

# ArcGIS Pro Editing: An Introduction

Jared Sellers

The editing environment within ArcGIS Pro allows you to create and edit data interactively in 2D and 3D. This introductory session gives you an understanding of common editing workflows. Topics include creating new features, working with feature templates, using snapping, updating attributes, and editing existing features.

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# ArcGIS Pro Editing: An Introduction

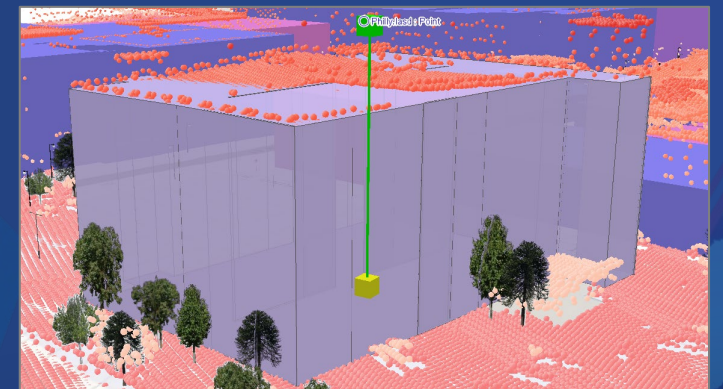
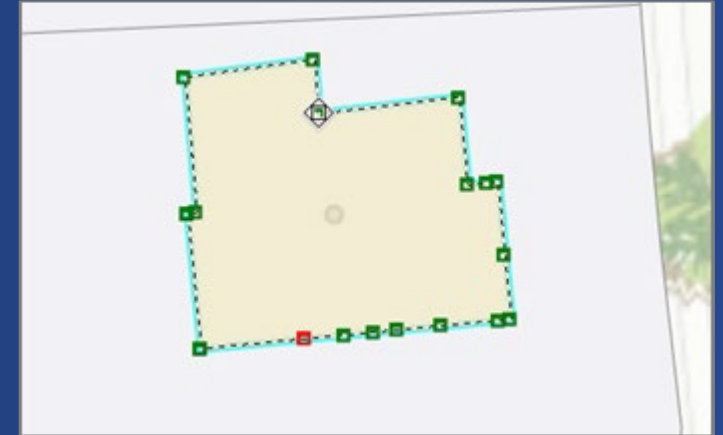
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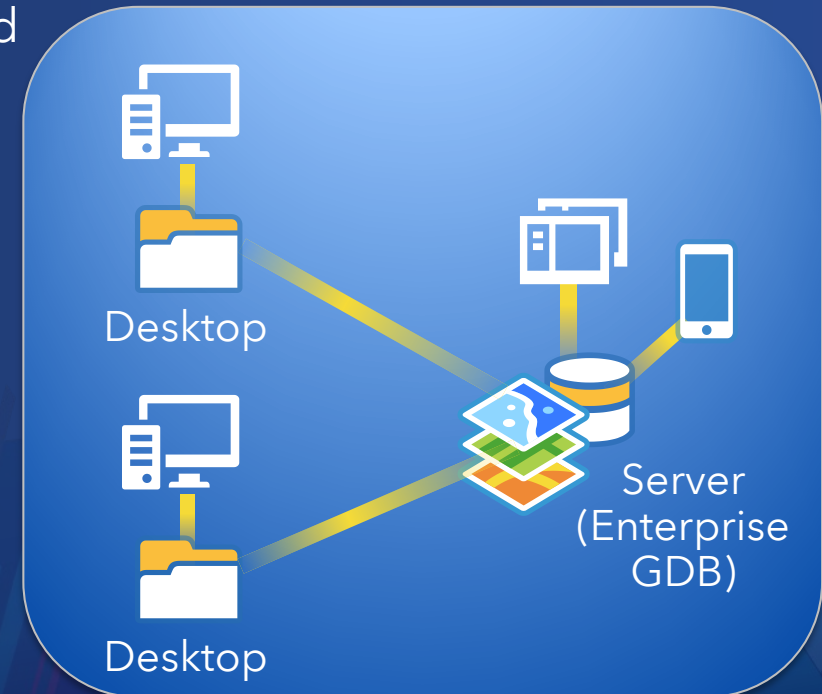
# ArcGIS Pro Editing – Overview

- Provides tools that allow you to maintain, update, and create new data
  - Modifying geometry, drawing new features
  - Entering and updating feature attributes
- Supports editing features in 2D maps and 3D scenes
  - View and edit features at their real-world elevation
  - Construct features on surfaces and at a constant elevation
- Edit multiple workspaces simultaneously
  - File GDBs, Enterprise GDBs, Feature Services, Shapefiles
  - Set layer editability, configure autosave



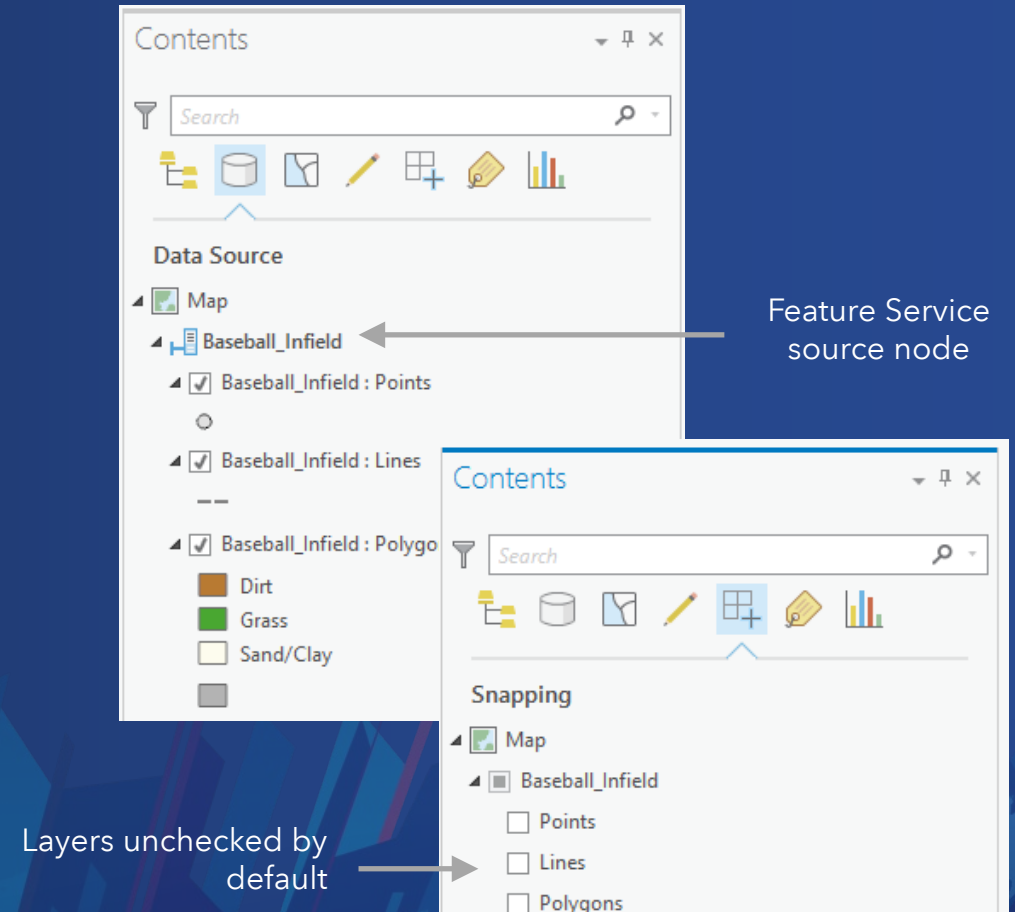
# Single or Multi-user Editing Environments

- Editing file-based data sources
  - Shapefiles (.shp), File Geodatabases (.gdb)
- Editing data in multi-user database servers
  - Supported DMBS types, versioned and non-versioned
- Editing data via feature services
- Not supported
  - Personal geodatabases
  - Geometric networks
  - Dimensions



# Feature Service Editing

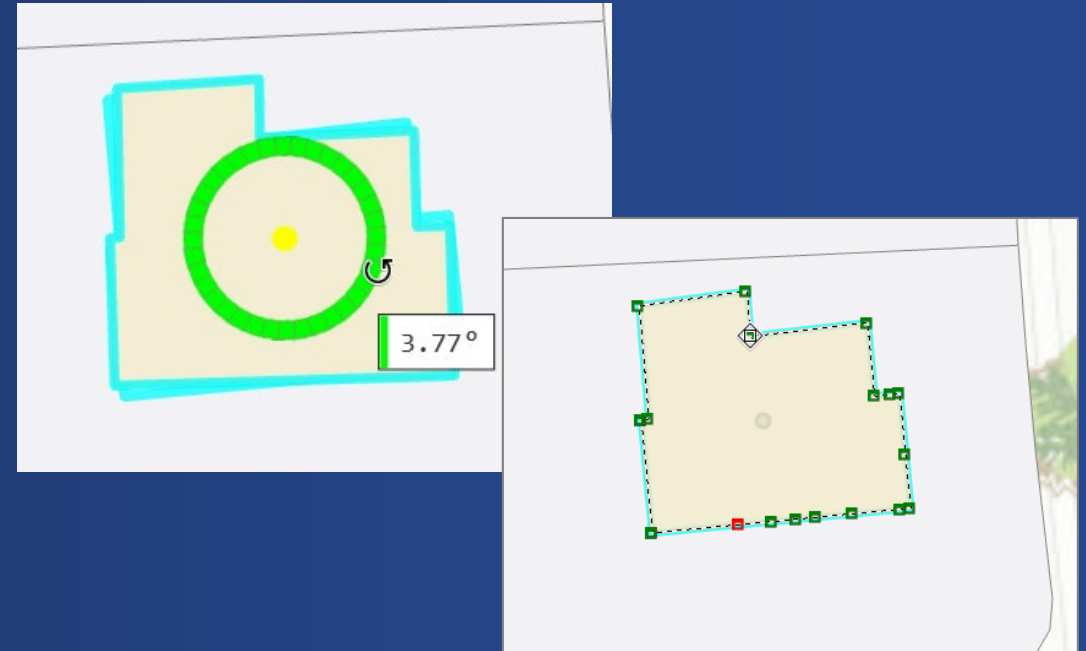
- Edits are directly committed to the feature service
- Undo/redo is not currently supported
  - Will be available in a future release
- Snapping to feature service layers is off by default
  - At the map level
  - Can be enabled in the Content's pane Snapping view





# Editing Fundamentals

- Editing feature geometry
  - Modify the location, orientation, and size
  - Modify the individual segments and vertices that comprise a feature
- Editing tabular data
  - Add new records and update existing records in feature or business tables
  - Perform batch updates or isolate individual features rows and cells



Road Centerlines

Field: 

New

Delete

Calculate

Selection: 

Zoom To

Switch

Clear

Delete

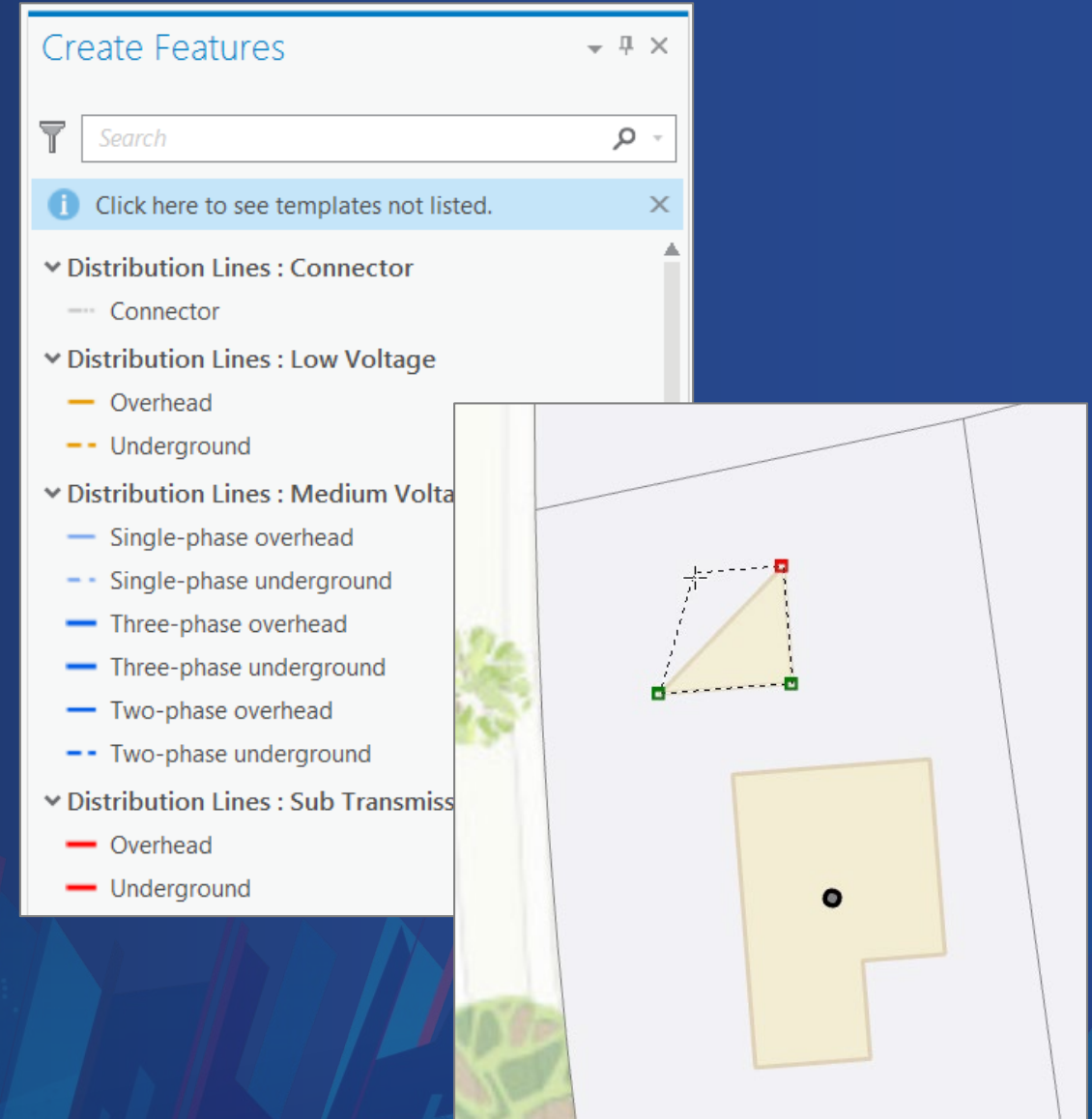
OBJECTID	Centerline ID	Left From Address	Left To Address	Right From Address	Right To Address	Full Road Name	Federal Route
11408	RD-3108	1455	1455	0	0	91st St	<Null>
11409	RD-3109	2400	2400	2401	2441	Madera Ln	<Null>
11410	RD-3110	232	300	255	299	Westbrook Cir	<Null>
11411	RD-3111	2404	2422	2401	2421	Flambeau Dr	<Null>
11412	RD-3112	2328	0	2329	2411	Mecan Dr	<Null>
11413	RD-3113	600	608	601	609	Alexandria Dr	<Null>
11414	RD-3114	0	0	0	0	Book Rd	<Null>
11415	RD-3115	3304	3308	3303	3311	White Eagle Dr	<Null>
11416	RD-3116	653	753	660	760	Perkins Ct	<Null>

