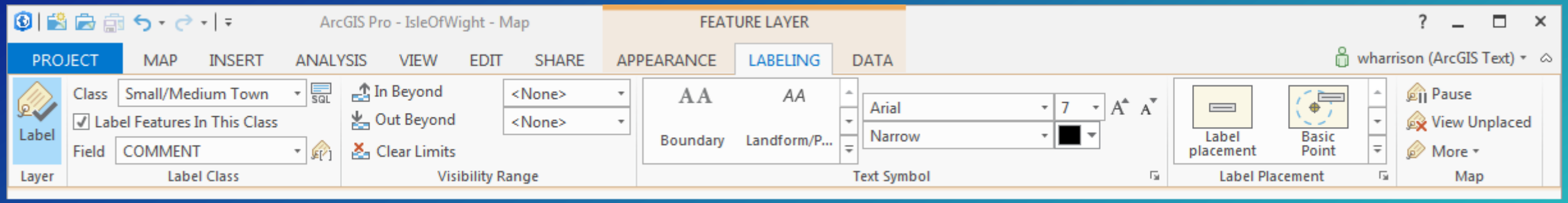
- **Improvements to performance and placement quality**
  - **Multi-threading**
- **Intuitive and efficient authoring experience**
  - **No more cascading modal dialogs!**
  - **Multi-select**
- **Improved style experience**

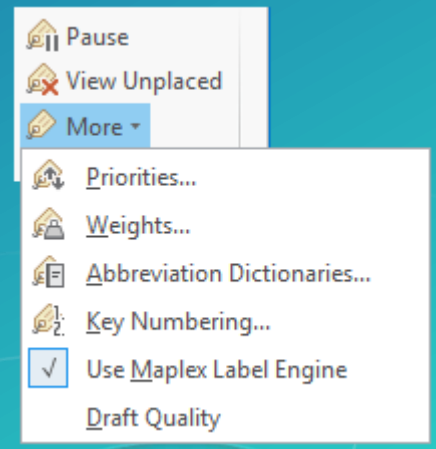
Labeling View of the Contents Pane

- View label classes
- Add, remove or rename a label class
- Copy\paste\reorder is in development
- Multi-select workflow
- Similar to the Label Manager in ArcMap



Labeling Ribbon

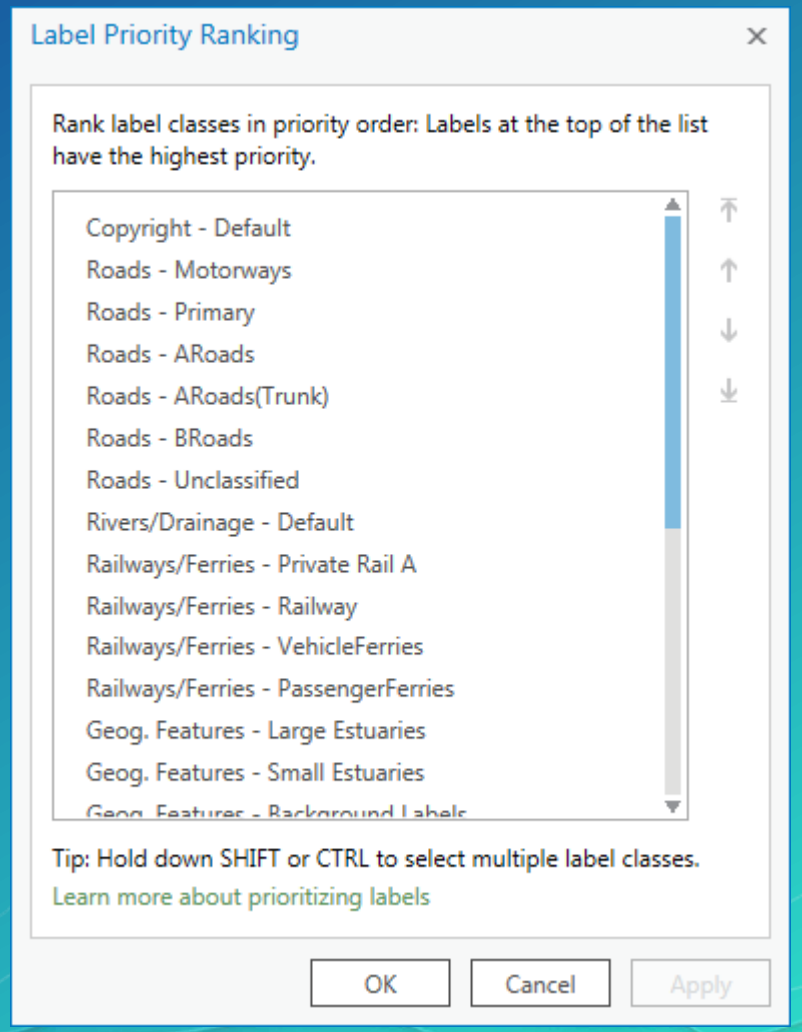




Label Priority

Rank your label classes in order of their relative importance on the map

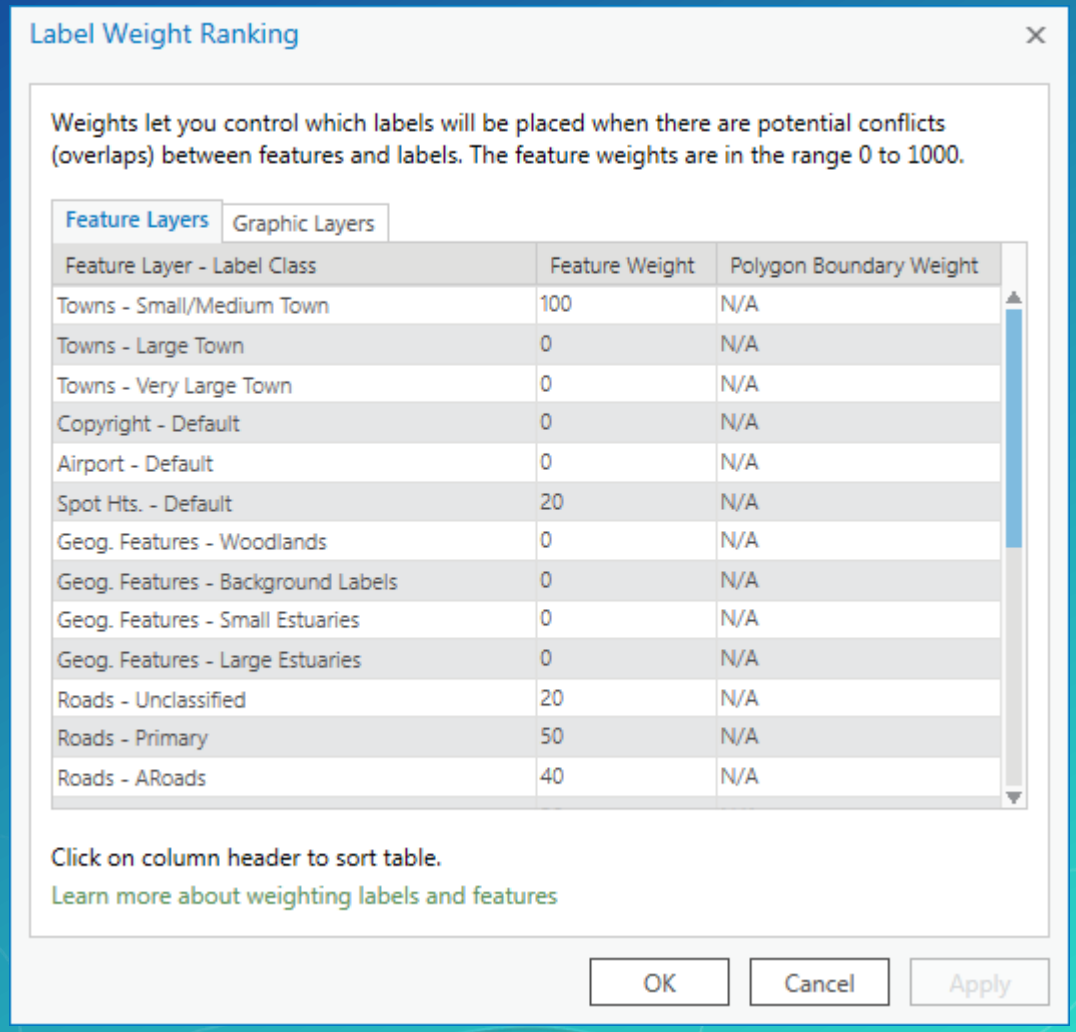
- UI shows all label classes in the map
- Controls the label placement order
- Also serves as the deletion priority for conflict resolution
  - If two labels are in conflict it's the one that has the higher priority that will win



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



Feature Weights *(continued)*

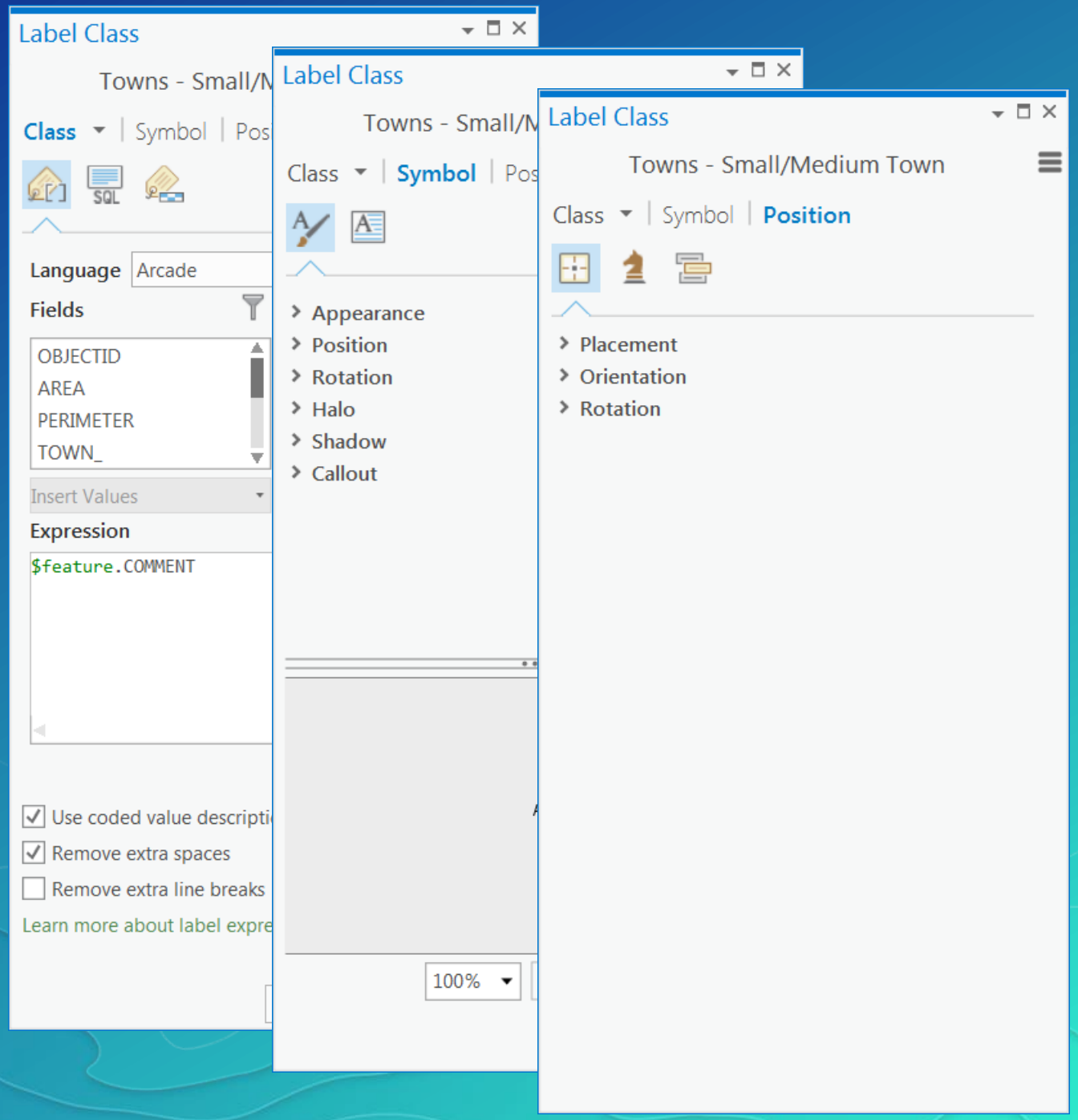
Two things you really need to know about weights !

- **Be careful when giving an interior weight to a large polygon**
  - Large background polygons may not need an interior weight
  - Labels will try to avoid the weighted interior
  - Maybe only the boundary needed a weight?