0 of 8332 selected

100 %

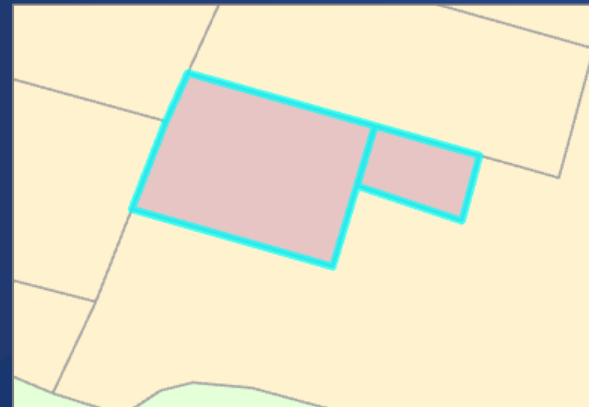
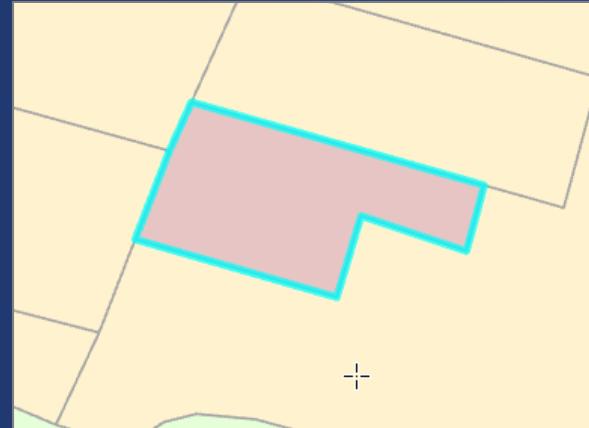
# Data Creation

- Relies on feature templates to create new data
- They are layer based, matching the symbology authored in the map
- Default attributes and attribute overrides provide efficient ways for pre-populating newly created features



# Data Modification

- Core edit operations such as...
  - Move/Rotate/Scale
  - Edit Vertices
  - Reshape
  - Split
  - Merge
- Update feature attributes in grid/cell format
  - Use of Domains to constrain valid data
  - Apply edits instantly or use batch mode to reduce number of transactions

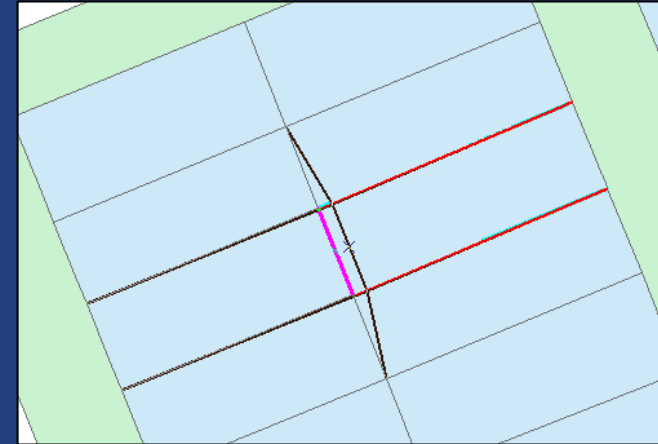


Attributes	
Road Centerlines	
12th Ave	
Attributes   Geometry	
OBJECTID	8669
Centerline ID	RD-368
Left From Address	109
Left To Address	117
Right From Address	104
Right To Address	120
Full Road Name	12th Ave
<input checked="" type="checkbox"/> Auto Apply	



# Topological Editing

- Map Topology enables users to preserve contiguous data through topological editing
  - Work with the entire feature or with individual edges
- Geodatabase topology allows you to detect errors based on defined rules
  - Use Error Inspector window for managing errors



Moving an node; connected edges



Moving multiple features with the move tool

# Editing User Interface

Edit Ribbon Tab

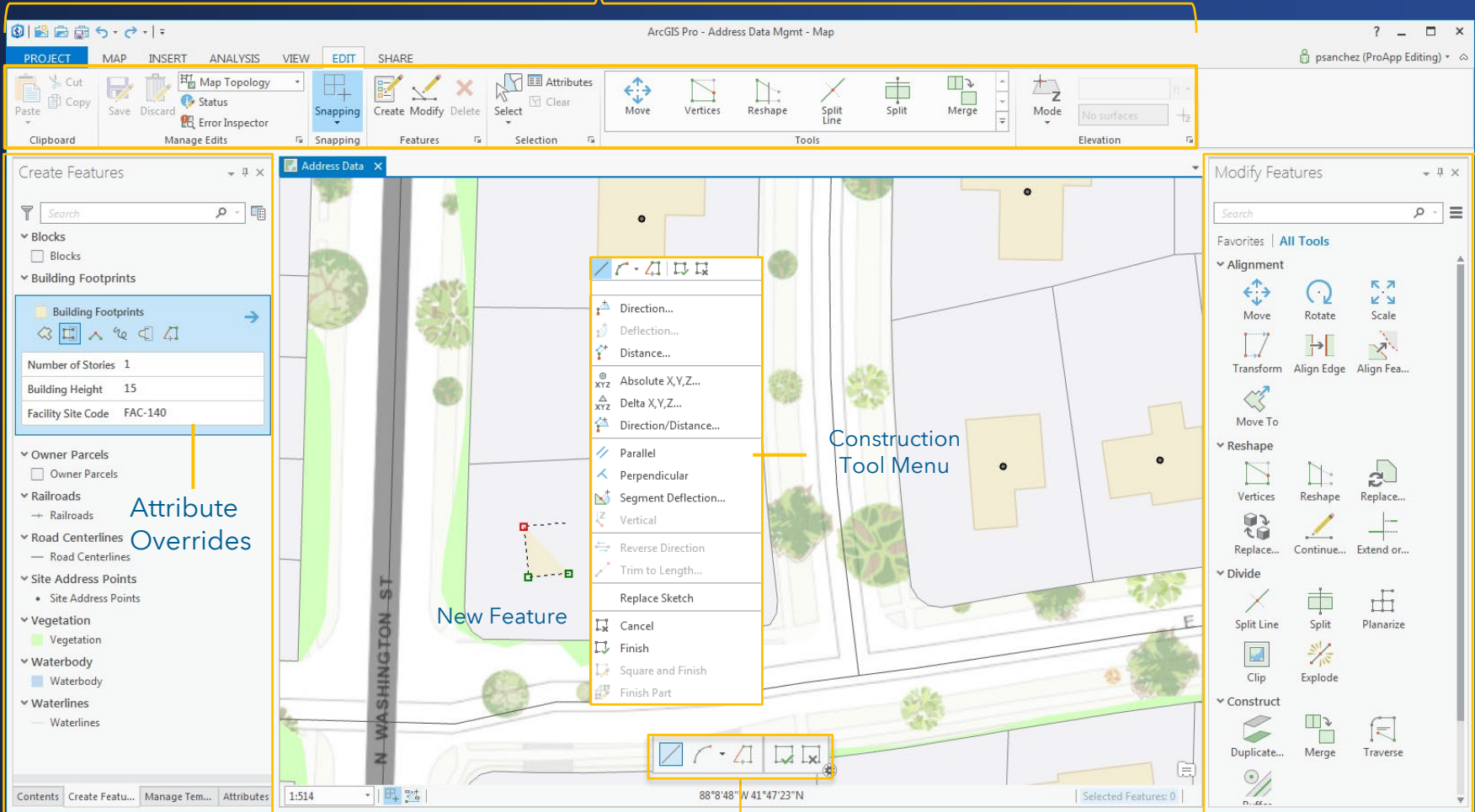
Create Features Pane

Attribute Overrides

Construction Tool Menu

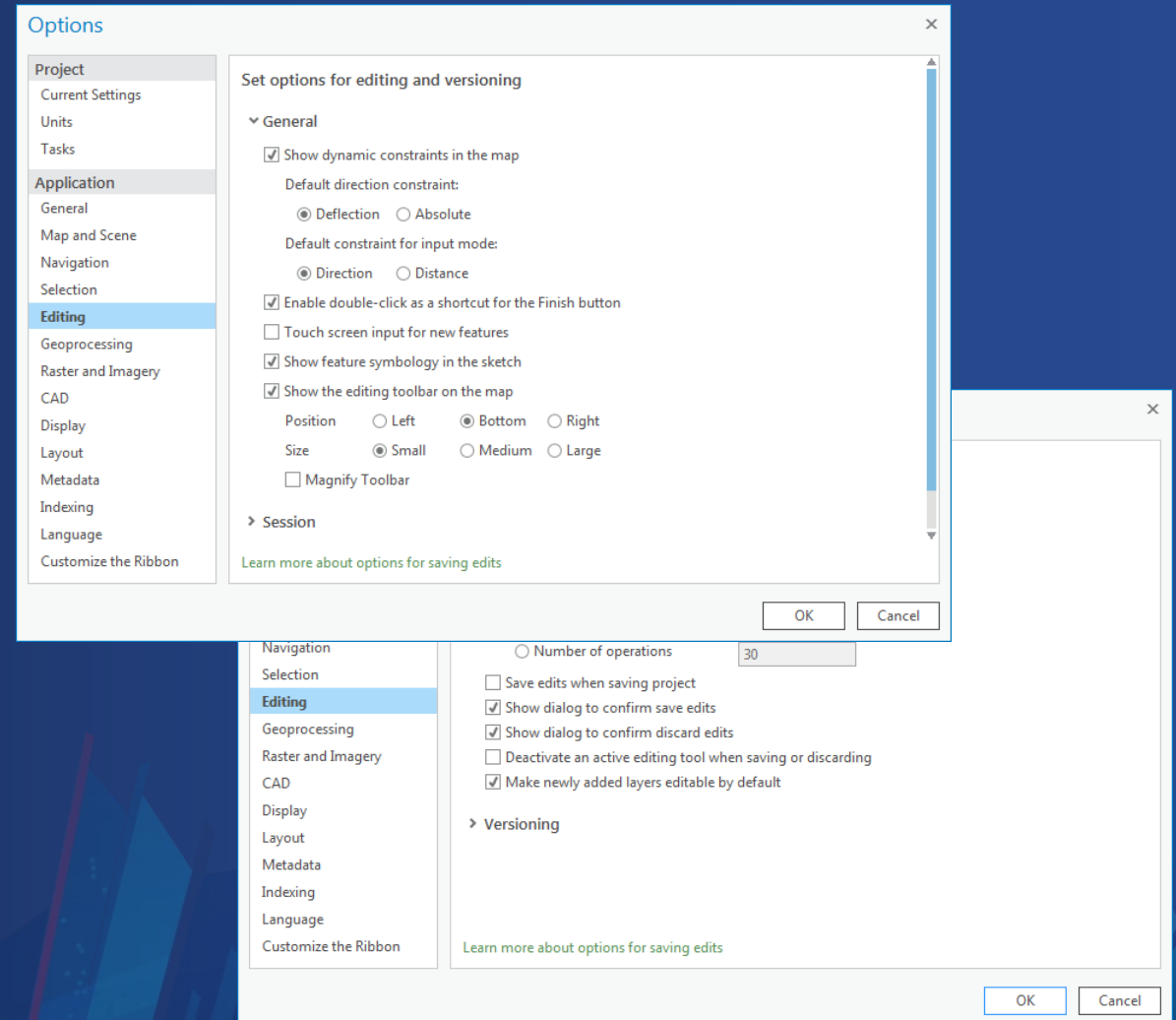
Modify Features Pane

Editing Toolbar



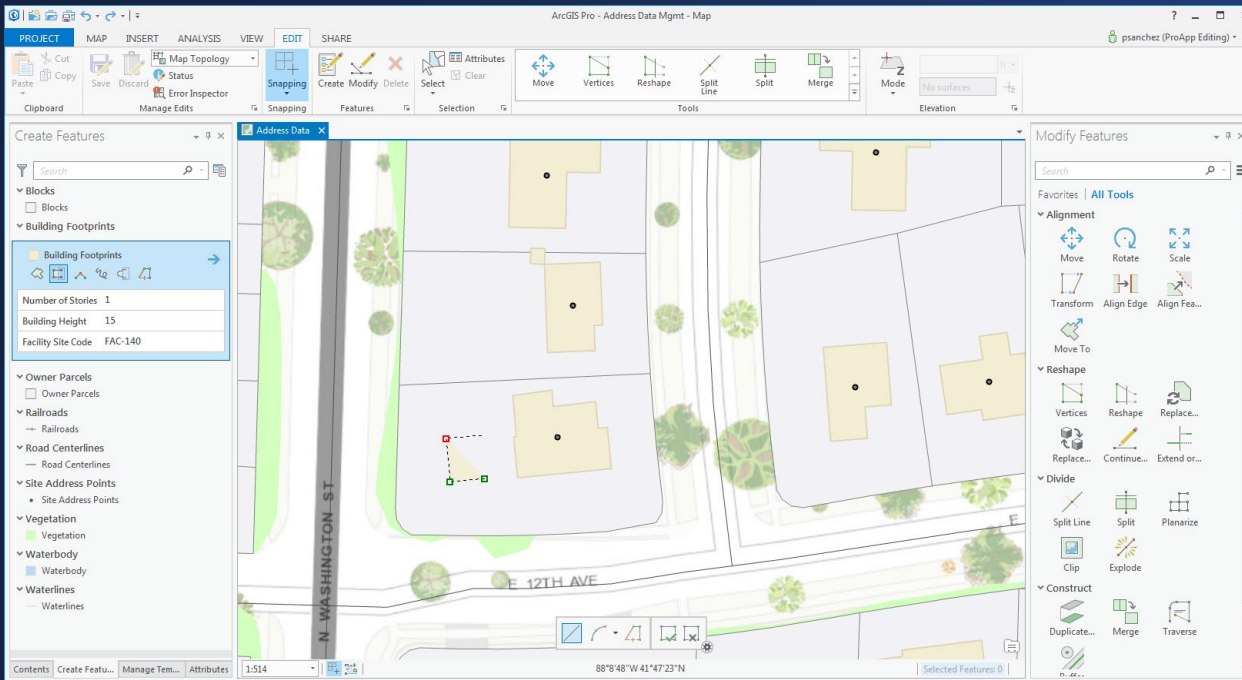
# Editing Options

- Application level options for editing behavior
  - Key items:
    - Auto save (by time or number of operations)
    - Show Editing toolbar
    - Make newly added layers editable by default
    - Show dynamic constraints
    - Versioning conflicts
- Accessible from the backstage and from dialog launchers



# ArcGIS Pro Editing – Session Demos

- Overview of Editing
- Creating Features
  - Templates: Feature, Group, Preset
- Modifying Features
  - Topological and non-topological editing
- Editing Guides
  - Grid, Constraints
- Editing in 3D