- **Be careful when a label class is ‘checked off’ but it has a feature weight**
  - The label class is still active: it represents a set of barrier features
  - Labels will try to avoid the barrier features
  - More often than not – it was not intentional ☹

Label Class Pane

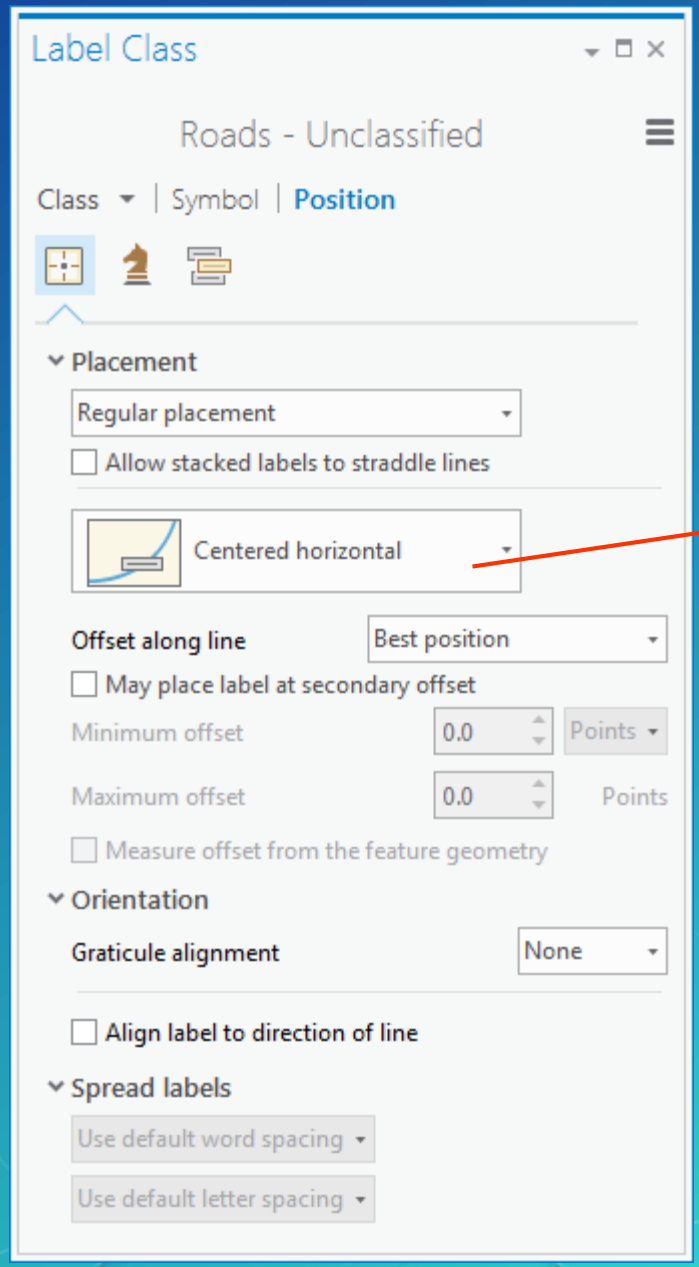
- The details
  - Label Expression
  - SQL Query
  - Visibility Range
  - Text Symbol
  - Placement properties
- Launch from:
  - Ribbon
  - Context menu on the feature layer

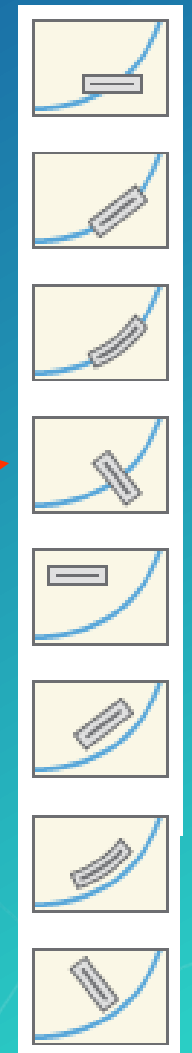


Line Label Position

How do you want to place the label on the line?

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

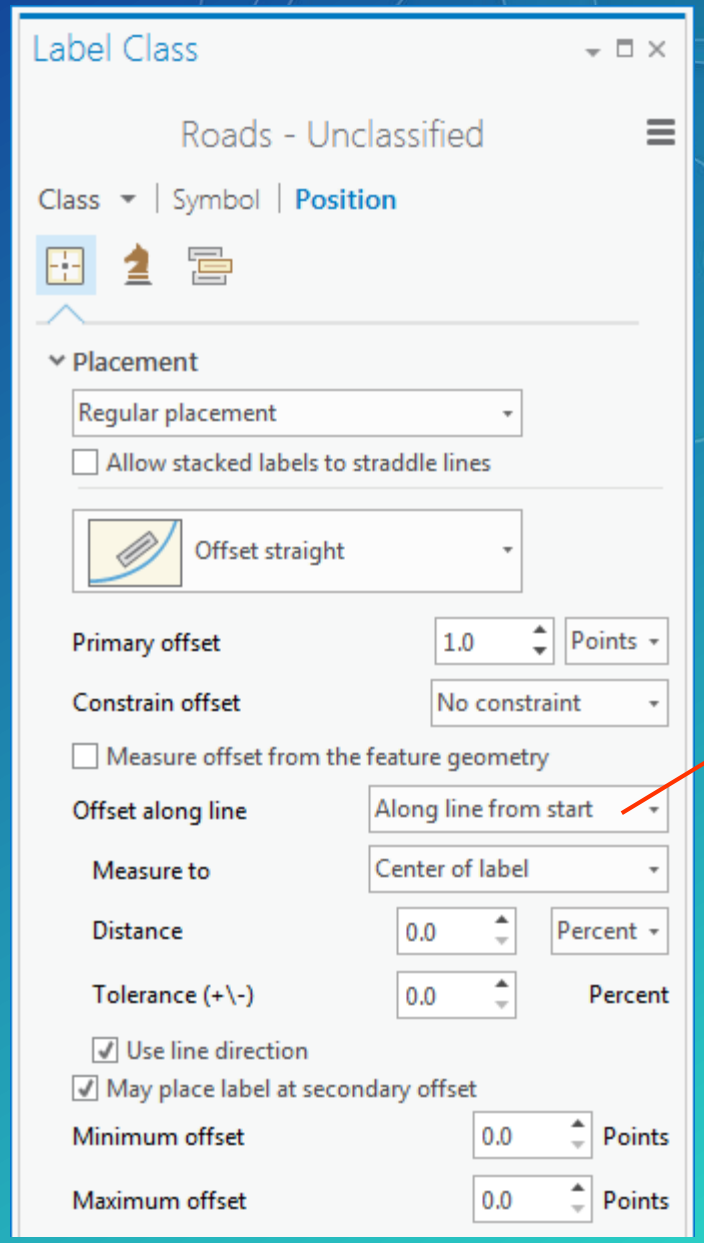


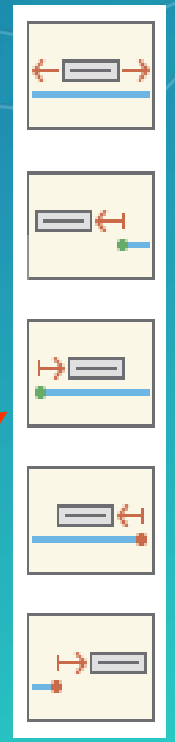


Line Label Offset

- **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

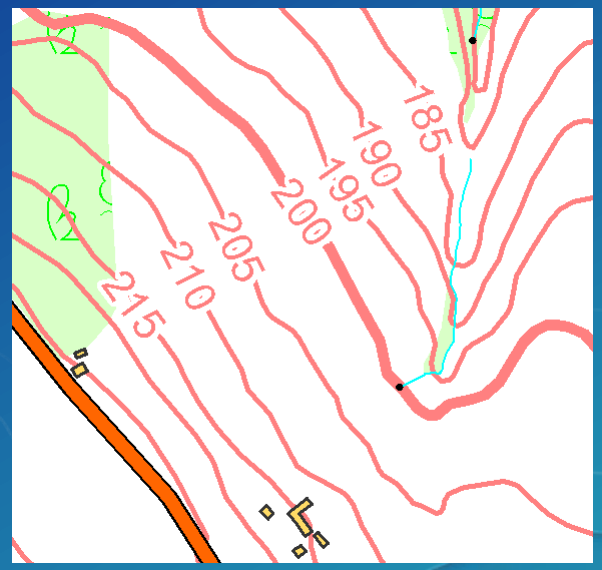


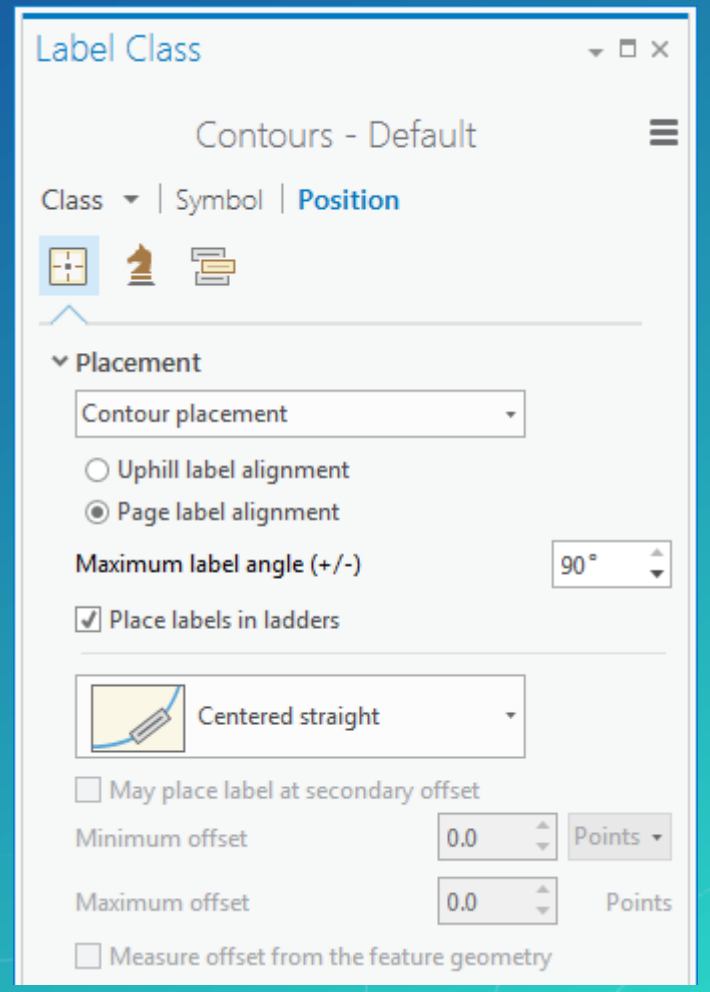


Contour Placement

Where you categorize a line as a terrain feature with height attribute

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

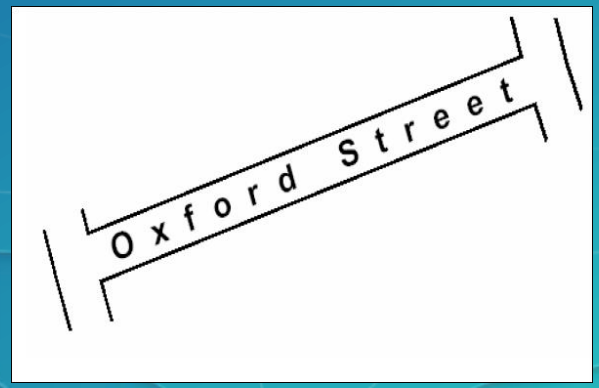


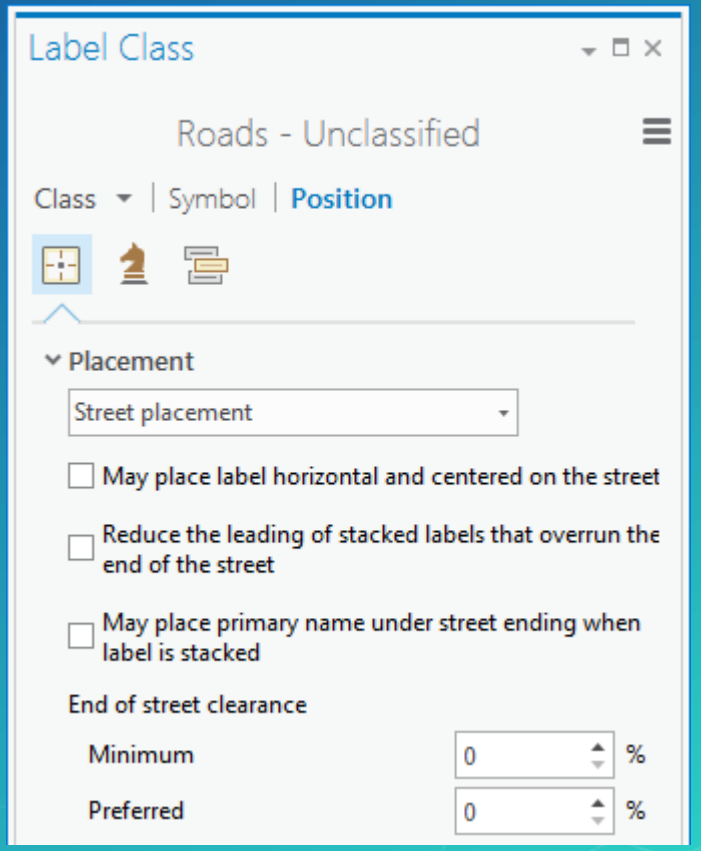


Street Placement

Where you categorize a line as a street feature at large map scales

- **Street placement style**
  - Special rules for line connection
  - 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