# Demo – Overview of Editing

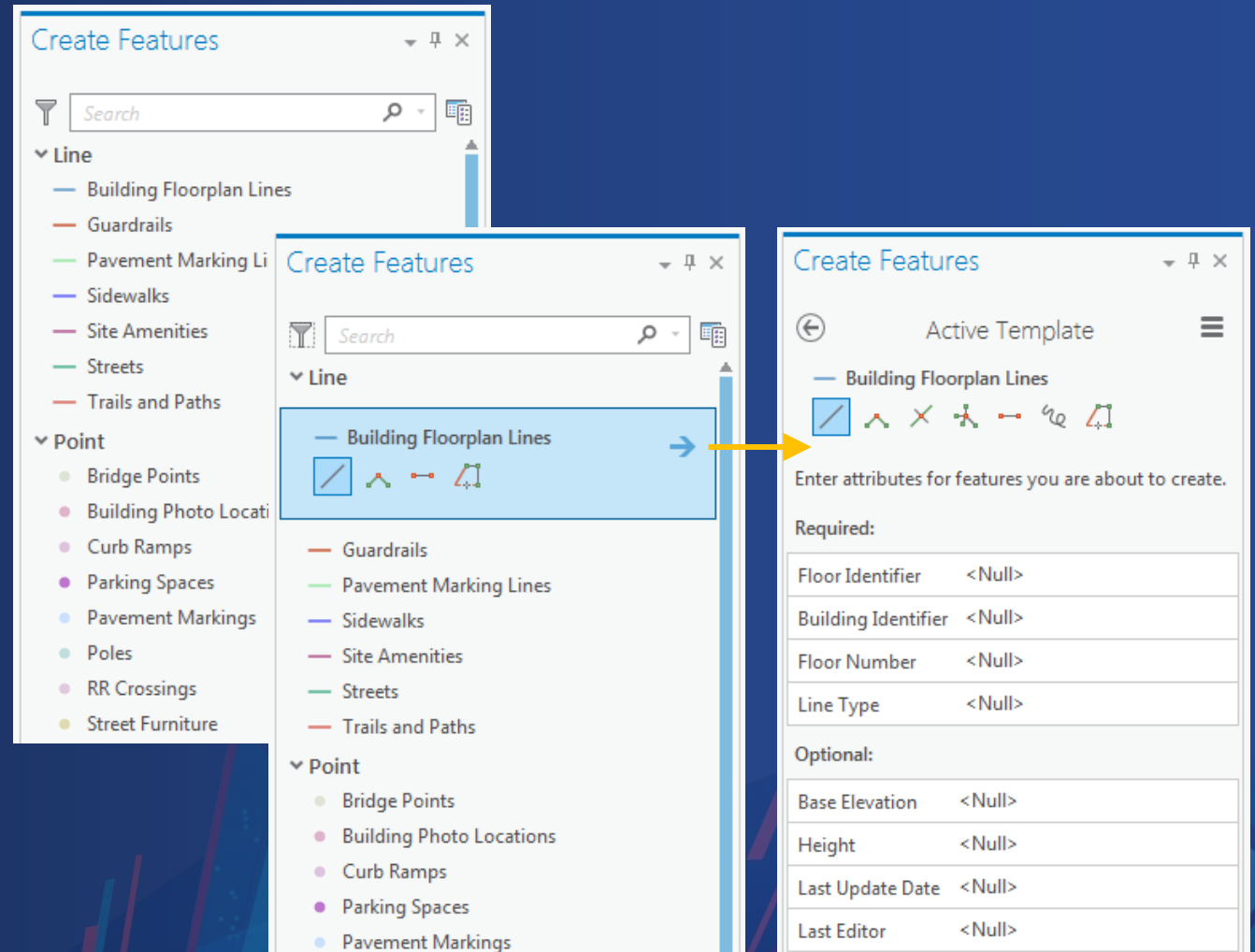


# Creating Features - Overview

- There are three ways to create new features with the editor:
  - Feature Templates
  - Copy & Paste
  - Output from modify tools
- You can create the following feature types:
  - Points, Polylines, Polygons
  - Multipatch
  - Annotation

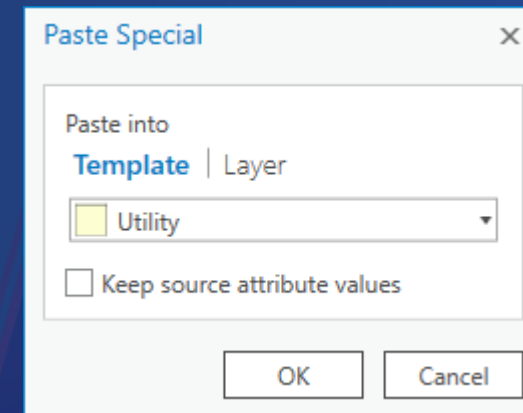
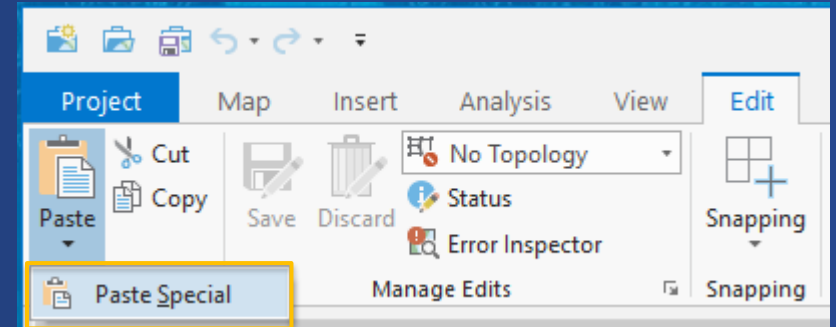
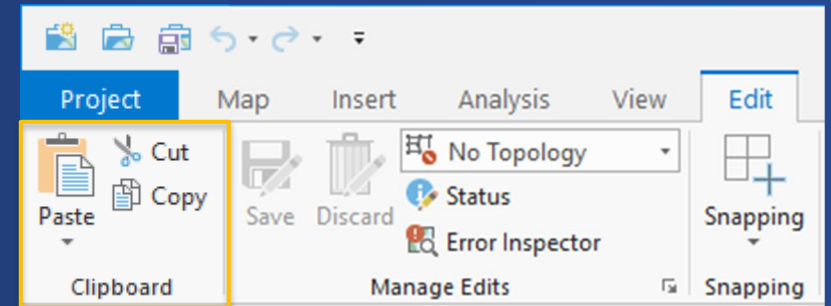
# Create Features Pane

- Hosts feature templates for data creation tasks
  - Filter by geometry type or searching by keywords
  - Organize by layer or geometry type
- Can be customized to show specific tools and attribute overrides in the template
- Advance to Active Template to access all attributes (w/o authoring)



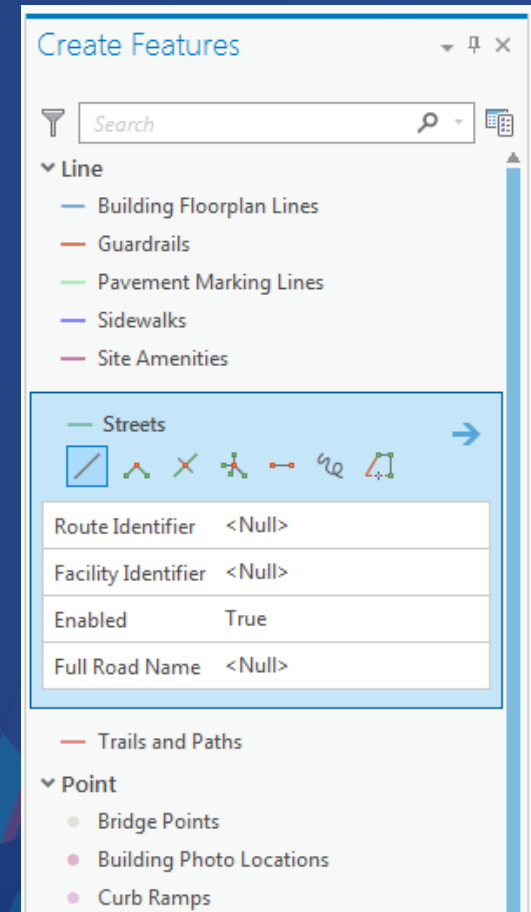
# Copy & Paste/Paste Special

- Copying and pasting features is a quick way to create new features
  - Features will be placed in the same location as the original feature
  - Move mode will be automatically invoked to reposition feature
- Paste Special allows you to paste features from one layer to another layer
  - By Template or by Layer
  - Option to keep attribute values from the source feature



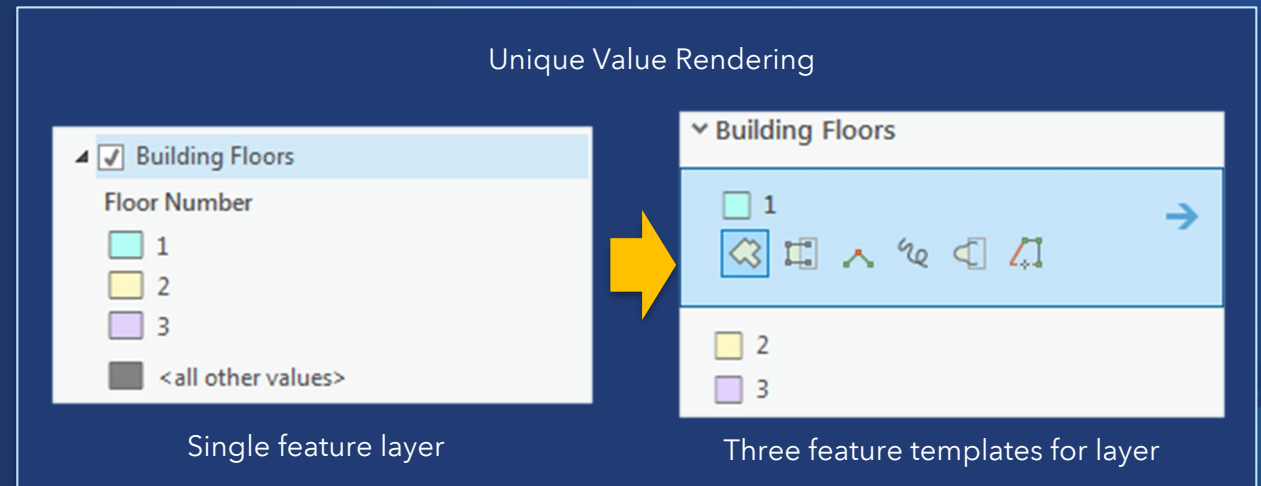
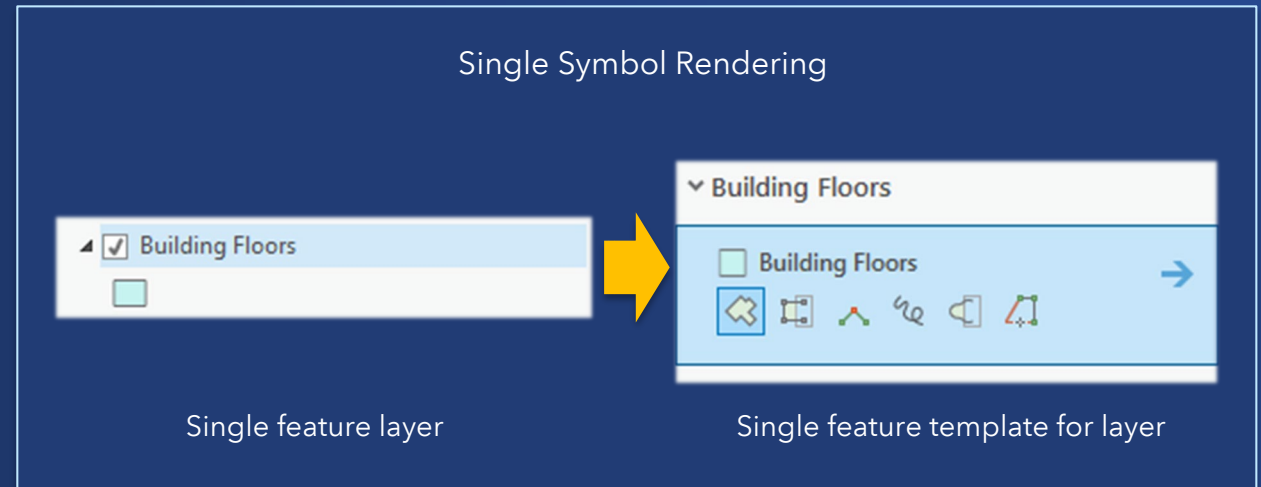
# Templates Overview

- Templates are used to create new features and records
  - Hosted in the Create Features pane
  - Can be configured to meet your workflow requirements
- They store references to attributes
  - Default values (defined in the Geodatabase)
  - Attribute Overrides
    - Set through Template Properties window
    - On the fly in the Create Features pane (as shown in the graphic)
- They also store references to tools
  - Templates can be configured to only show tools that apply to the edit



# Feature Templates

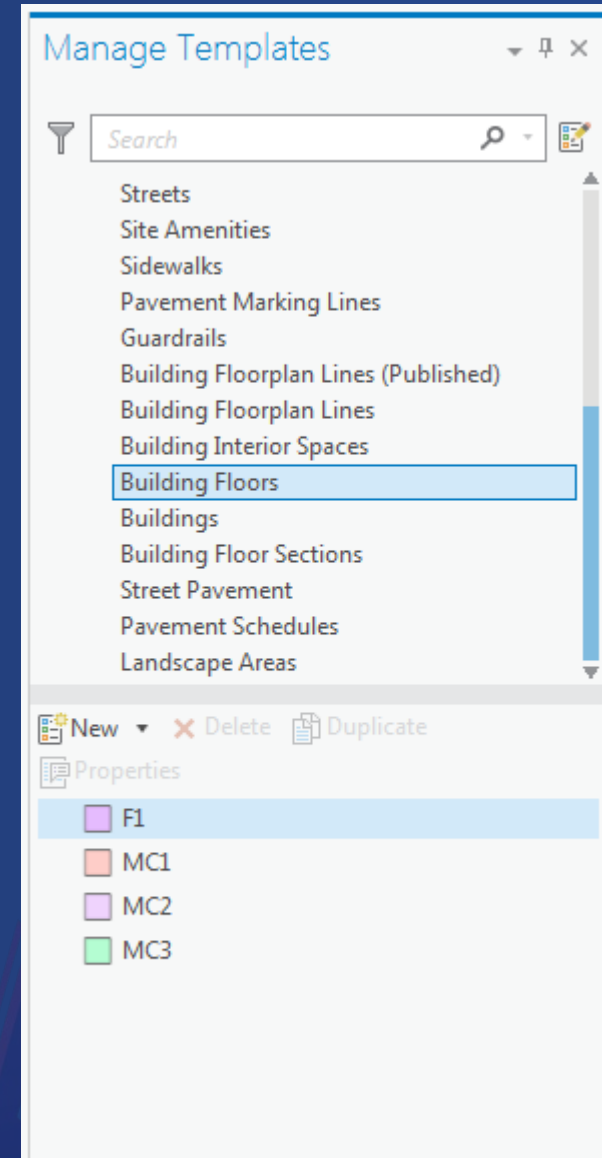
- Feature Templates can be used to create features for a single layer
  - One or more templates can reference the same layer
- Automatically generated when a layer is added to a map or scene
  - Can be modified, deleted, recreated
- Uses the layer's symbology
  - Will automatically update when rendering method is changed





# Managing Feature Templates

- The Manage Features pane allows you to create, duplicate and delete templates
  - Displays lists of all templates associated with a layer
- You can also access template properties from this pane
- Manage Templates is also the entry point for creating Group Templates and Preset Templates



# Feature Template Properties

- Allows authoring of feature templates for editors
  - Assign name, description, and tags
- Tools
  - Choose which tools should be available to editors
- Attributes
  - Choose which attributes should be available as overrides

The image displays two screenshots of the 'Template Properties: Buildings' dialog box, illustrating the configuration options for feature templates.

**Top Screenshot: Tools Tab**

The 'Tools' tab is selected, showing a list of polygon tools with checkboxes to enable or disable them:

- ☒ Polygon Tool (Default Tool)
- ☐ AutoComplete Polygons Tool
- ☐ Right Angle Polygon Tool
- ☒ Circle Polygon Tool
- ☐ Rectangle Polygon Tool
- ☐ Ellipse Polygon Tool
- ☒ Freehand Polygon Tool

**Bottom Screenshot: Attributes Tab**

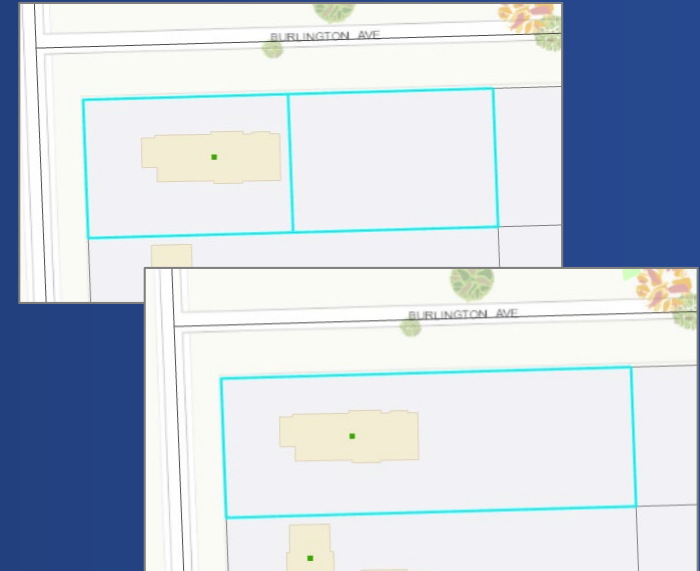
The 'Attributes' tab is selected, showing a list of attributes with checkboxes to enable or disable them. The 'Show Non-Visible Fields' checkbox is also checked.

Attribute	Value	Enabled
Building Identifier	<Null>	<input checked="" type="checkbox"/>
Facility Site Identifier	<Null>	<input checked="" type="checkbox"/>
Short Name of Building	<Null>	<input checked="" type="checkbox"/>
Full Name of Building	<Null>	<input type="checkbox"/>
Number of Floors	<Null>	<input checked="" type="checkbox"/>
Building Height	<Null>	<input type="checkbox"/>
Size of Building	<Null>	<input type="checkbox"/>
Building Type	<Null>	<input checked="" type="checkbox"/>
Operational Hours	<Null>	<input type="checkbox"/>
Operational Date	<Null>	<input type="checkbox"/>
Access Type	<Null>	<input checked="" type="checkbox"/>
Condition	<Null>	<input type="checkbox"/>
Owned By	<Null>	<input type="checkbox"/>
Managed By	<Null>	<input type="checkbox"/>
Last Update Date	<Null>	<input type="checkbox"/>
Last Editor	<Null>	<input type="checkbox"/>

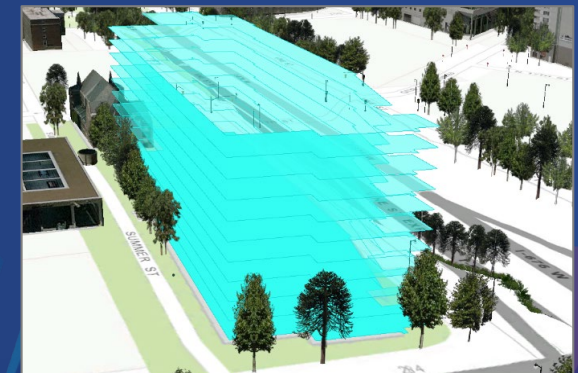
Buttons: OK, Cancel

# Constructing Features

- Tools that allow you to merge, buffer, and duplicate features
- Merge multiple features into a single feature
  - Option to merge into an existing feature or a new feature
  - Manage attributes for output feature
- Buffer features into existing layer
  - Options to generate rings and dissolve intersections
- Duplicate features vertically in scenes
  - Specify offset distance and units



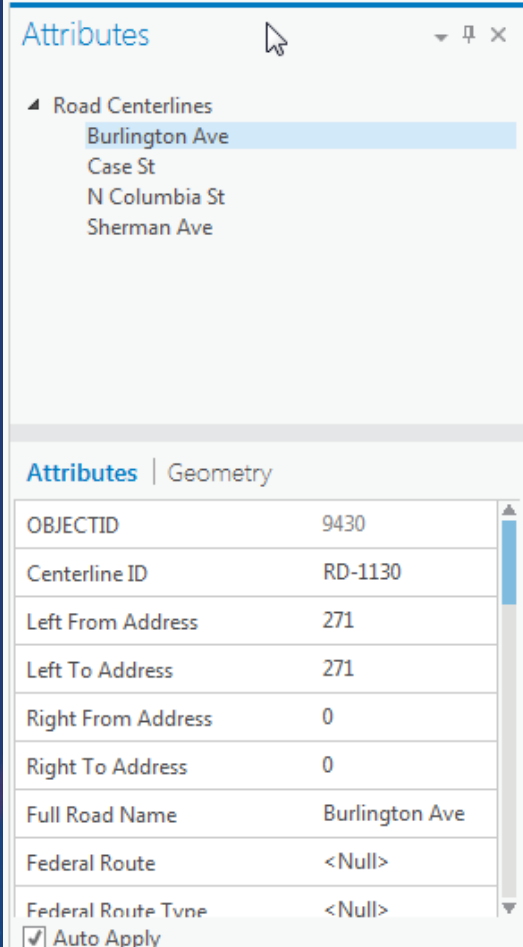
Merging two parcels into one



Duplicating a building floor

# Updating Attributes

- You can update feature attributes with the Attributes Pane and the Attribute Table
- Tree view displays currently selected features
  - Iterate through each feature
  - Click the layer node to update attributes for entire selection
  - Auto Apply will commit changes as you edit them
- Geometry tab displays vertex coordinates for each segment



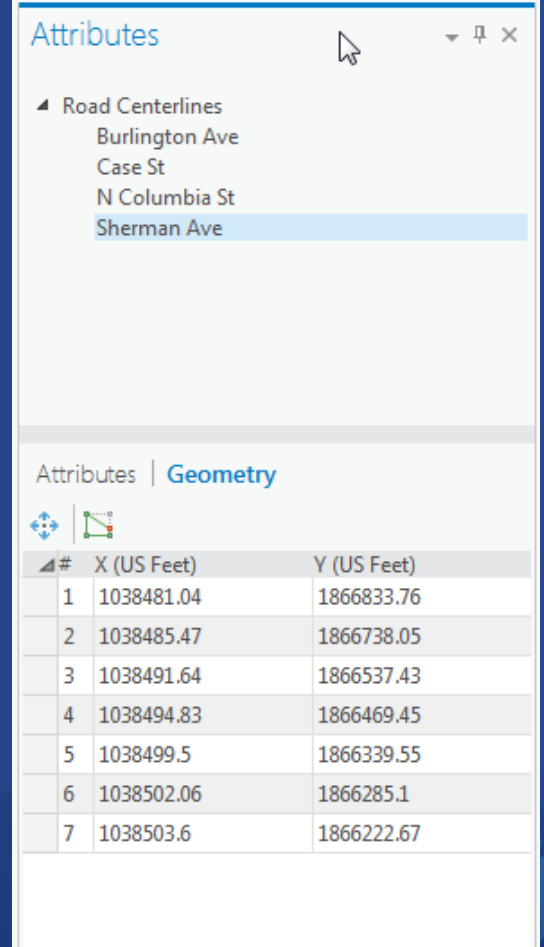
Attributes

▲ Road Centerlines

- Burlington Ave
- Case St
- N Columbia St
- Sherman Ave

Attributes | Geometry

OBJECTID	9430
Centerline ID	RD-1130
Left From Address	271
Left To Address	271
Right From Address	0
Right To Address	0
Full Road Name	Burlington Ave
Federal Route	<Null>
Federal Route Type	<Null>
<input checked="" type="checkbox"/> Auto Apply	



Attributes

▲ Road Centerlines

- Burlington Ave
- Case St
- N Columbia St
- Sherman Ave

Attributes | Geometry

#	X (US Feet)	Y (US Feet)
1	1038481.04	1866833.76
2	1038485.47	1866738.05
3	1038491.64	1866537.43
4	1038494.83	1866469.45
5	1038499.5	1866339.55
6	1038502.06	1866285.1
7	1038503.6	1866222.67

# Using the Attribute Table

- You can edit feature attributes and stand alone tables with the Attribute Table
- Standard grid/cell based editing user experience
- Toggle selection, use the zoom control to increase size

The screenshot shows the 'Attribute Table' window in Esri software, titled 'Road Centerlines'. The window has a toolbar with icons for 'New', 'Delete', 'Calculate', 'Selection', 'Zoom To', 'Switch', 'Clear', and 'Delete'. Below the toolbar is a table with 11 columns: OBJECTID, Centerline ID, Left From Address, Left To Address, Right From Address, Right To Address, Full Road Name, Federal Route, Federal Route Type, Alternate Federal Route, and Alternate Feder. The table contains 11 rows of data. The row with OBJECTID 11035 is selected, highlighted in light blue, and its 'Full Road Name' cell, 'Brooklea Ct', is also highlighted with a green border. At the bottom left, a status bar indicates '1 of 8332 selected'. At the bottom right, there is a zoom control with a slider and a percentage value of 100%.

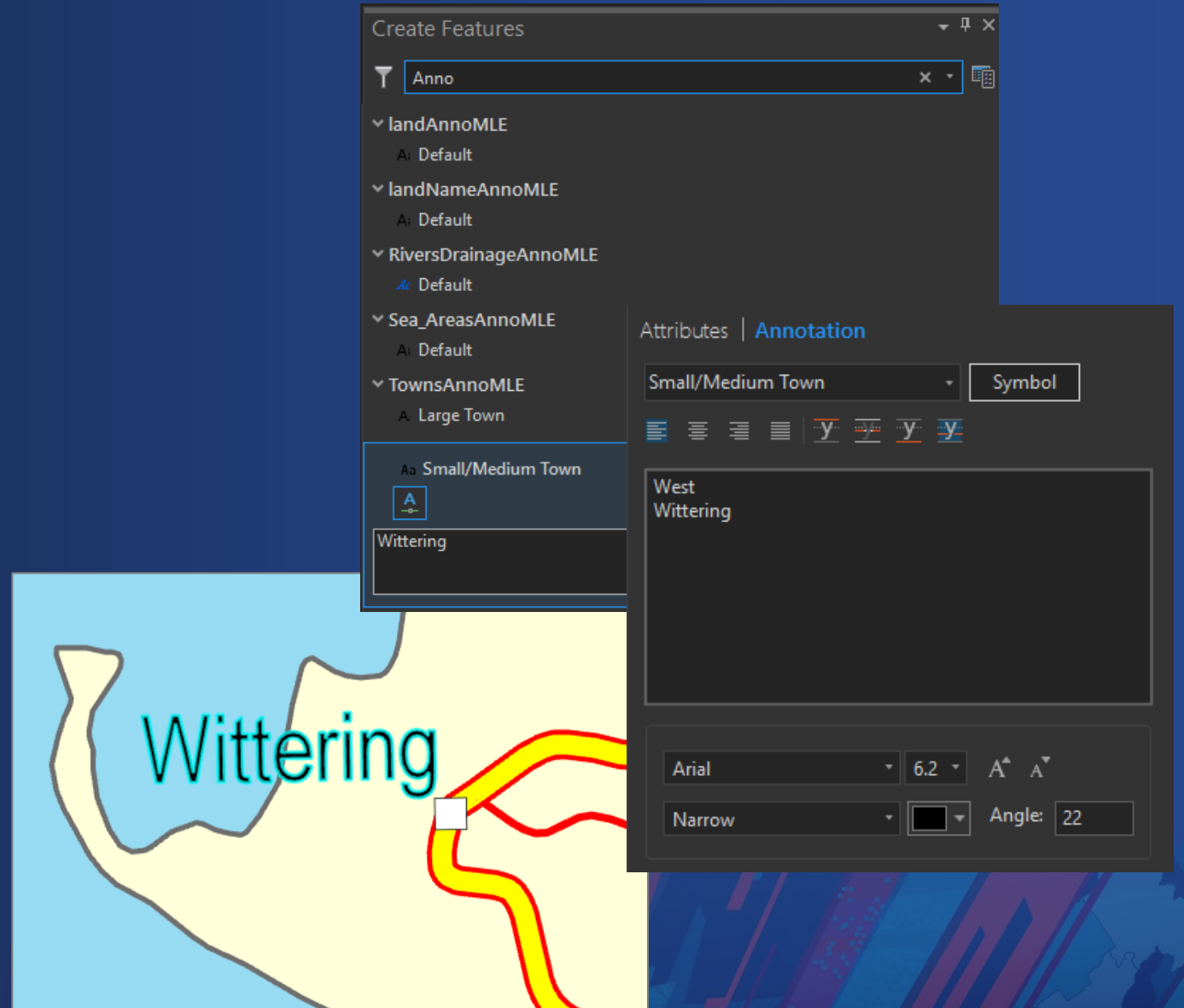
OBJECTID	Centerline ID	Left From Address	Left To Address	Right From Address	Right To Address	Full Road Name	Federal Route	Federal Route Type	Alternate Federal Route	Alternate Feder
11032	RD-2732	501	611	506	612	Staunton Rd	<Null>	<Null>	<Null>	<Null>
11033	RD-2733	469	489	470	488	Staunton Rd	<Null>	<Null>	<Null>	<Null>
11034	RD-2734	2034	2036	2035	2035	Coach Dr	<Null>	<Null>	<Null>	<Null>
11035	RD-2735	225	331	228	336	Brooklea Ct	<Null>	<Null>	<Null>	<Null>
11036	RD-2736	2110	2110	2105	2115	Lancaster Cir	<Null>	<Null>	<Null>	<Null>
11037	RD-2737	2012	2040	2025	2033	Cherrywood Cir	<Null>	<Null>	<Null>	<Null>
11038	RD-2738	104	116	105	117	Coventry Ct	<Null>	<Null>	<Null>	<Null>
11039	RD-2739	2163	2167	2160	2160	Lancaster Cir	<Null>	<Null>	<Null>	<Null>
11040	RD-2740	1549	1557	1550	1570	Valley View Ct	<Null>	<Null>	<Null>	<Null>
11041	RD-2741	2106	2114	2105	2121	Hidden Valley Dr	<Null>	<Null>	<Null>	<Null>