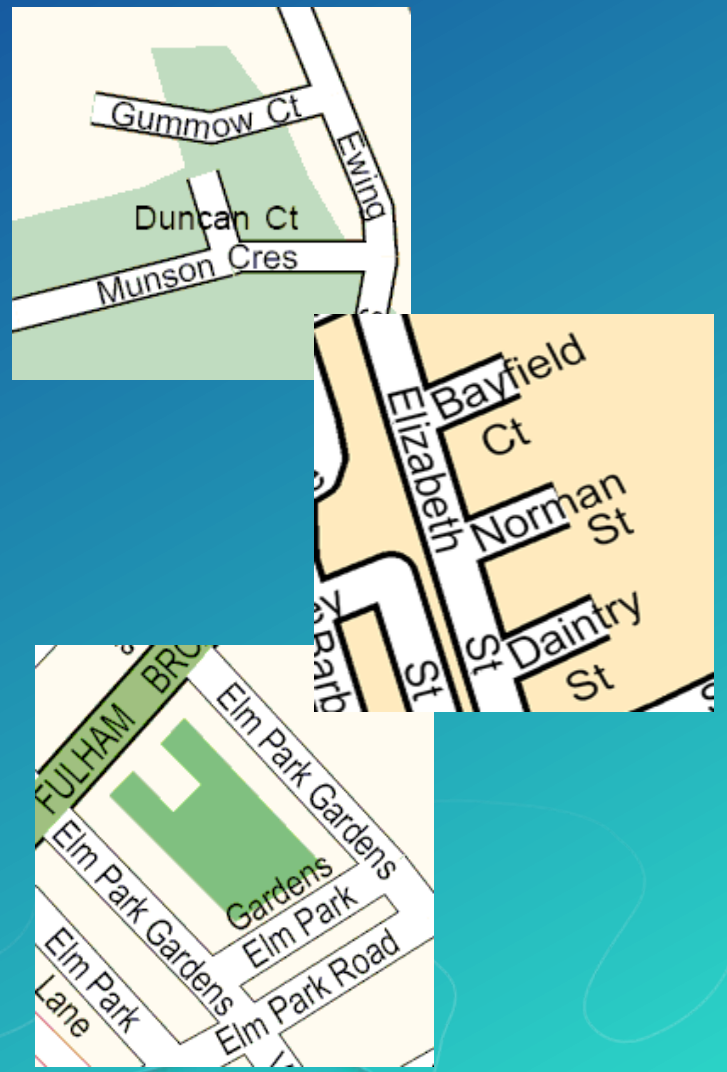




Street Placement *(continued)*

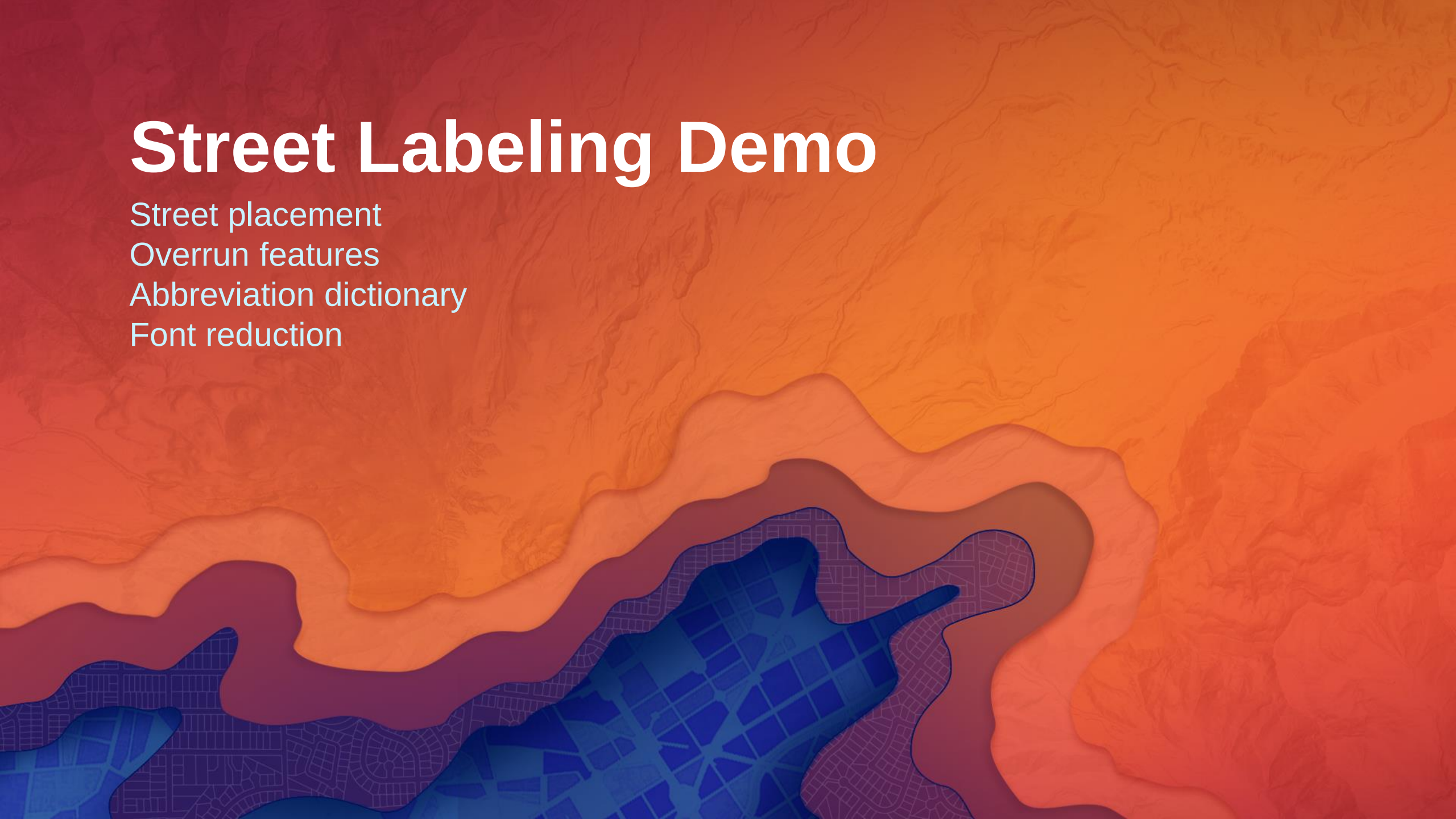
Additional strategies for street placement

- **May place label horizontal and centered on street**
  - **‘Duncan Ct’**
- **Reduce the leading of stacked labels that may overrun the end of the street**
  - **‘Norman St’**
- **May place primary name under the street ending when label is stacked**
  - **‘Elm Park Gardens’ to ‘Gardens Elm Park’**



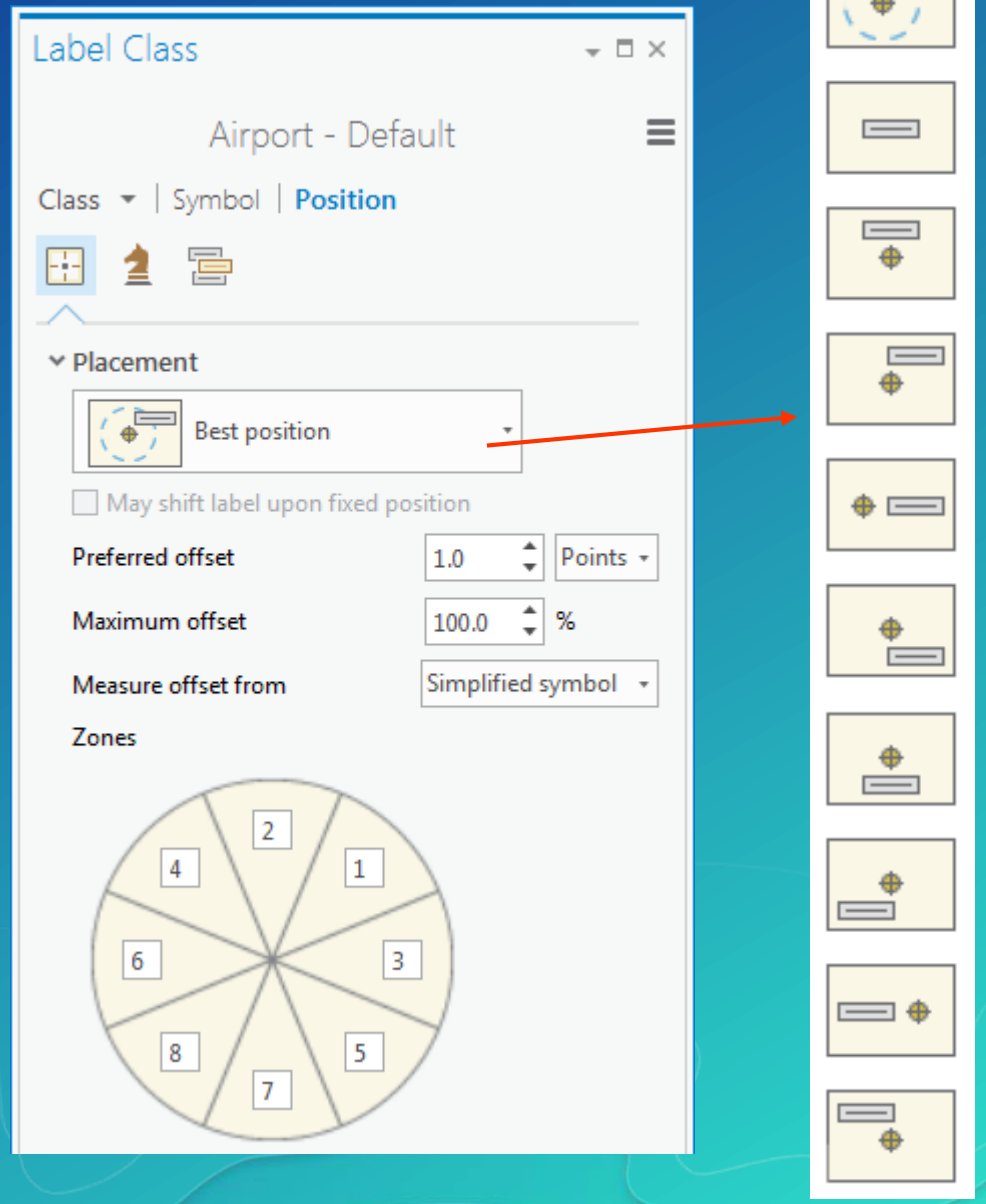
Street Labeling Demo

Street placement
Overrun features
Abbreviation dictionary
Font reduction



Point Label Positioning

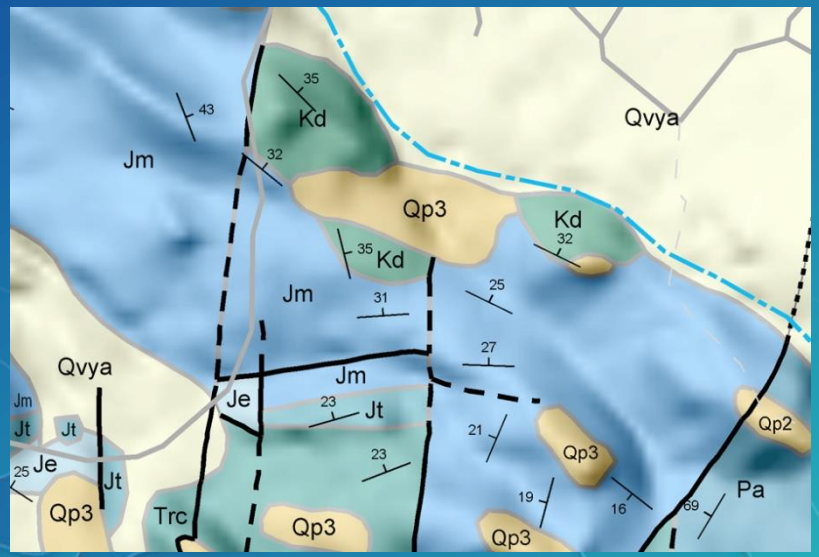
- **Default positioning is best position**
  - Control over which zone is preferred
  - Cartographic preference often top right
  - Zone grid (1- 8 preference, 0 to block)
- **Fixed positions**
  - Centered on the point
  - Cardinal positions around the point