# Demo: Creating Data

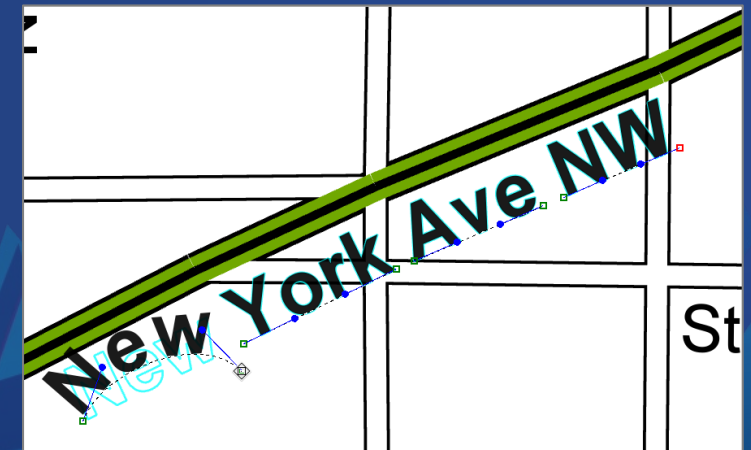
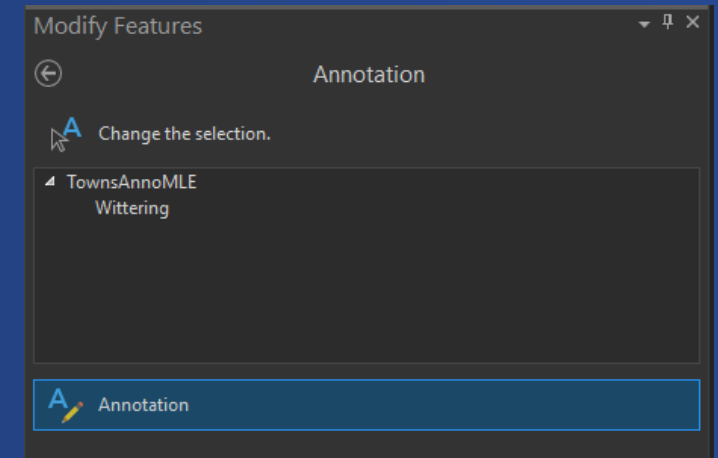
# Annotation

- Create via:
  - Annotation feature templates
  - Feature linked annotation
  - Copy/Paste
- Use Attributes pane's Annotation tab for updating text and formatting



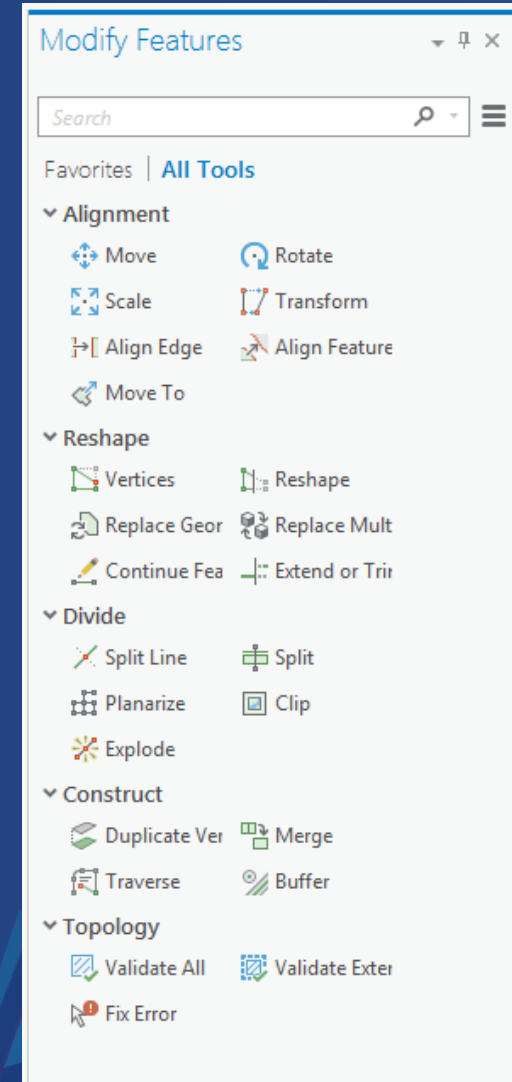
# Annotation Edit Tool

- On-screen text editing
  - Enter text strings directly on the map
- Use standard transformation tools for repositioning text
  - Move
  - Rotate
  - Scale
- Edit the baseline using Edit Vertices tool



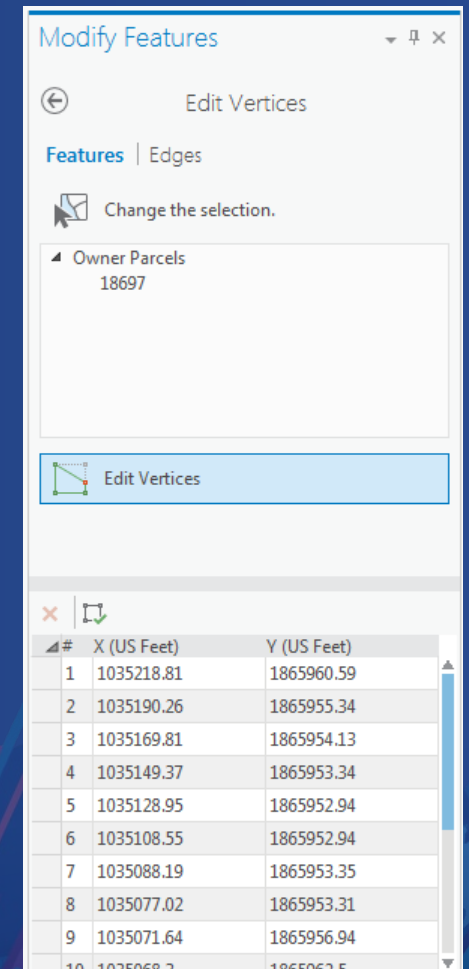
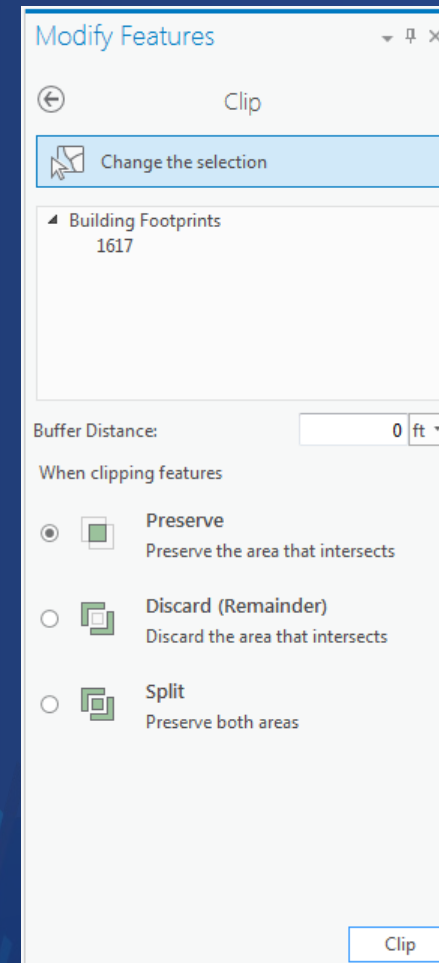
# Modifying Features

- Pro provides tools to update feature geometry and their attributes
  - You can modify an entire feature or the parts that comprise a feature
  - You can use other features to modify a target feature
- Tools organized into the following categories:
  - Alignment
  - Reshaping
  - Division
  - Construction



# Modify Features Pane

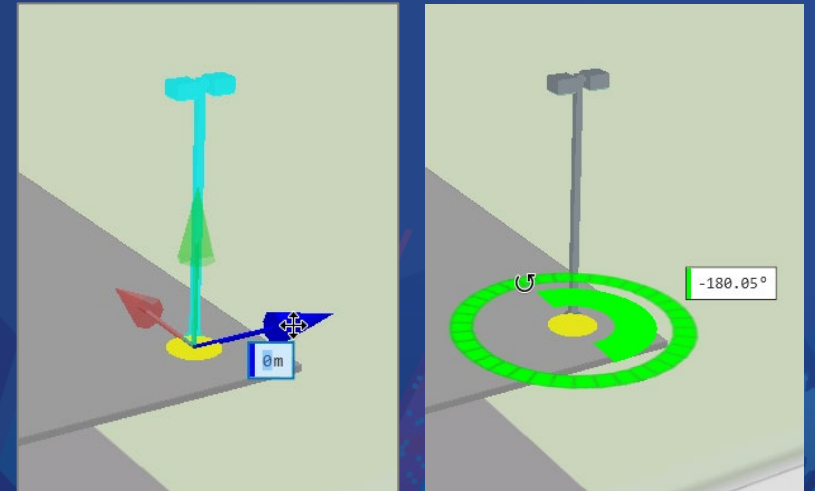
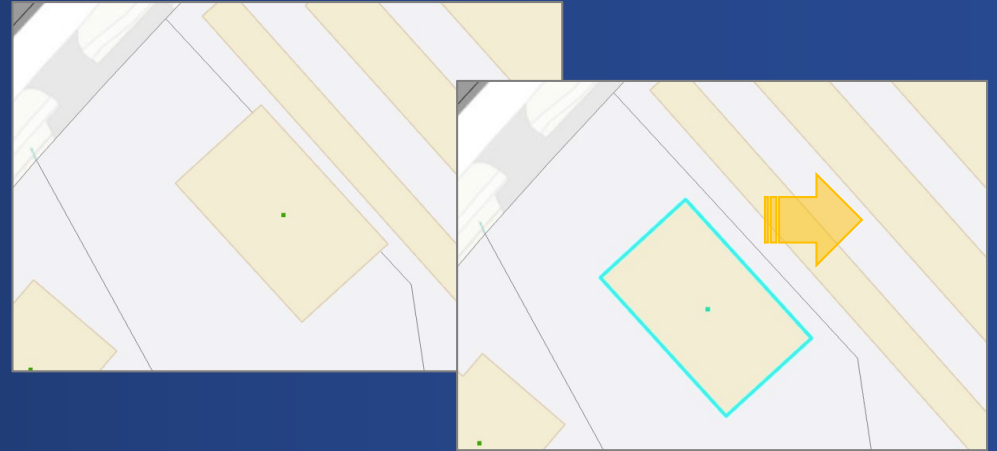
- The Modify Features pane hosts the controls for the active tool
  - Types of controls vary between tools
- Select tool is hosted and always the top most control
- Tree view lists the currently selected features
  - Context menu allows you to manage items
- Additional parameters and input boxes





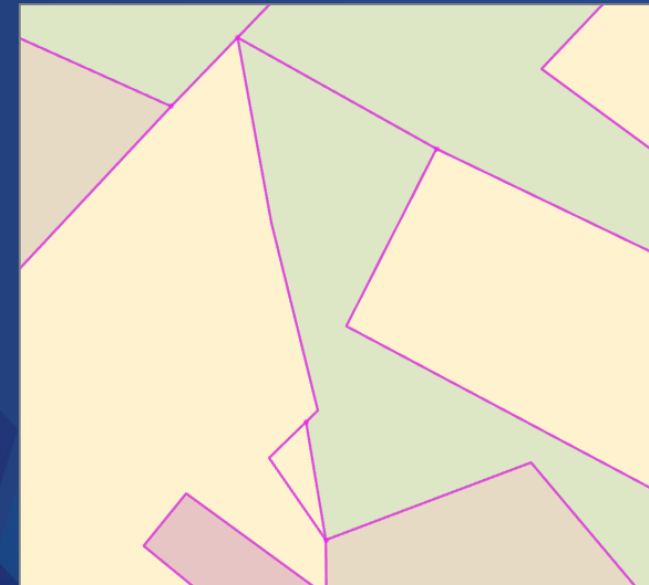
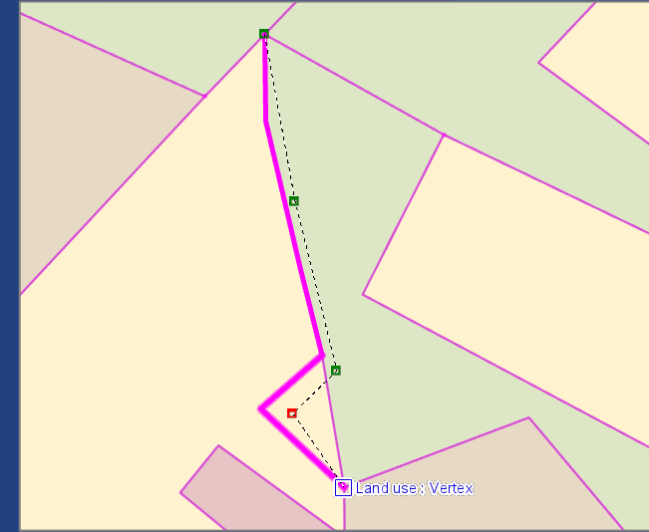
# Aligning Features

- Tools for repositioning features and edges
- Can be performed using the following methods:
  - Interactively with the mouse pointer - Move, Rotate, Scale
  - By entering absolute coordinates or offset values 0 Move To
  - By defining source and destination coordinates - Transform
- Features can also be aligned to other features
  - Edges to edges - Align Edge
  - Features to features - Align Features



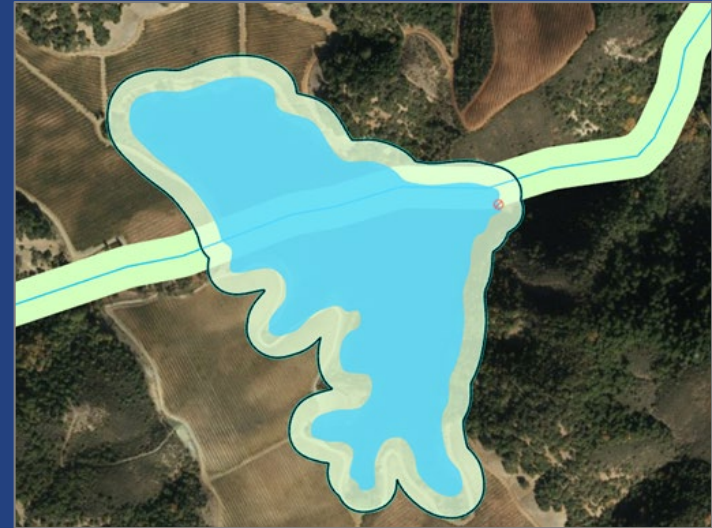
# Reshaping Features

- Feature segments and vertices can be moved, reshaped, and/or replaced
- Edit Vertices allows the editing of individual vertices
  - Add, Delete, Move,
- Reshape allows you to modify a portion of a feature or edge
  - Can be faster than editing the segments



# Dividing Features

- Tools that allow you to split, clip, and explode features
- Split allows you to create multiple features from a source feature
  - Split lines at a point
  - Split polygons by lines that intersect it
- Clip allows you cut holes in polygons based on overlapping and neighboring features
  - Options to preserve, discard, or split areas



# Demo: Modifying

# Editing Guides

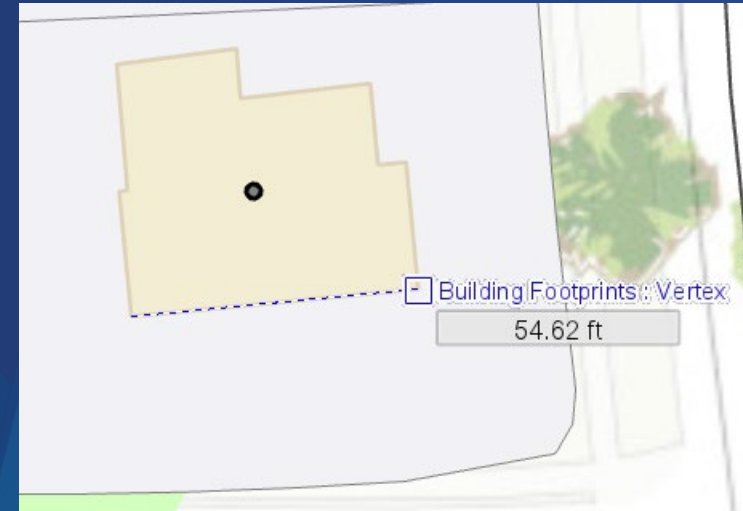


# Snapping Overview

- Snapping allows you to connect geometric shapes
  - Ensures connectivity between features
- Available for all create and modify tools



Snapping with feature construction tool

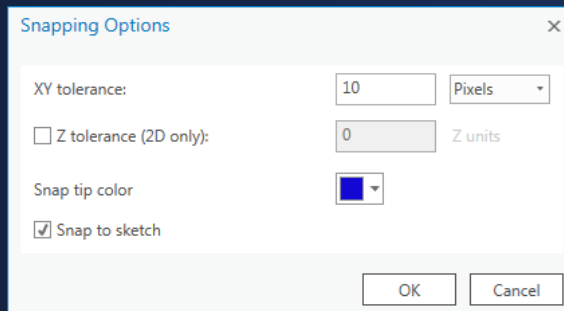
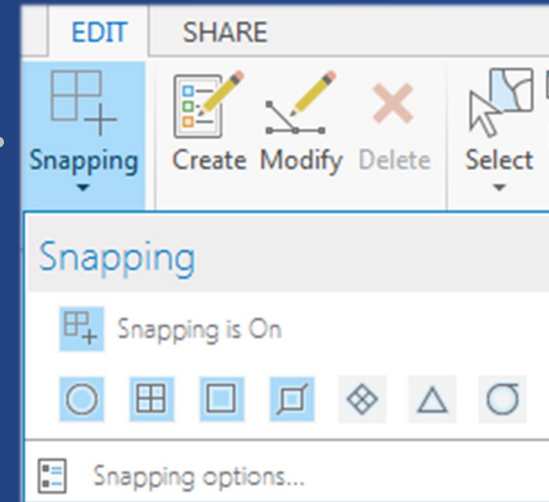


Snapping with Measure tool

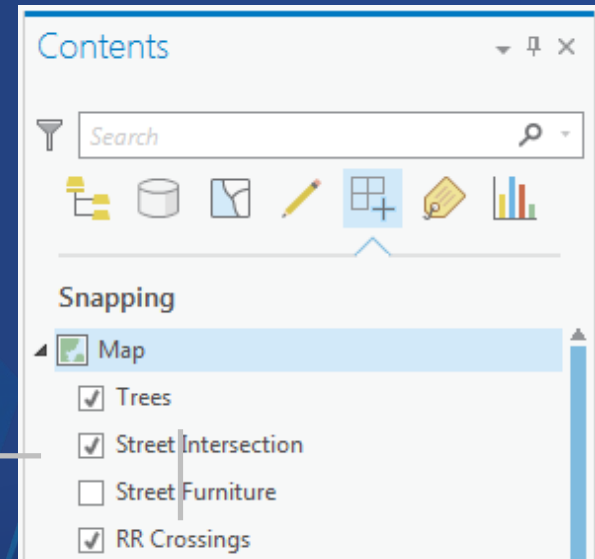
# Configuring Snapping

- Toggle snapping on and off from the ribbon
- Control snapping by layer in Contents pane
- Snapping Options
  - Set tolerance by pixels or map unit
  - Must enable Z tolerance for snapping in maps
  - Snap to sketch

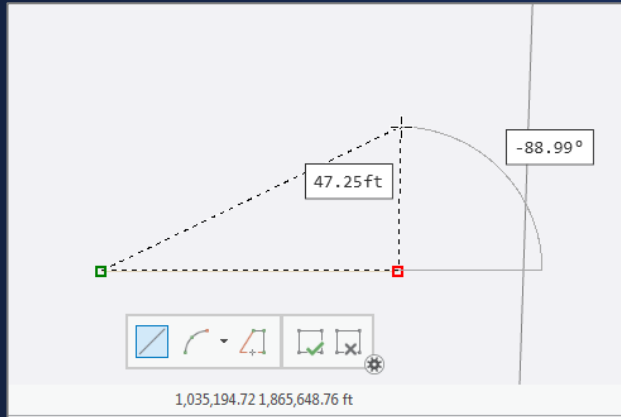
Snapping  
On/Off Toggle



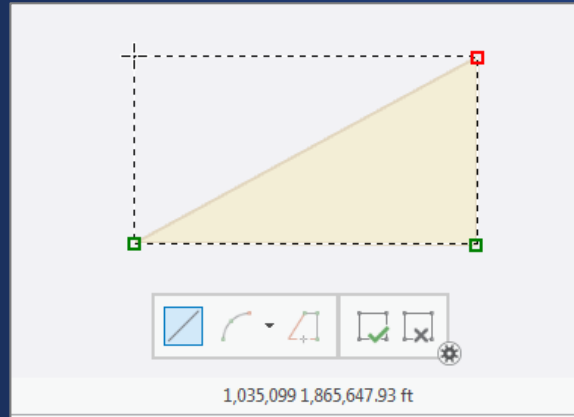
Layer Snapping  
Enable/Disable



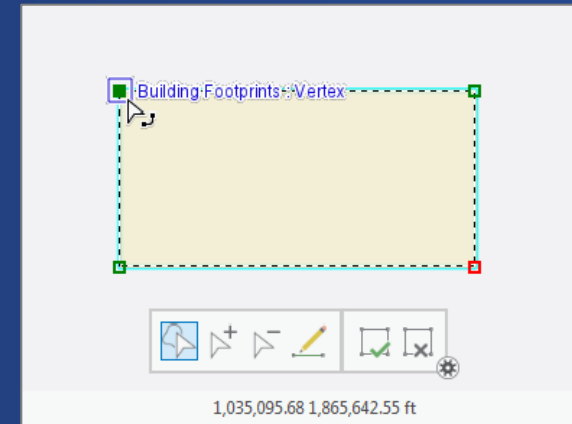
# On Screen Controls



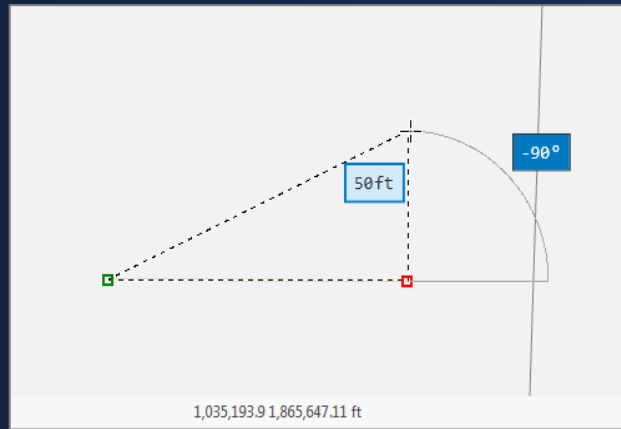
Dynamic Constraints - Display



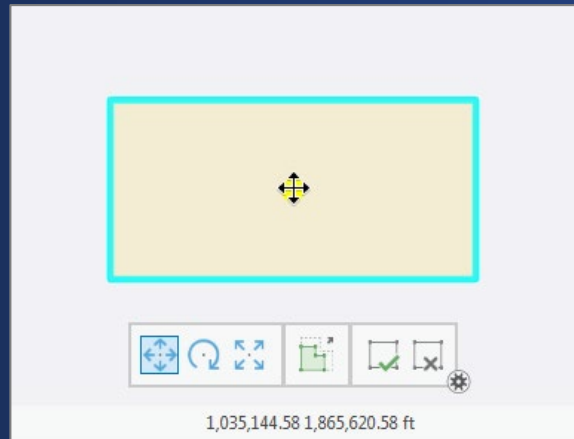
Editing Toolbar - Construct Features



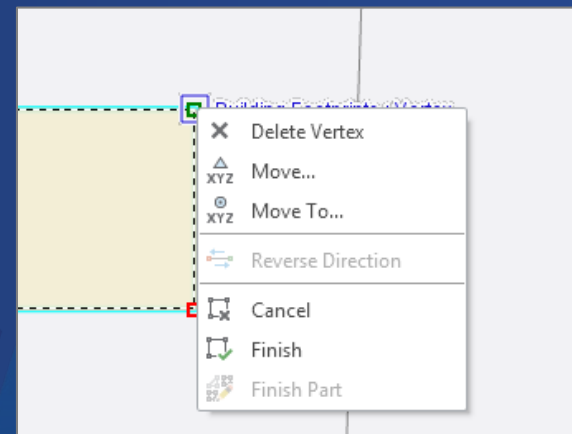
Editing Toolbar - Edit Vertices



Dynamic Constraints - Editing Values



Editing Toolbar - Modify Features



Edit Vertices - Context Menu

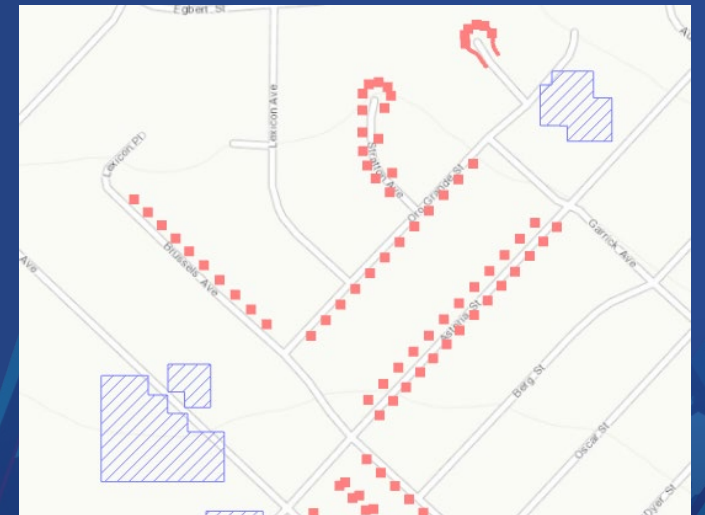
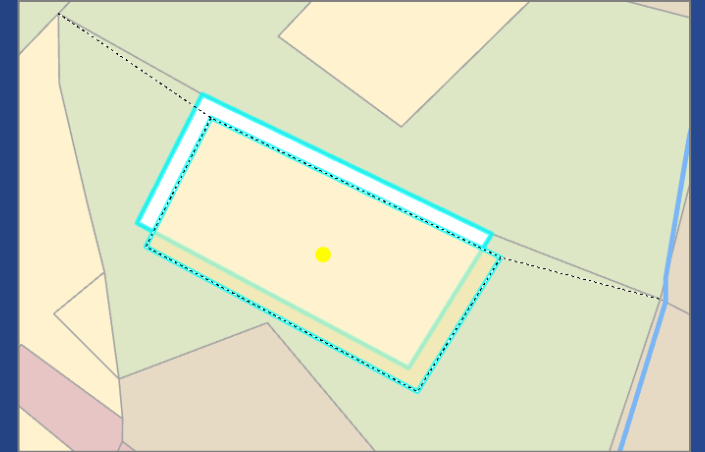
# Demo: Editing Guides

# Topological Editing



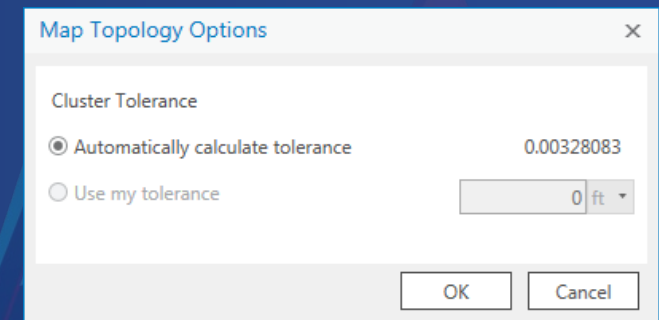
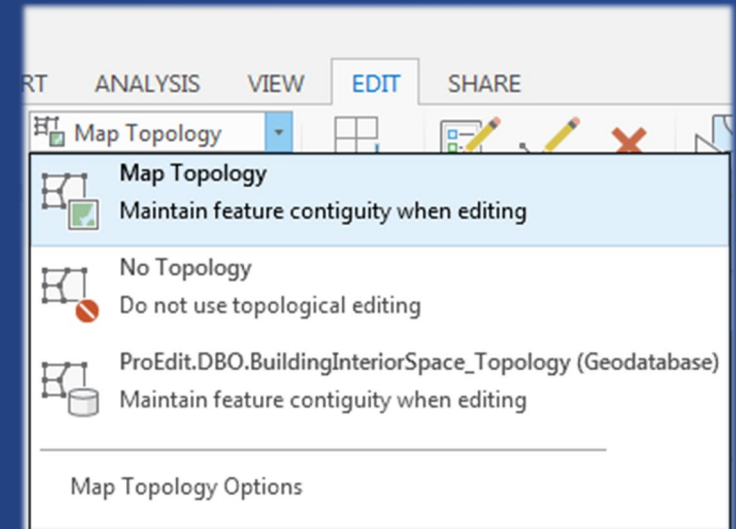
# Topological Editing Overview

- Topology assists with the maintenance, updating, and creation of contiguous features, ensuring data integrity
- There are two types of topologies in ArcGIS:
  - Map Topology - allows you to edit shared edges and nodes while maintaining feature contiguity
  - Geodatabase Topology - rules-based methodology that involves validating spatial relationships and correcting feature geometry