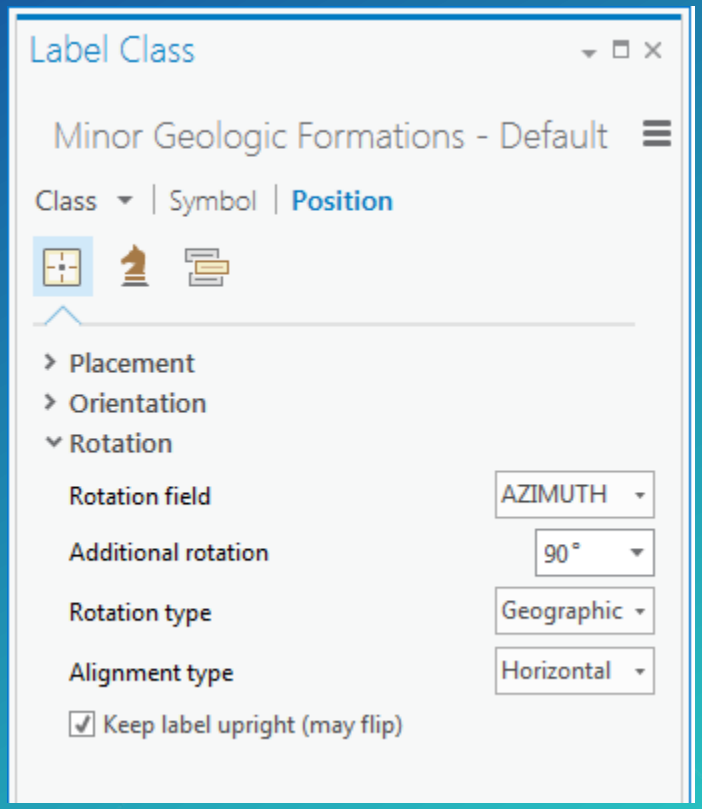


Point Label Rotation

Angle the label using an attribute in the data

- Select the field that contains the angle
- Select the alignment
  - Horizontal, Straight or Perpendicular
- Example – strike and dip

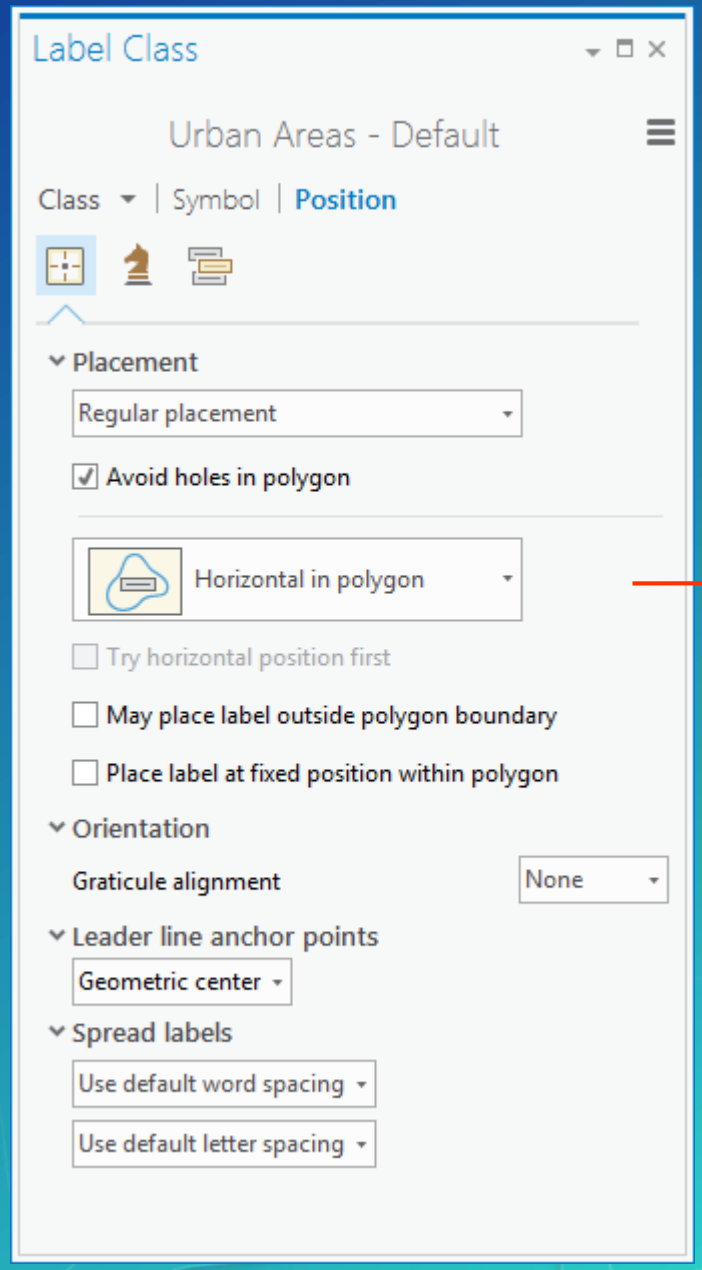


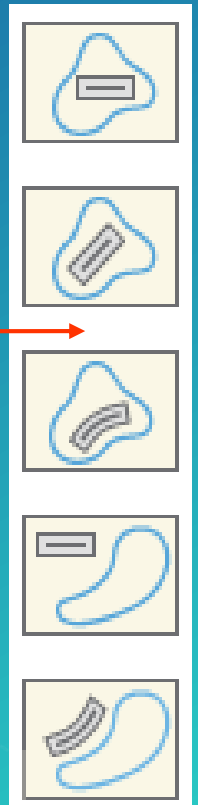


Polygon Label Positioning

- **Placement methods**
  - Centered or offset
  - Various orientations (horz, straight, curved)

- **Feature Types**
  - Regular placement
  - Land parcel placement
    - *only useful if you have building footprints
  - River placement
  - Boundary placement





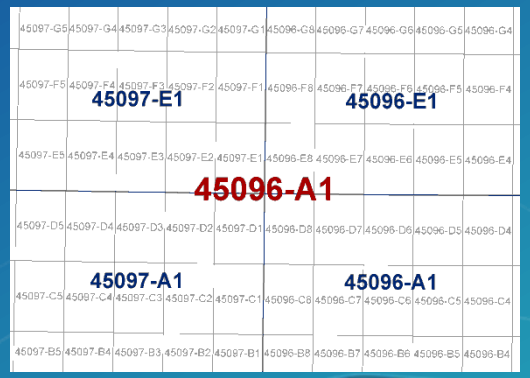
Polygon Boundary Labeling

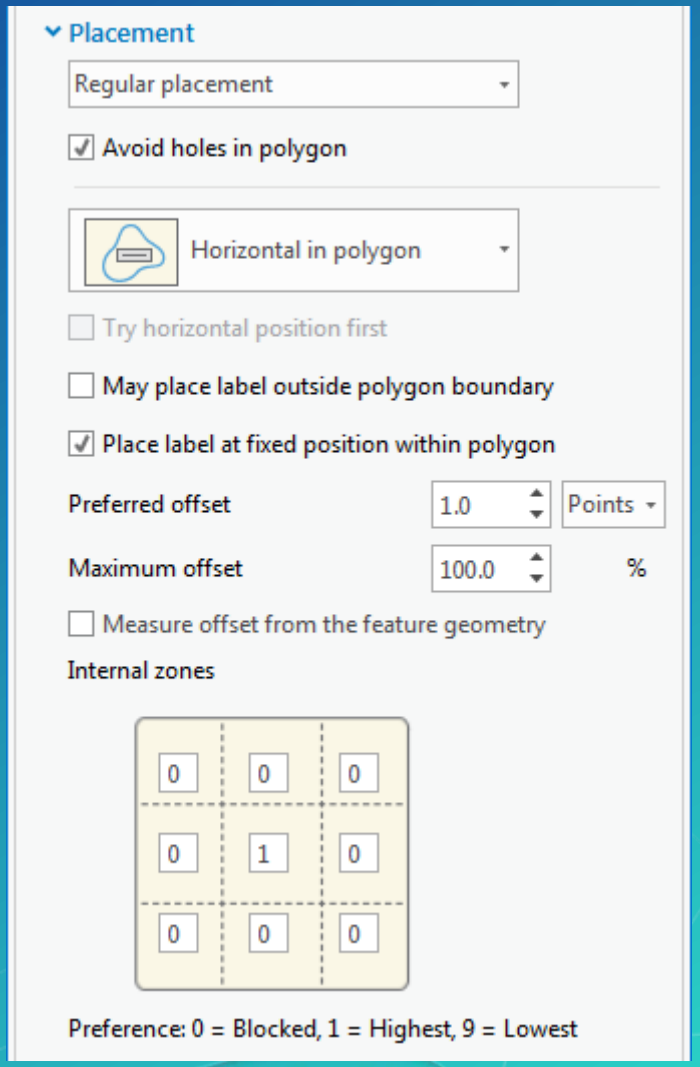
Adjacent polygons are labeled at their boundary

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

Fixed Position Within a Polygon

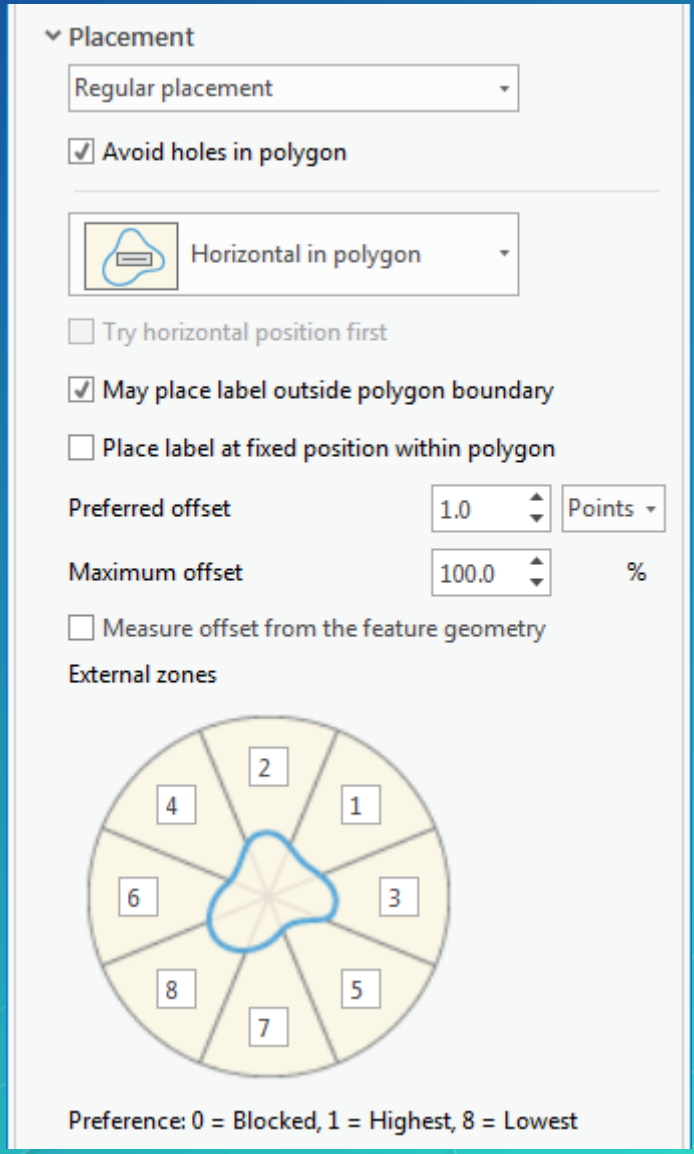
- Place label at fixed position within polygon
  - Specify internal zones
  - Refers to the unclipped polygon
- Best with rectangular features





Fixed Position Outside of the Polygon

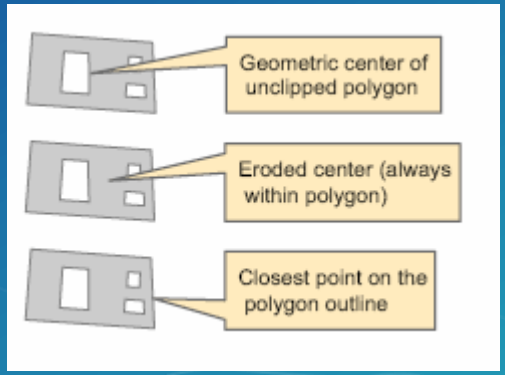
- Similar to placing a label around a point
  - Specify external zones
- May place label outside of the polygon
  - Mixed size features such as lakes
- Often used with a leader line style