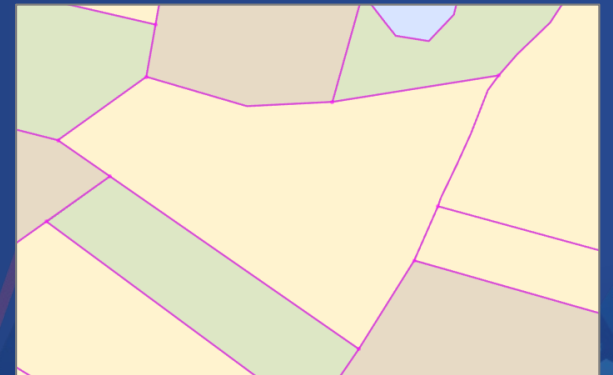
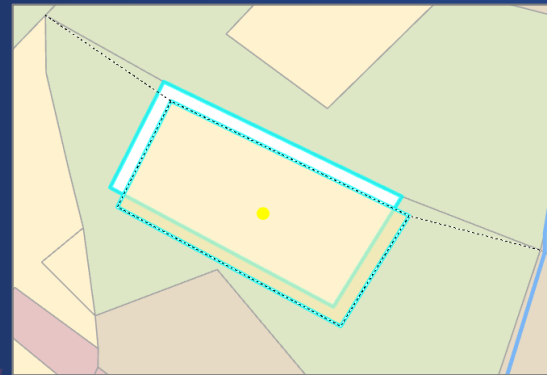
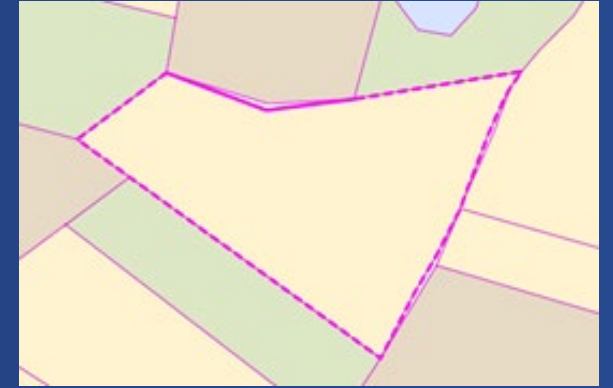
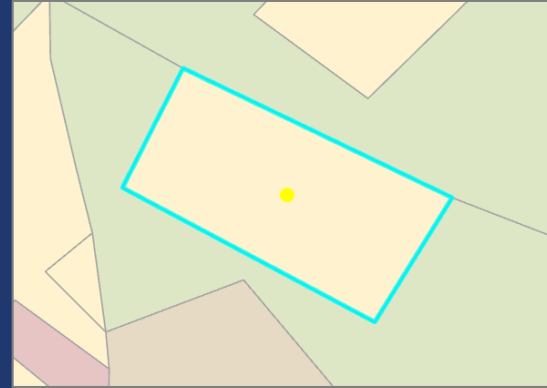
# Editing Behavior Settings

- Map Topology
  - Enables shared edge editing behavior for all editable and visible layers in the map
- Geodatabase Topology
  - Enables shared edge editing behavior for all feature classes that participate in the topology
  - Feature classes do not have to be in the map to be updated
- No Topology
  - Disables topological editing – features can be ‘disconnected’ from adjacent features



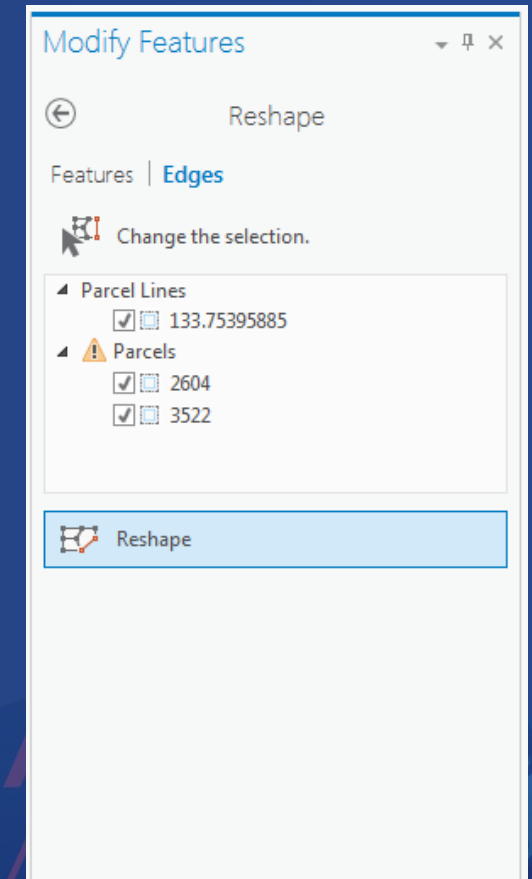
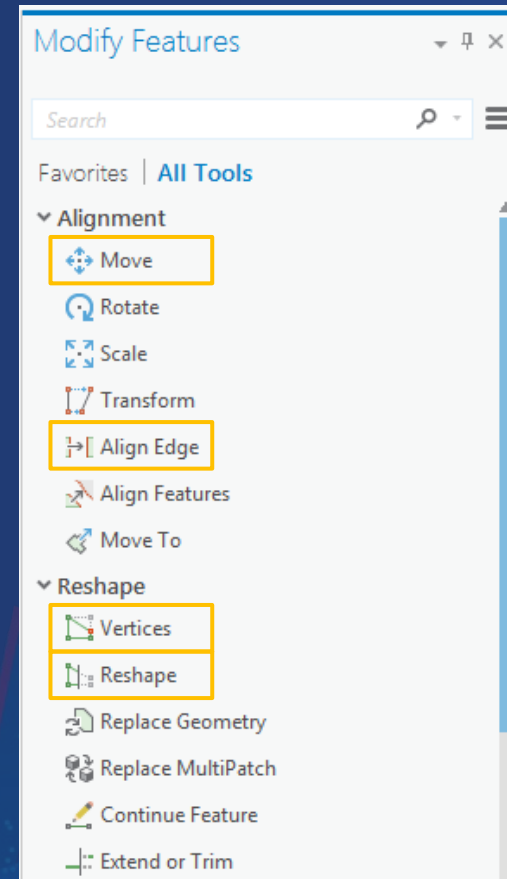
# Map Topology - Shared Edge Editing

- No Topology setting is default in Pro
- Edge editing is integrated in several tools
  - Supports moving, reshaping, and aligning edges
- Shared edge editing is only available in 2D map views



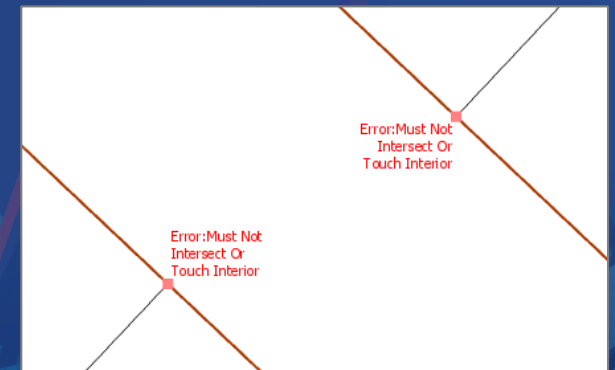
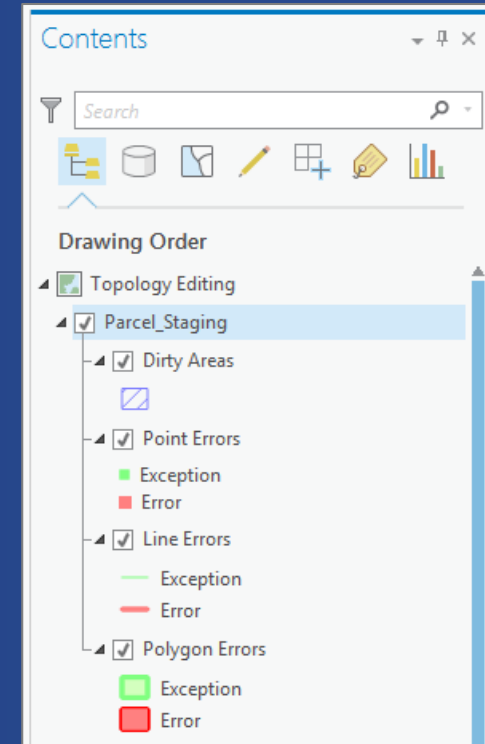
# Edge Editing Mode

- When topological editing is enabled, these tools will display the 'Edge' tab
- The selected edge is displayed in the tree view
  - Connected features that will be impacted by the edge edit are also listed in the tree
  - You can omit edges from the edit by unchecking their box



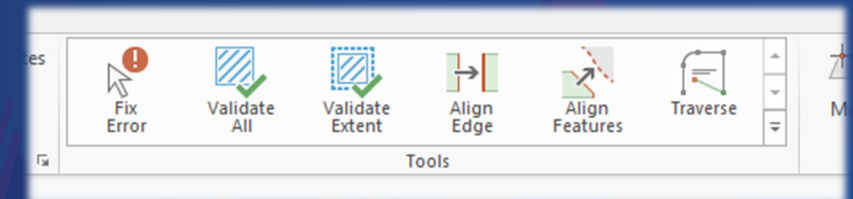
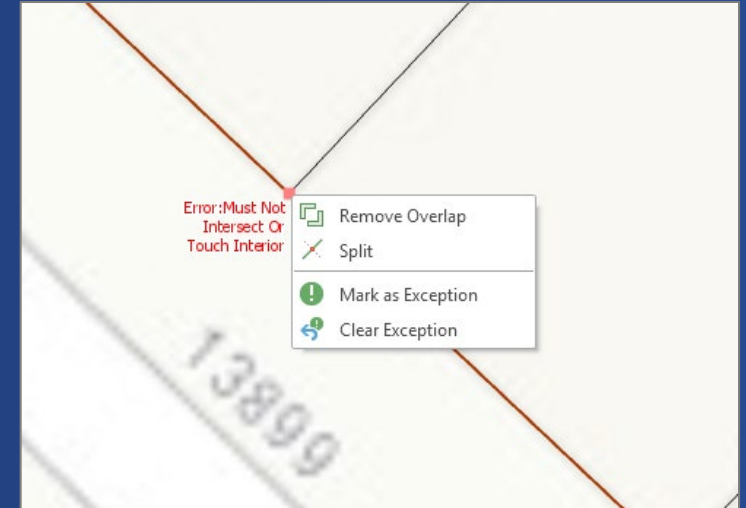
# Geodatabase Topology

- Geodatabase Topology layer is now a group layer in the map
  - Allows you to work with errors as standard feature layers
  - Can now label errors in the map for visualization
- Geodatabase Topology tools are only available in 2D map views
- Geodatabase Topology Administration
  - Geodatabase administration tools in Pro will be available in the next release (1.4)
  - Continue to use ArcCatalog/ArcMap for these tasks



# Fixing Errors

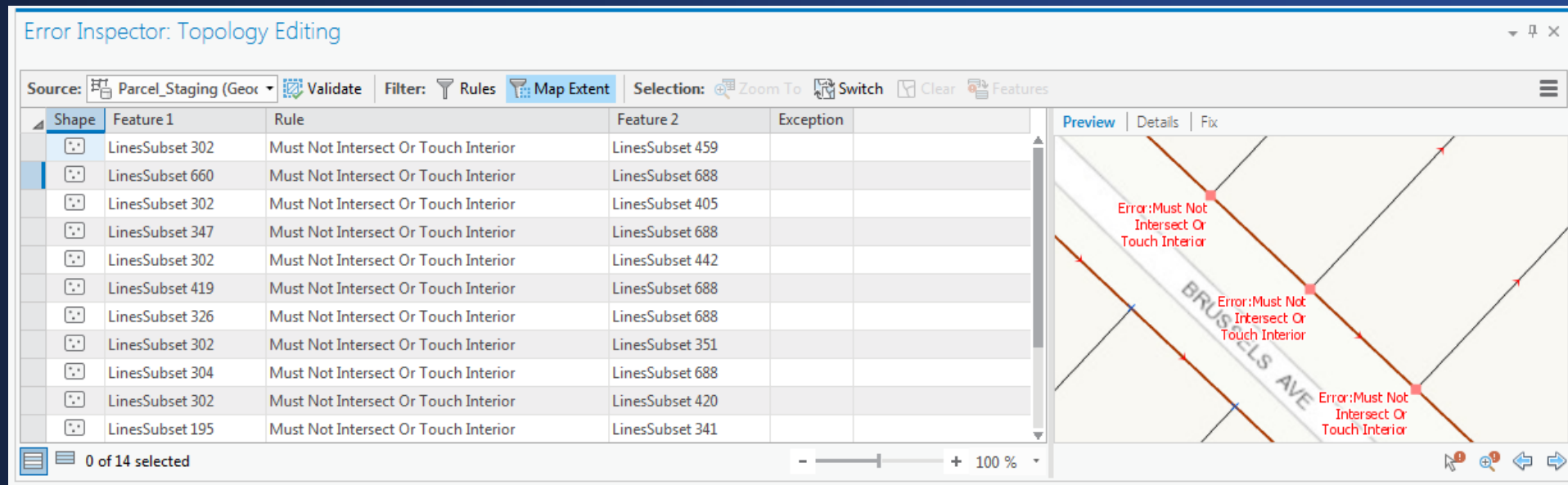
- Fix Error tool provides a quick and easy way to fix topological errors in the map
- Click an error and a context menu will appear with choices to:
  - Resolve error with a suggested fix
  - Mark as exception, clear exception
- Validate current map extent or entire topology





# Error Inspector

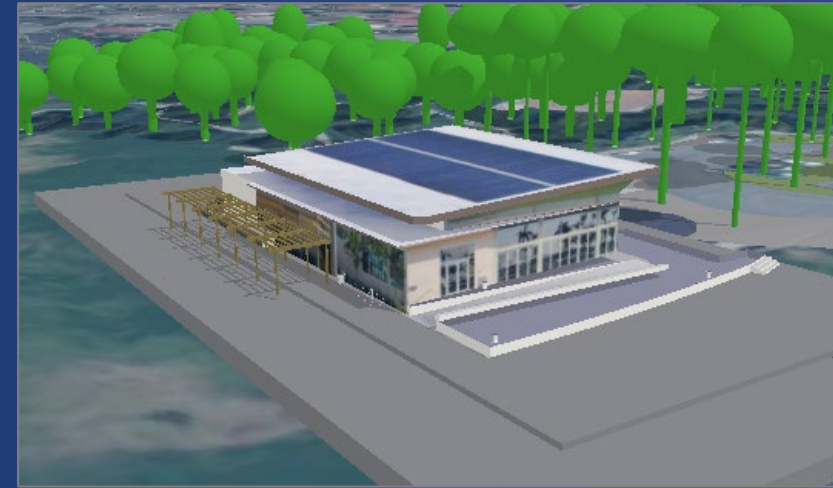
- Error Inspector displays errors and associated information in a table format
- Ideal for fixing multiple errors at a time (i.e., batch mode)
- Can view all errors or filter by rule; map preview allows inspection of error