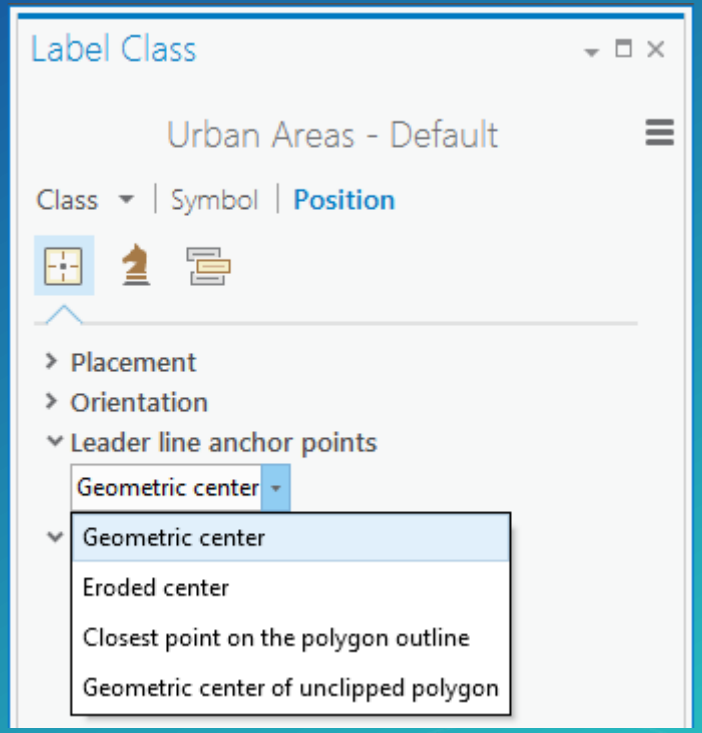


Polygon Leader Anchor Points

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

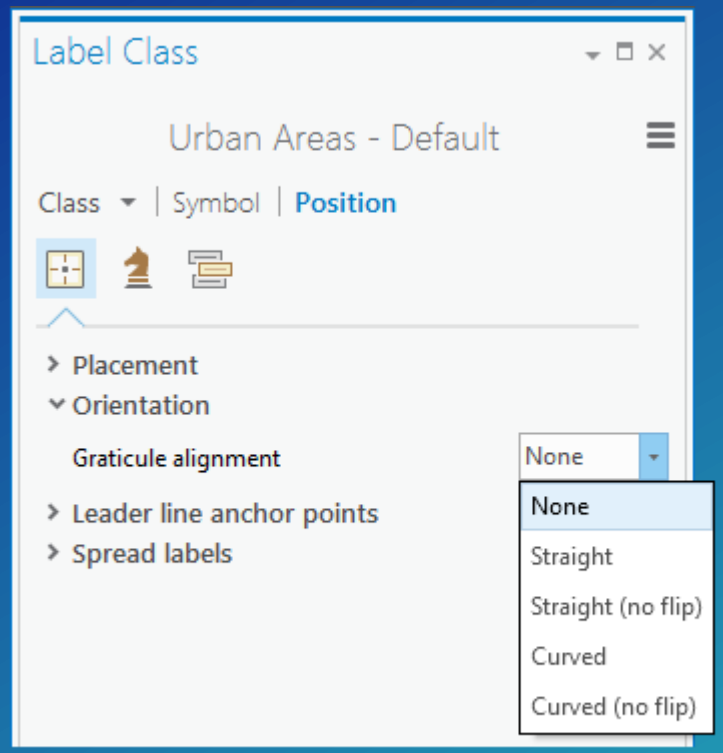




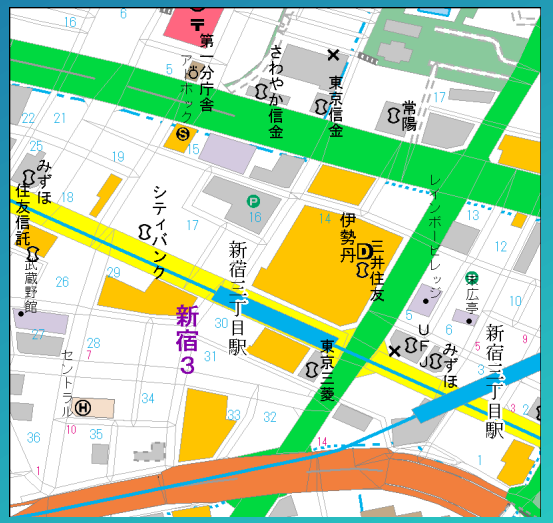
Label Orientation

Applies to any label with a horizontal style

- **Graticule alignment**



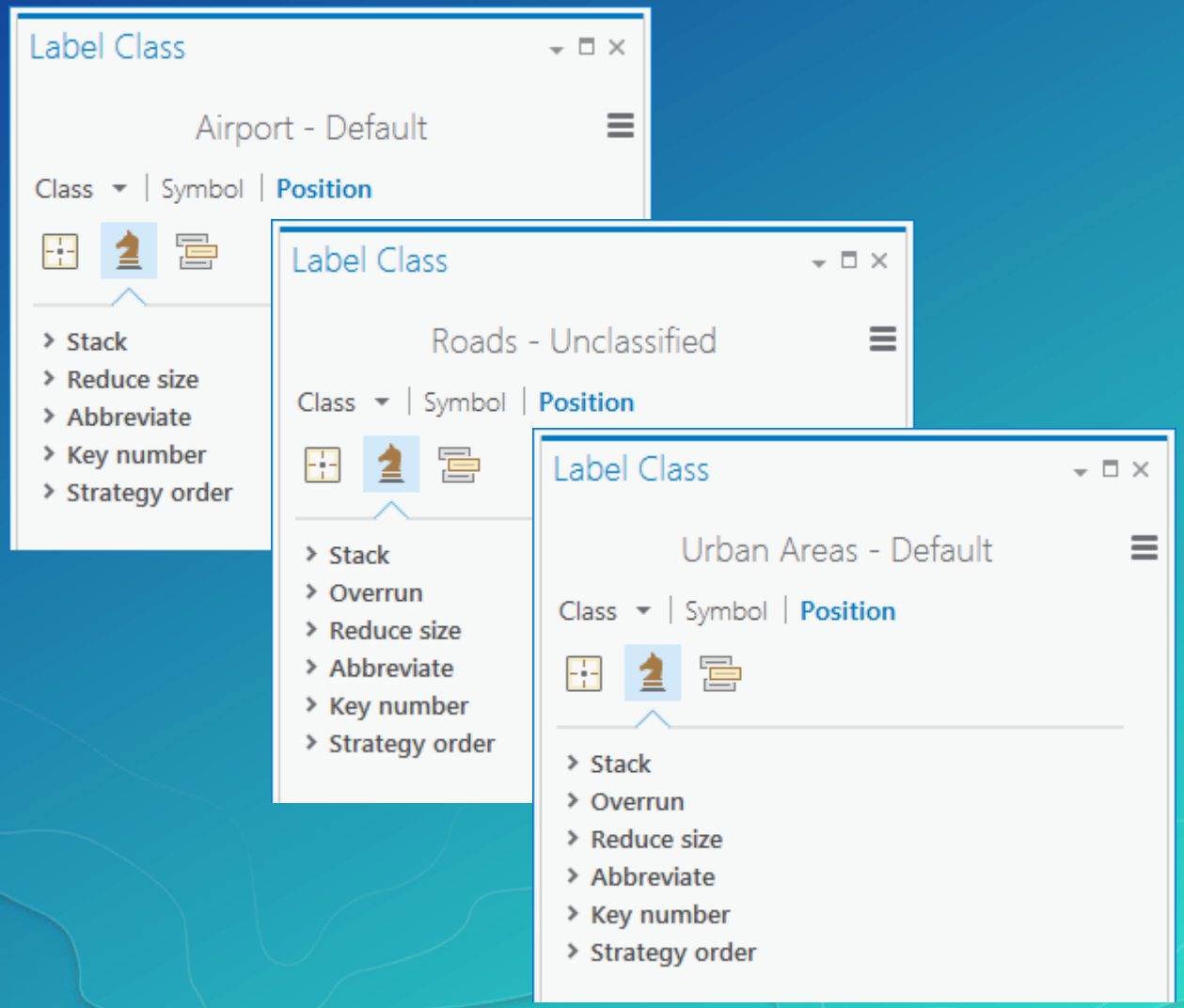
- **Vertical text placement**
  - **East Asian langauages**
  - **Font must have vertical text metrics**



Fitting Strategies

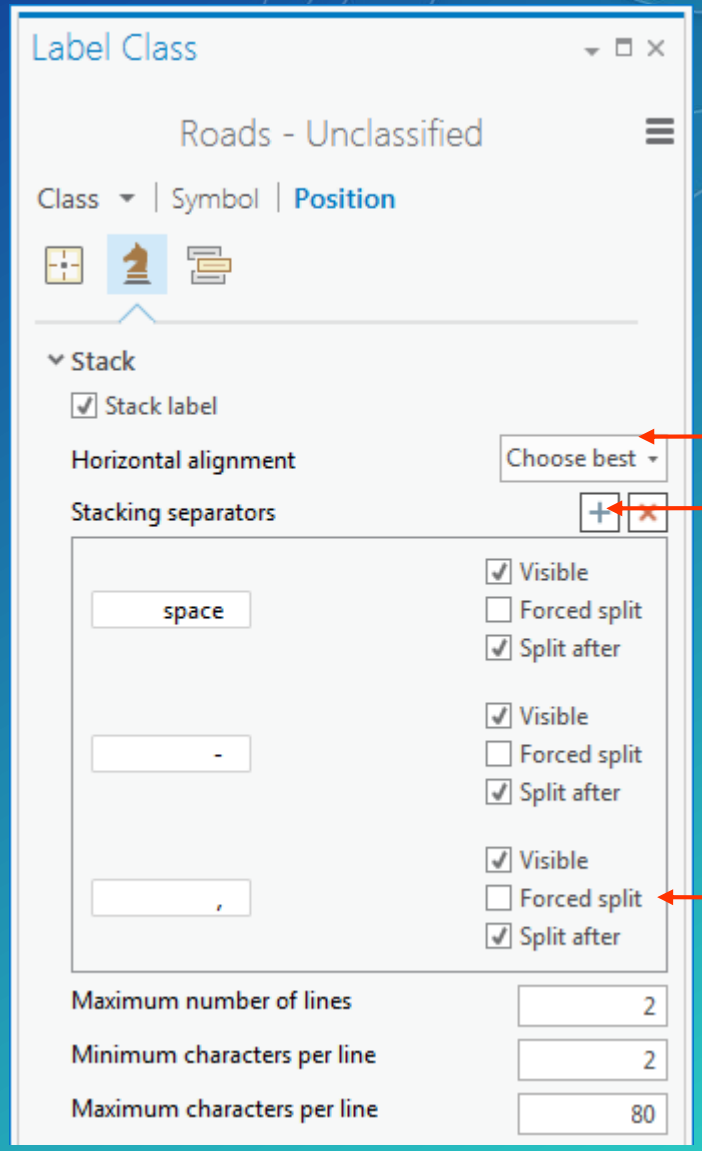
Techniques to place more labels on the map when space is limited

- **What are you willing to do to get that label on the map?**
- **Essentially the same for all feature types**
- **Points do not have Overrun option**



Label Stacking

- Stacking Separators
  - User defined separators
    - Defaults are space and comma
  - Visible or not
  - Forced split
  - Split before or after
- Horizontal alignment
  - Choose best
  - Fixed (left, right or centered)
- Limits
  - Number of lines
  - Number of characters per line



Control the horizontal alignment

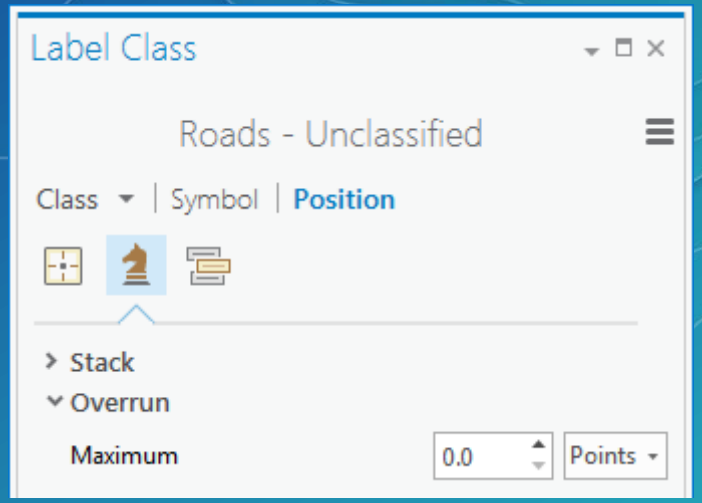
Add new character

Control the line break

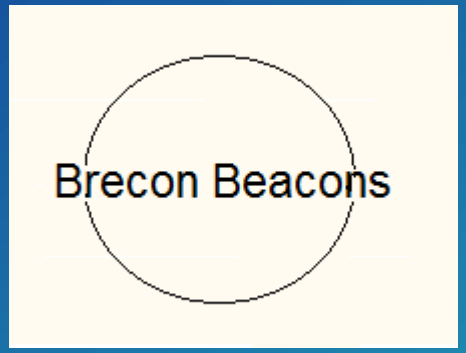
Label Overrun

Label is allowed to overrun the feature extent

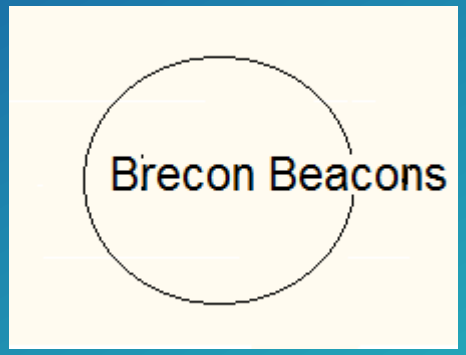
- **Line overrun**



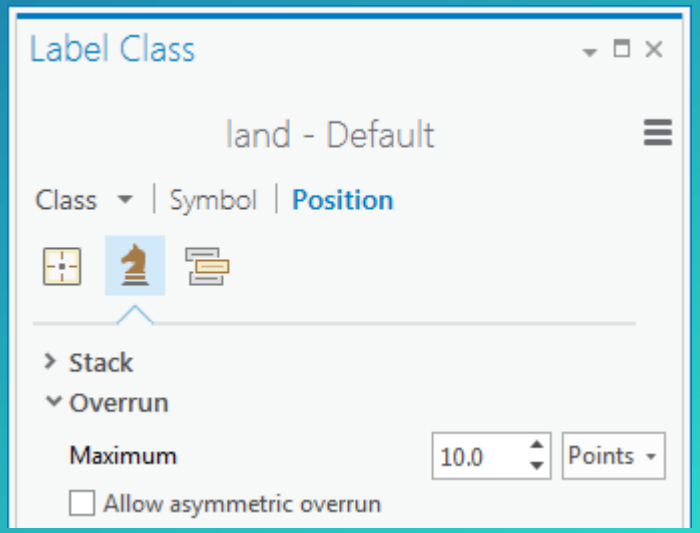
- **Polygon overrun**



Symmetric overrun



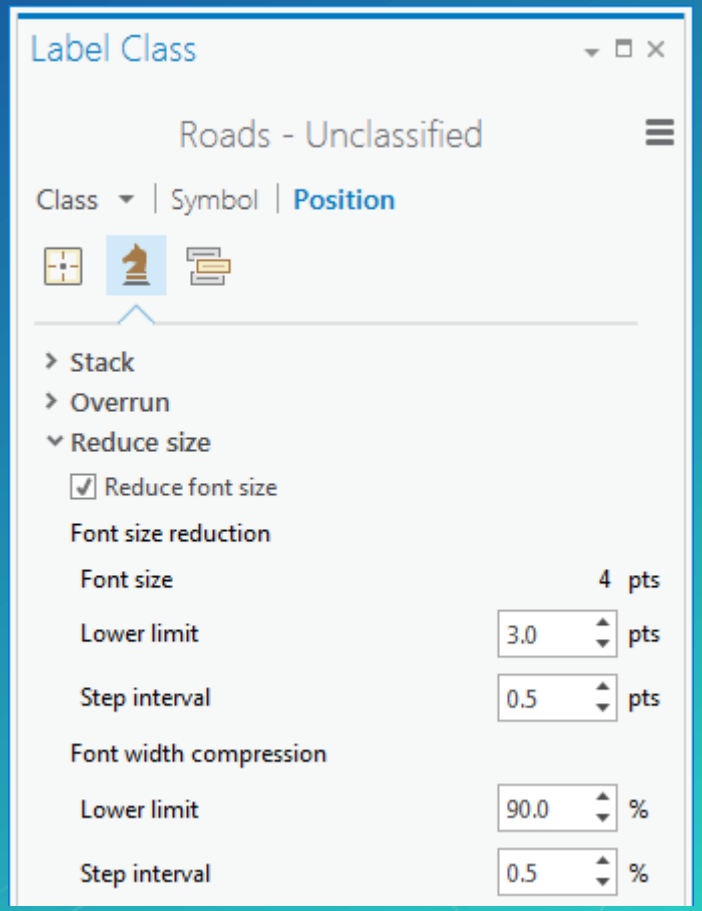
Asymmetric overrun



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 4pt to 3pt in 0.5 pt intervals**
- **Font width compression**
  - **Reduce label in width in stepped intervals**
    - **e.g 100% to 90% in 0.5% intervals**



Label Abbreviations

Where the label text is abbreviated using an abbreviation dictionary

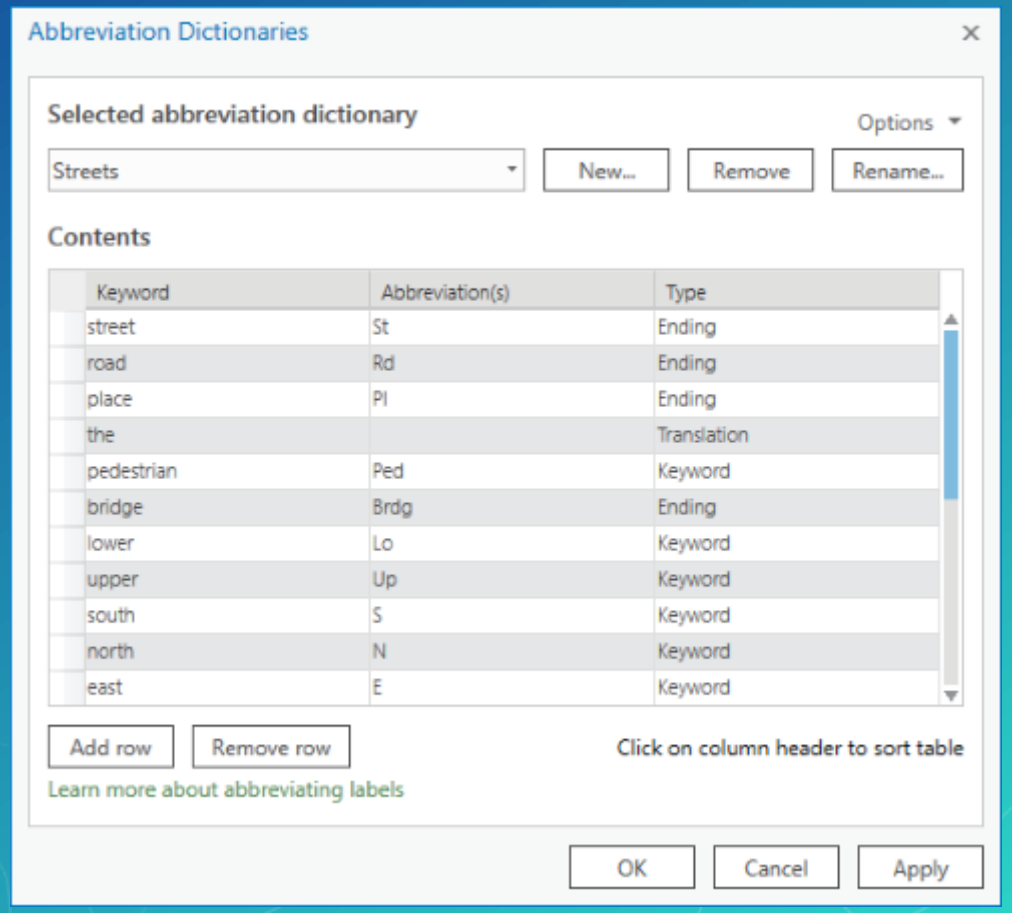
- **Abbreviation Types**
  - **Ending**
    - **Applies to the last word in the label**
    - **Street to St, Road to Rd, Avenue to Ave**
  - **Keyword**
    - **Applies to any word in the label except the last word**
    - **South to S., Mountain to Mt.**
  - **Translation**
    - **Applies to all words in the label**
    - **‘Postal Office’ to P.O.**
    - **‘Unknown Road’ to an empty string**
    - **Llanfairpwllgwyngyllgogerychwyrndrobwllllantysiliogogogoch to ‘Llanfair-PG’ ☺**

      (Saint Mary’s Church in the hollow of the white hazel near the rapid whirlpool and the Church of Saint Tysilio of the red cave)

Label Abbreviations (continued)

- **Multiple dictionaries per map**
- **Reference dictionary by name from label class**
- **See Esri Support article for US streets example**

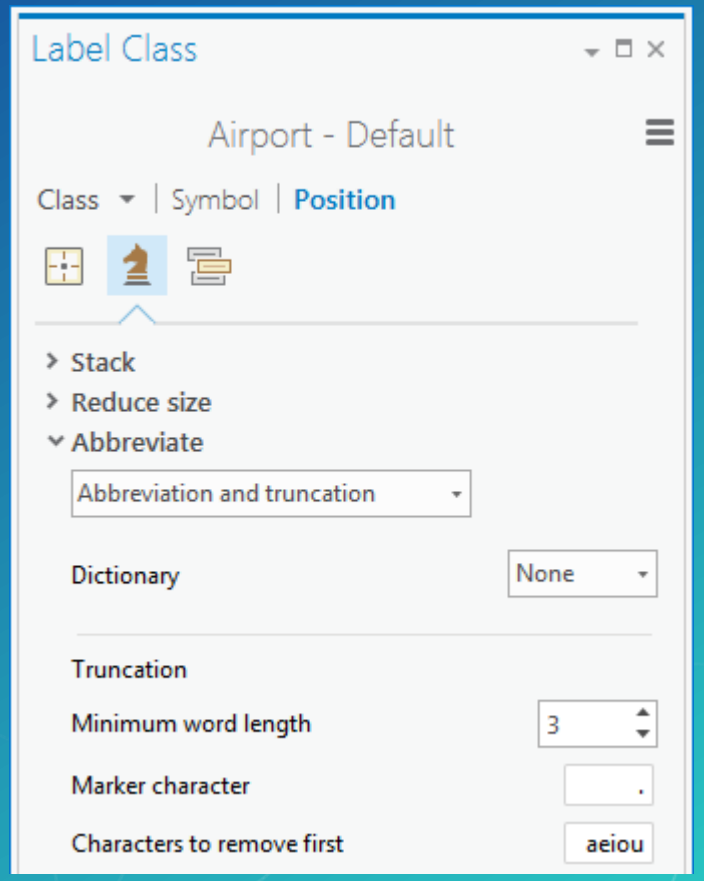
  FAQ: Is there an Abbreviation Dictionary for commonly used street suffixes?
- **Share dictionaries**



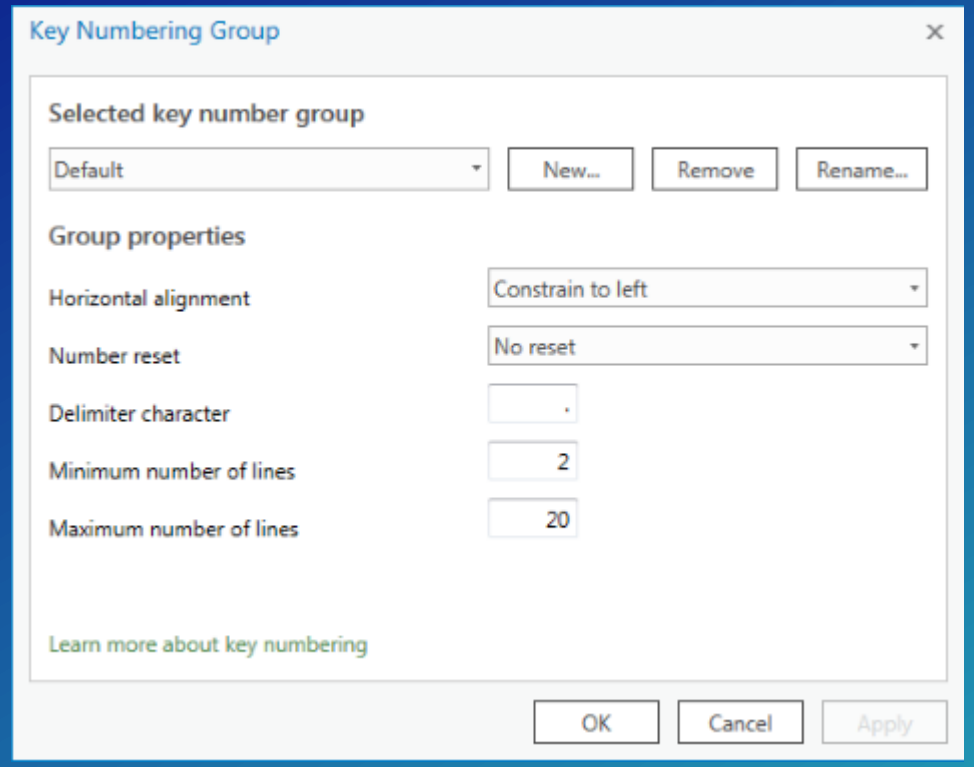
Label Abbreviations - Truncation

Where characters are automatically removed from the label text

- Another type of abbreviation, although not tied to a dictionary
- Algorithm that removes characters
- Default is ‘aeiou’
- Degrades readability
- Similar to ‘tweet shortening’



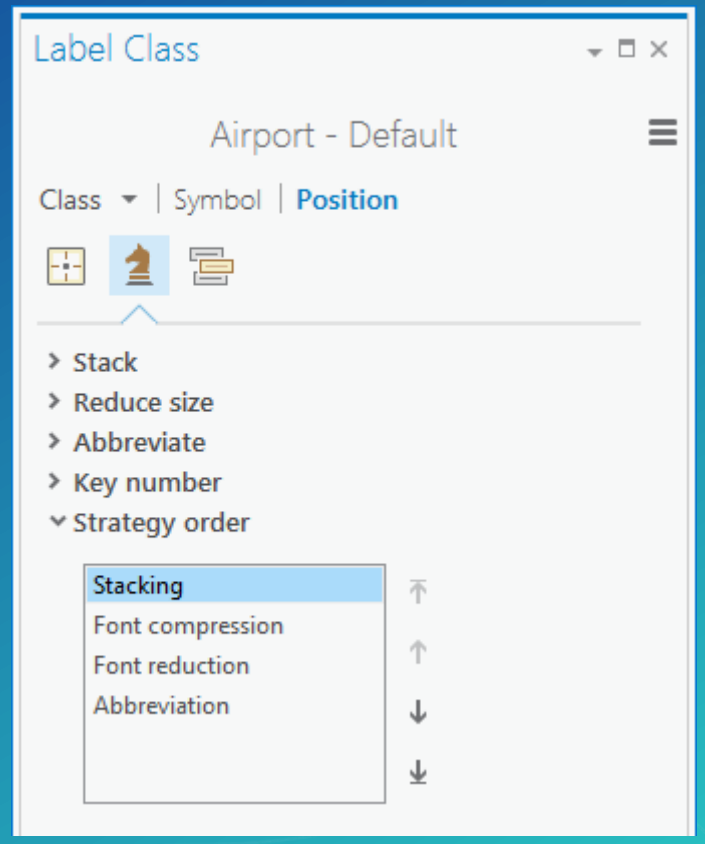
Key Numbering



- **Labels that don’t fit are replaced with a number**
- **Label text then placed in a list**
- **Key numbering groups can span multiple label classes**

Strategy Order

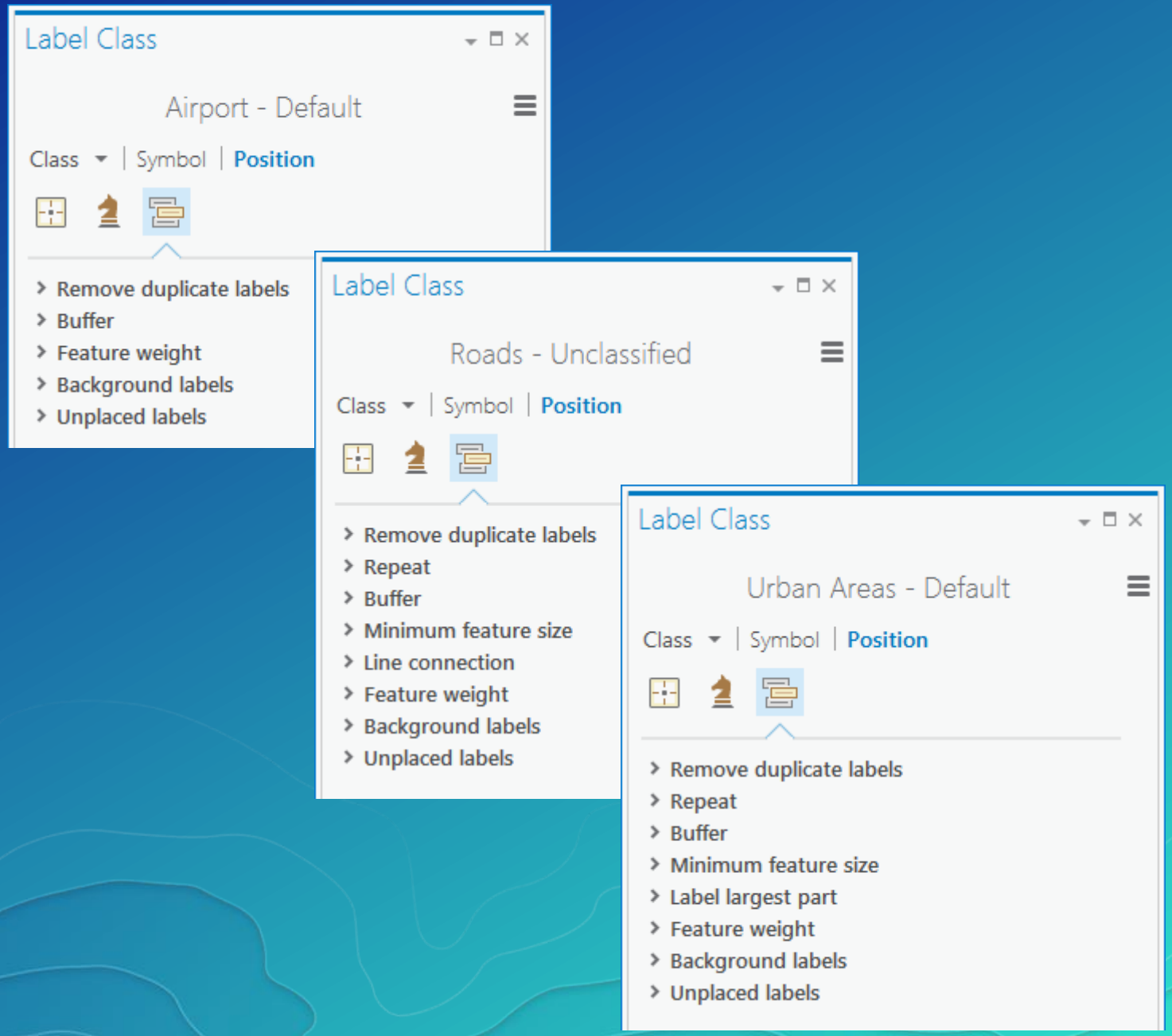
- Select the order in which fitting strategies are tried
- Preference as opposed to exact order



Conflict Resolution

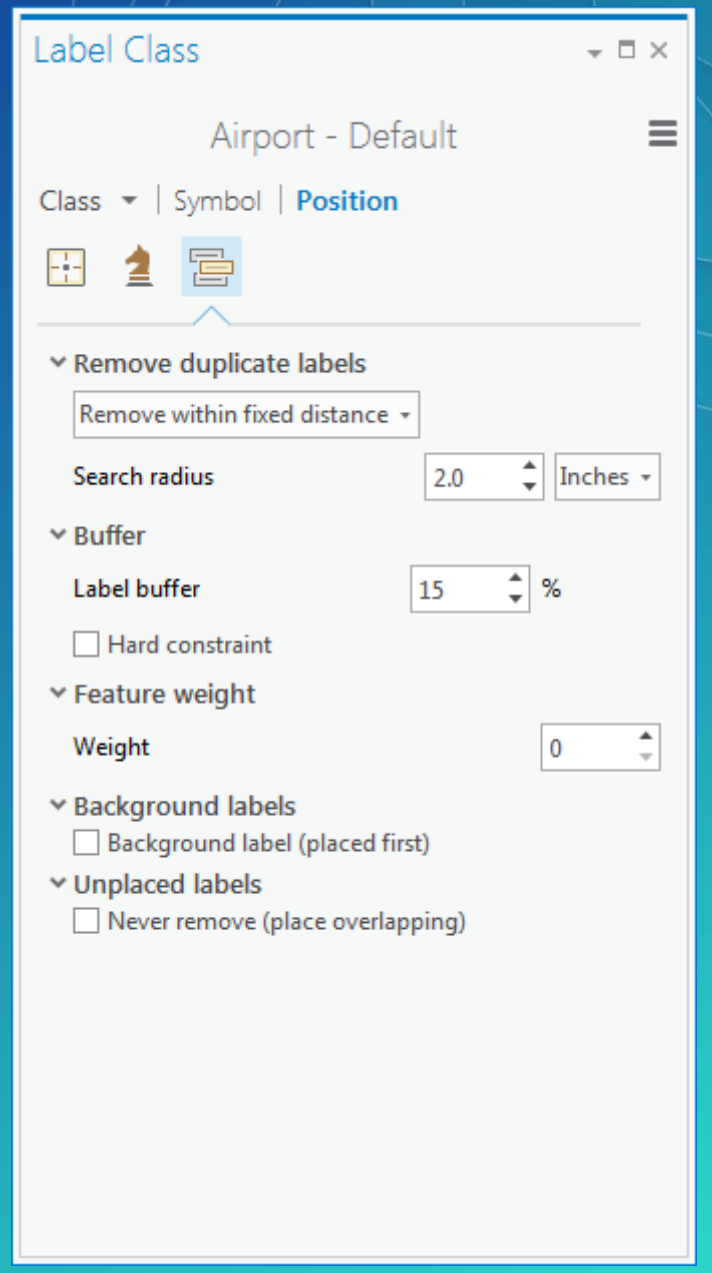
Control how label conflicts are going to be resolved.

- **If multiple labels are competing for space, which one wins?**
- **Control label density on the map**
- **Differ depending on feature type**



Conflict Resolution – Point layers

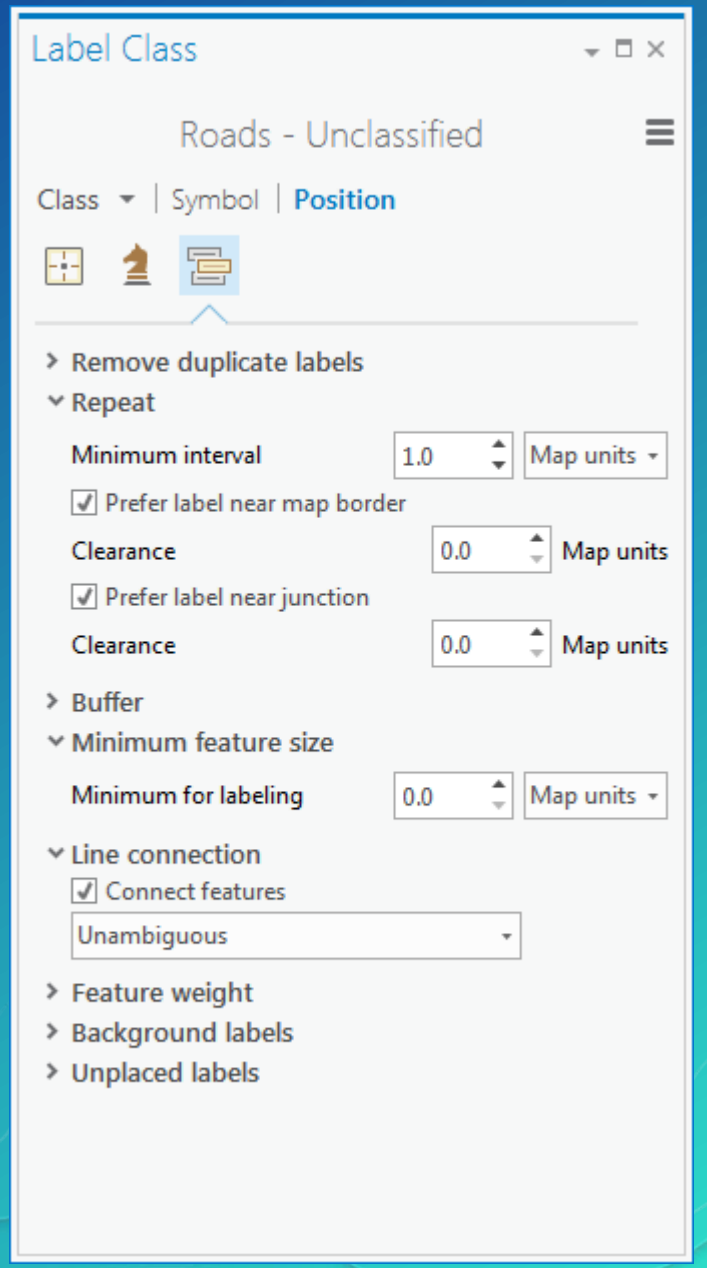
- Remove duplicates
- Buffer
- Additional access to the feature weights
- Specify background labeling
  - transparent text symbols!
- Never remove (place overlapping)
  - Forces the placement of the label…
  - …you may get overlap ☹
  - Last resort.



Conflict Resolution – Line layers

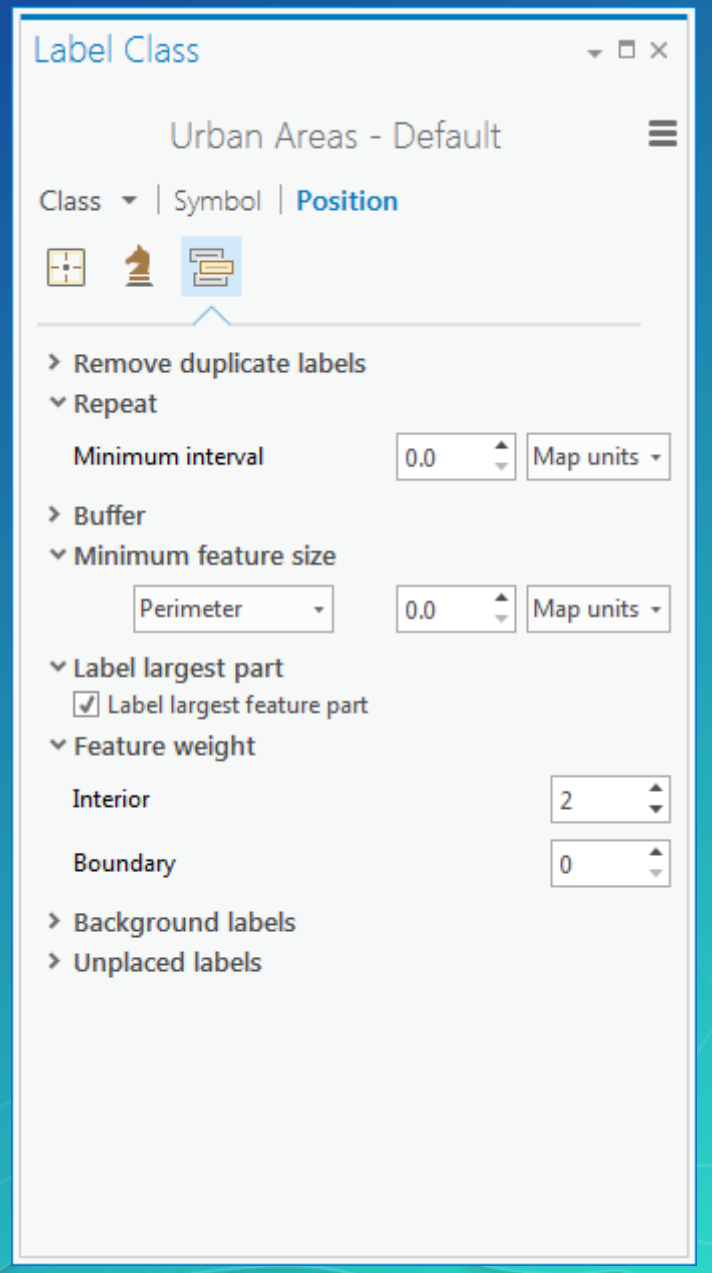
- Repeat
- Minimum feature size
- Line connection
  - Connected features
    - minimize labels, unambiguous

  - Separate features
    - Per feature, per part, per segment



Conflict Resolution – Polygon layers

- Repeat
- Minimum feature size
  - Perimeter or area
- Label largest part
- Feature weight
  - Interior and boundary



Maximizing Placement Demo

Boundary labels
Contour labels
River labels
Internal zones
Callouts
Repeating polygon labels

Labeling Process

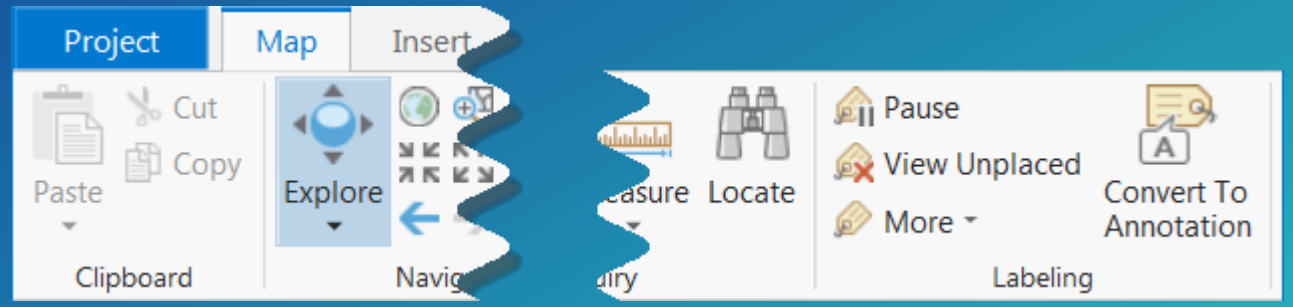
1. Takes in the map specification
2. Features are added from all of the label classes
3. Barriers are added from annotation layers etc
4. Run text placement algorithms
    1. *Multiple trial positions are generated for each label*
    2. *Each trial position is given a score*
    3. *Best score wins*
5. Labels are output as the result

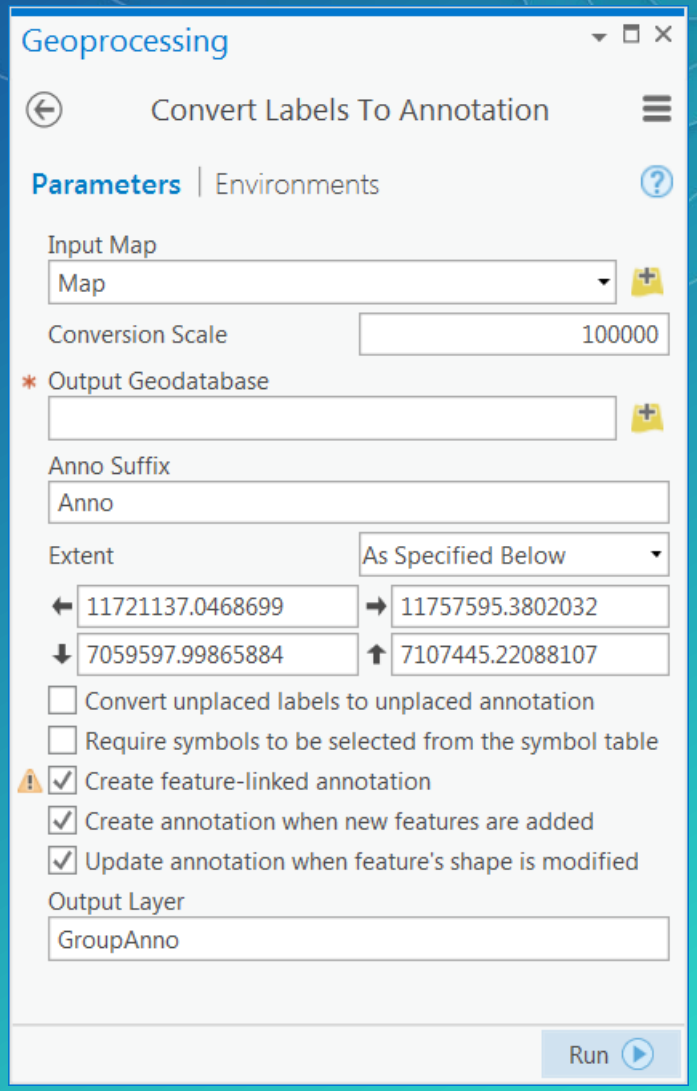
**Labeling is multi-threaded in ArcGIS Pro*

Converting Labels To Annotation

New at Pro 2.0

- **Convert Labels to Annotation GP tool**
  - **WYSIWYG conversion**
  - **Converts all labels in map to annotation**
  - **Unplaced labels written as annotation to the database**
  - **Standalone or feature-linked annotation**

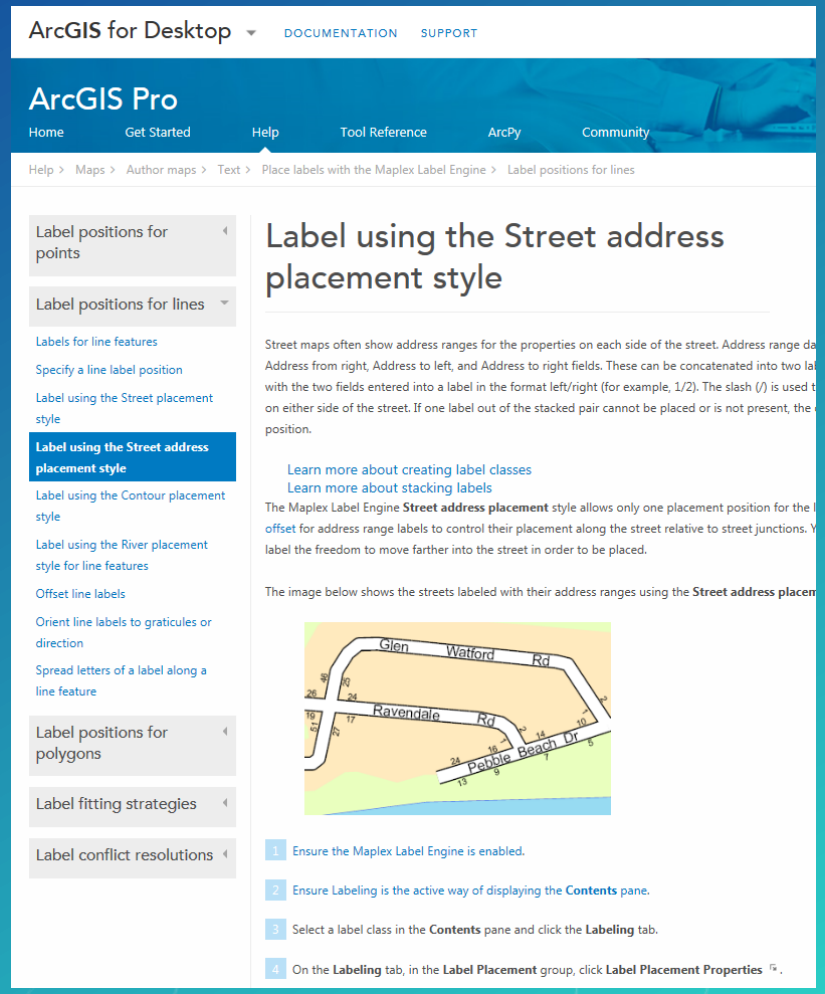




Maplex Help and Resources

- Examples
- Detailed explanations of options
- Common labeling tasks
- Labeling tutorial

- See Esri templates for examples of Maplex in use



Summary

- Maplex is an advanced high-quality cartographic text placement engine
- Integrates with the existing labeling framework in the same way as the standard 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 Take Our Survey on the **Esri Events App!**

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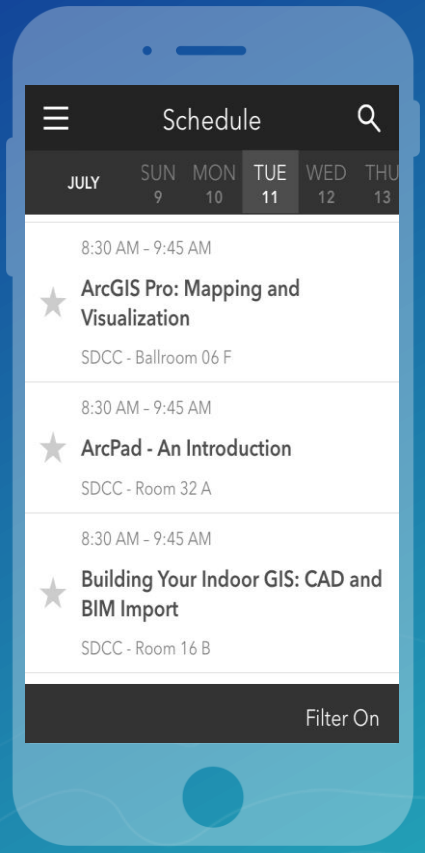
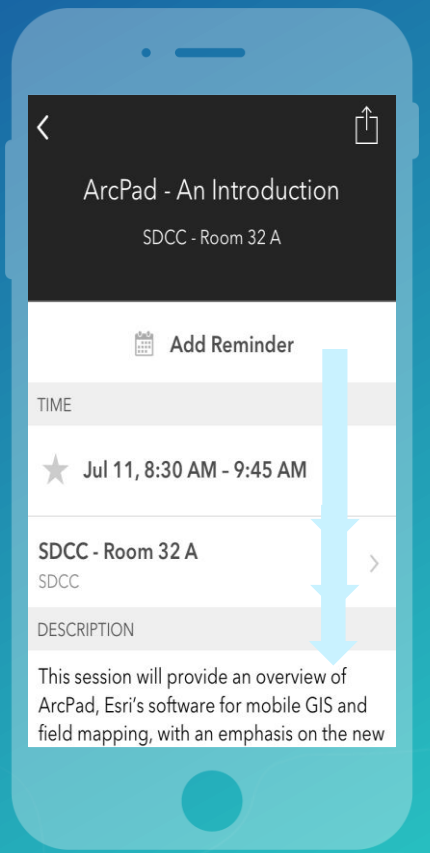
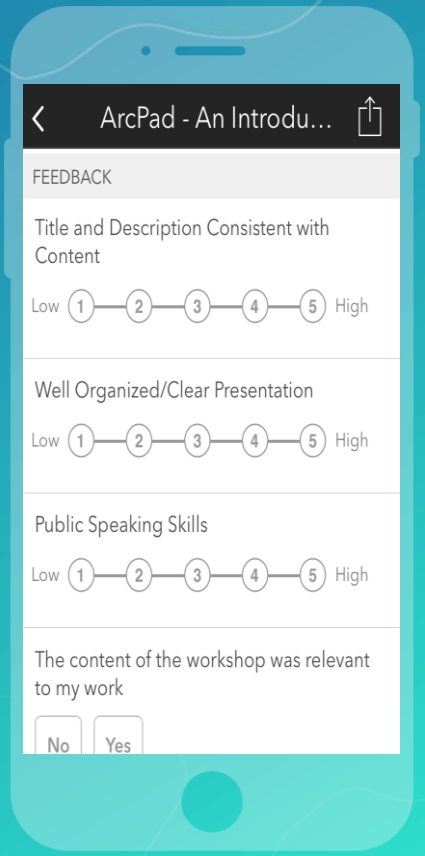
Select the session you attended



Scroll down to find the survey



Complete Answers and Select "Submit"



Thank You

- ArcGIS Pro Editing: An Introduction
  - Hilton – Sapphire Ballroom E/F
  - Wednesday 10:15am
- ArcGIS Pro: What's New and the Road Ahead
  - Ballroom 06A
  - Thursday 10:15am or Friday 9:00am
- Team is available to help
  - Mapping and Visualization Area
    - *Ciara Rowland-Simms, Samuel Troth, Craig Williams, Wendy Harrison*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