# Demo: Topological Editing

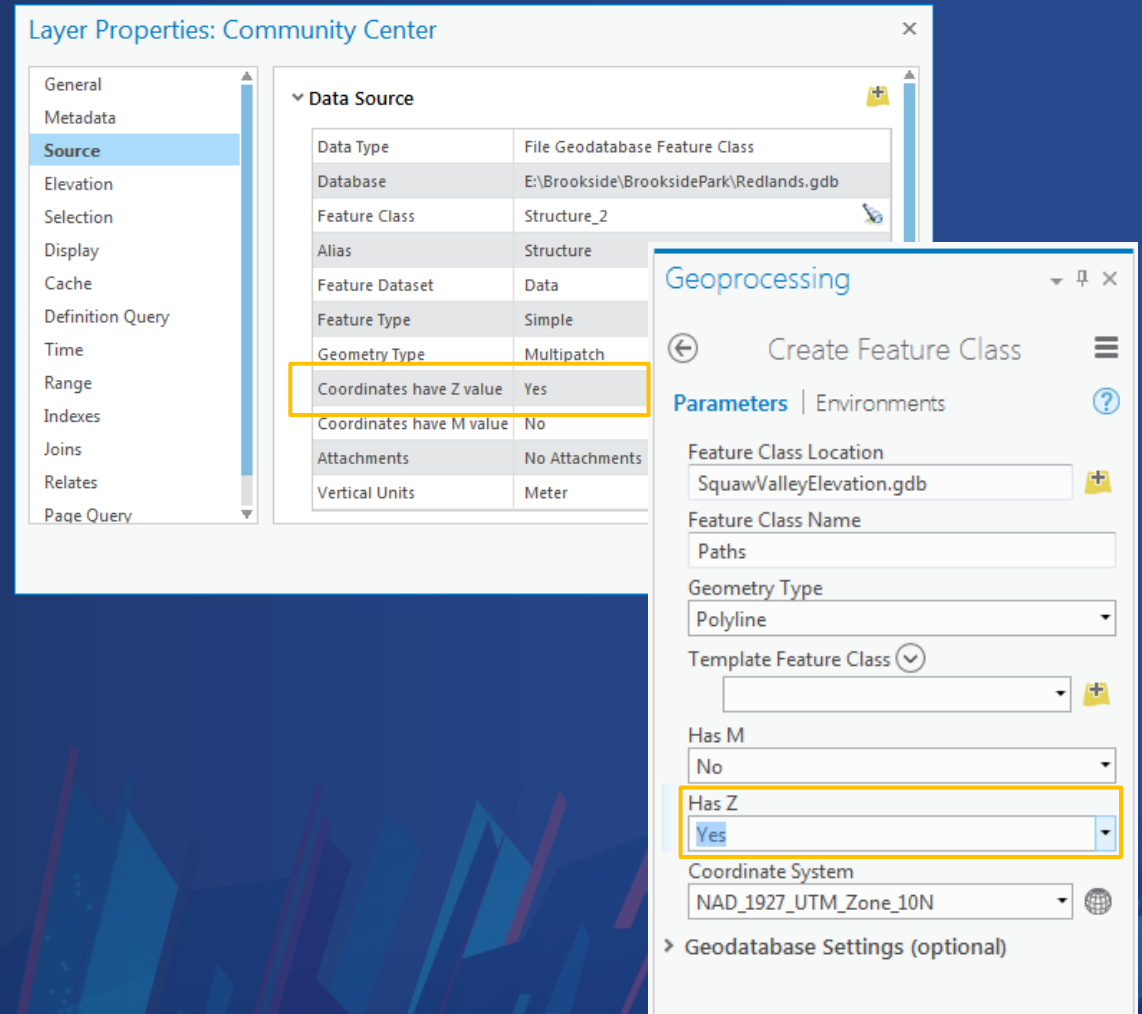
# 3D Editing Overview

- Create new features in 3D
  - On the surface or at a constant elevation
  - Draw vertical lines or lines with pitch (at any angle)
  - Duplicate features vertically
- Modify features in 3D
  - Reposition features along XYZ axis or freely in 3D space
  - Edit the Z coordinates of individual vertices or all vertices (batch)
  - Use editing tools to divide, reshape, and construct features



# Working with Z-enabled Layers

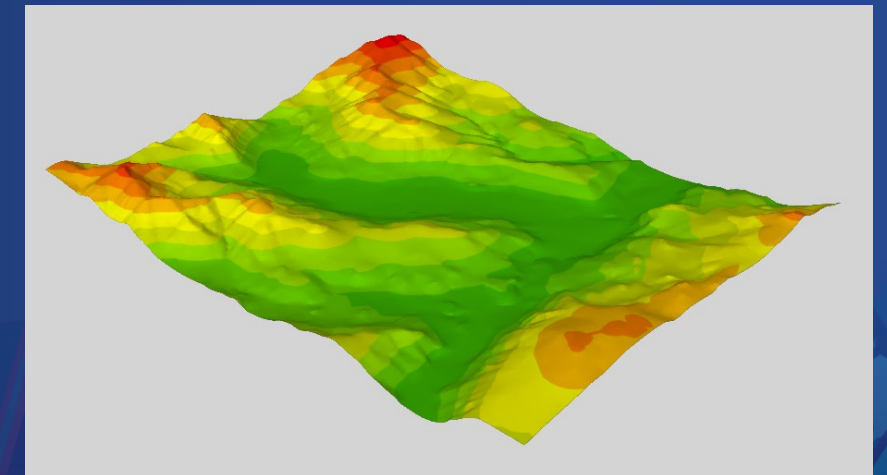
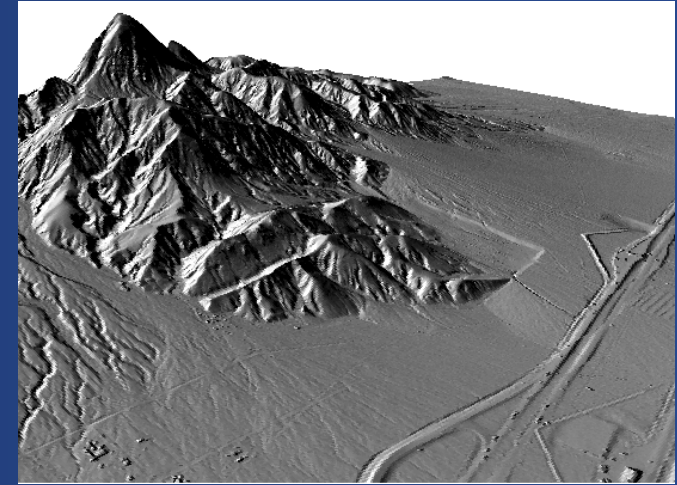
- Z enabled property reported in Layer Properties window
  - Sometimes referred to as a '3D Layer'
- You can Z enable a layer when creating new feature classes
  - Set Has Z = Yes
- Z enabled layers allow:
  - Editing of Z coordinate values
  - Setting layers at an absolute height





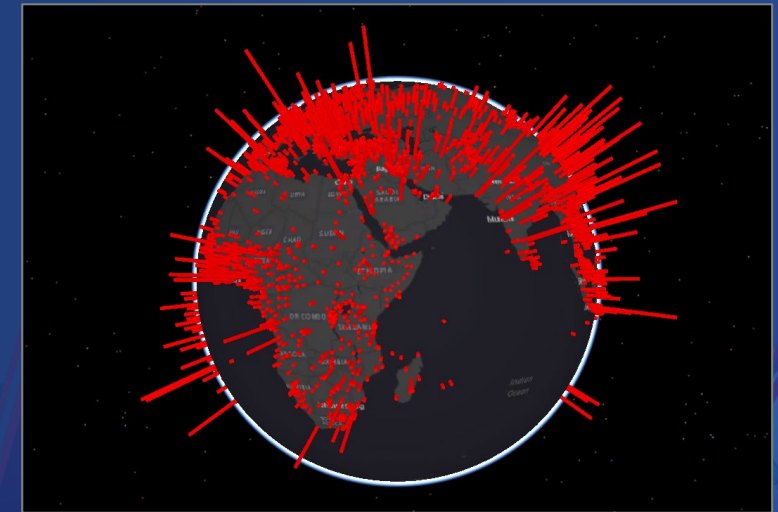
# Working with Surfaces

- Elevation surface is a digital representation of features in three-dimensional space
- For editing, a surface can be used to get accurate elevation values (Zs) when creating new features
  - Data can be on, above, or below the surface
- Scenes have ground surface by default from ArcGIS Online (Terrain 3D)
  - You can add your own custom surface
  - DEM, TIN, Terrain, LAS, Raster, LERC



# Local Scenes vs Global Scenes

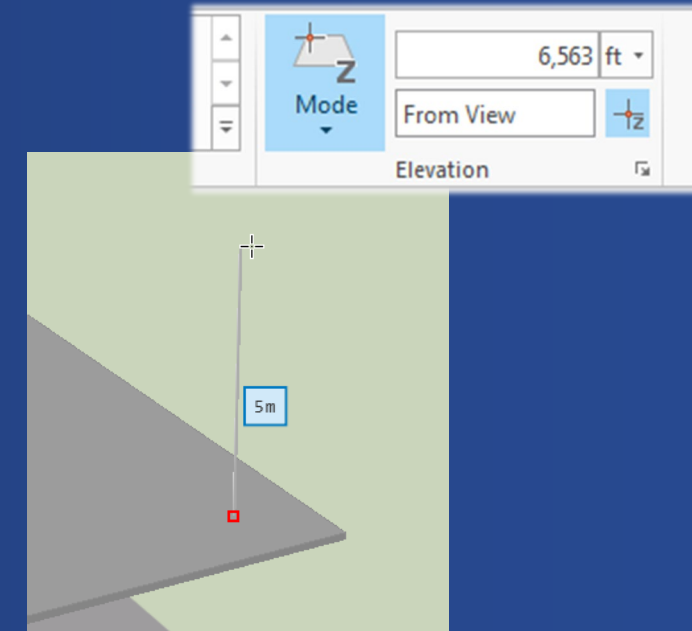
- Benefits of Local Scenes
  - use a projected coordinate system and linear units
  - manage data below the surface
  - use your own ground elevation source
- Use Global Scenes when you need to...
  - work in a fixed geographic coordinate system (WGS 84)
  - work in large, multiple geographic areas
  - use enhanced illumination and time effects
- You can easily switch between these scene types





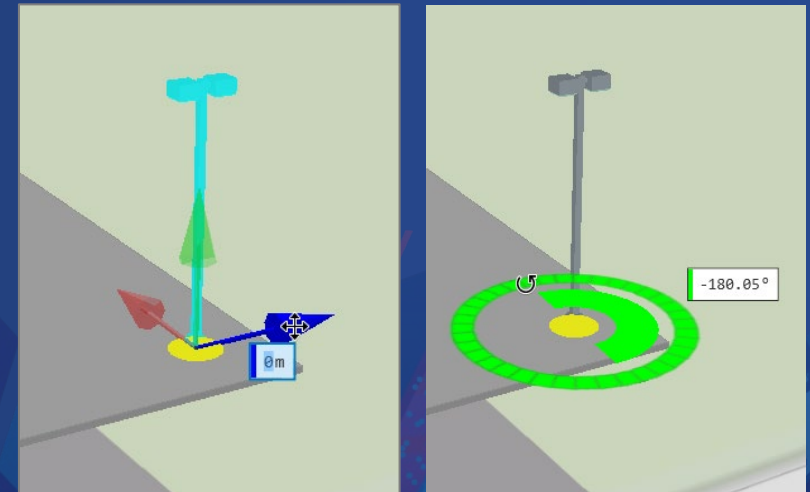
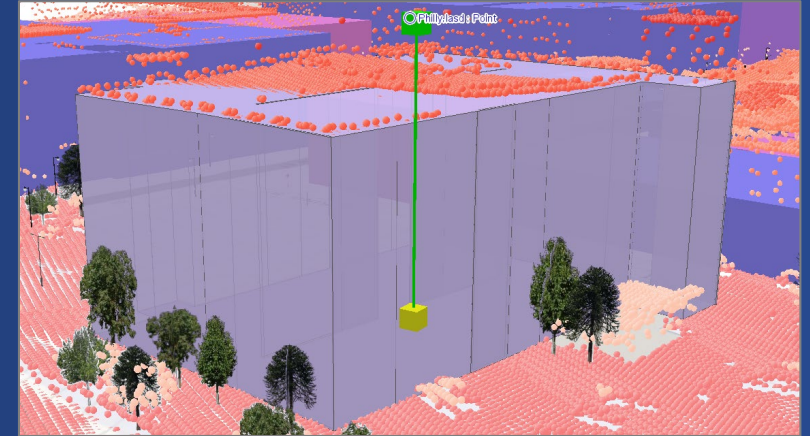
# 3D Data Creation Tools

- Constant Z allows you to set the elevation so new features inherit Zs
  - Can get Zs from surface or vector features
  - Set elevation by entering a value and units
- Draw lines in 3D space
  - Vertical or with a pitch
  - Snapping to other 3D features in scene
- Duplicate features vertically to easily create multiple instances at various heights
  - Specify number of copies and distance between them



# 3D Feature Modification

- Move, rotate, and scale features
  - Interactively with handles or by value with constraints
  - Perform a 3D affine transformation of features or entire layers
- Edit vertices of features
  - Interactively with the Edit Vertex tool (Move, Add, Delete)
  - Update XYZ vertex coordinate values in grid
- Replace models directly in a scene
  - Choose a different model from disk with the Replace Multipatch tool



# Demo: Working with Elevation & 3D



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**GIS Solutions Expo**

**Hall D**

5:15 pm – 6:30 pm

**GIS Solutions Expo Social**

**Hall D**

## Wednesday

10:45 am – 5:15 pm

**GIS Solutions Expo**

**Hall D**

6:30 pm – 9:00 pm

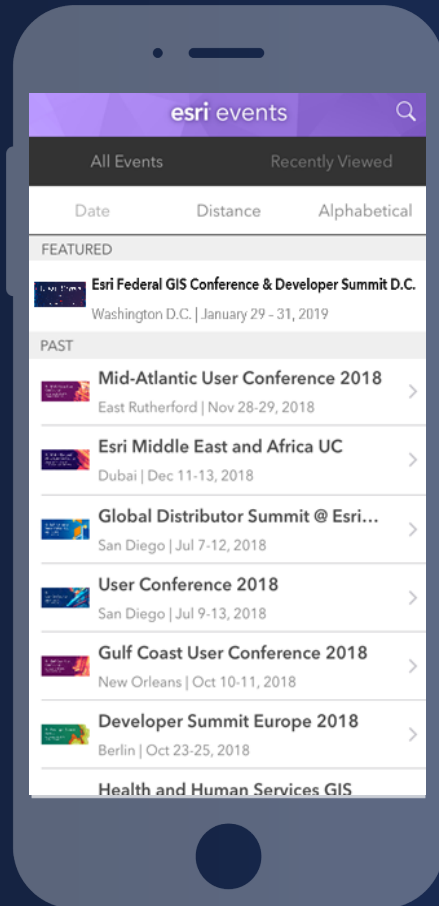
**Networking Reception**

**National Building Museum**

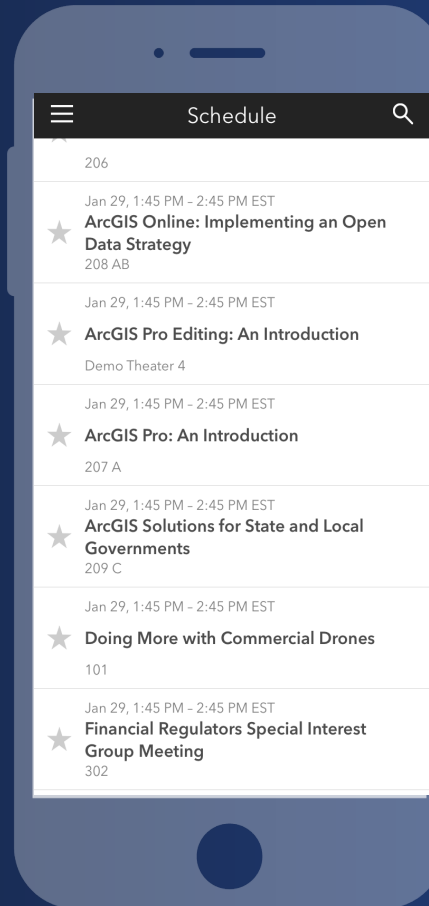


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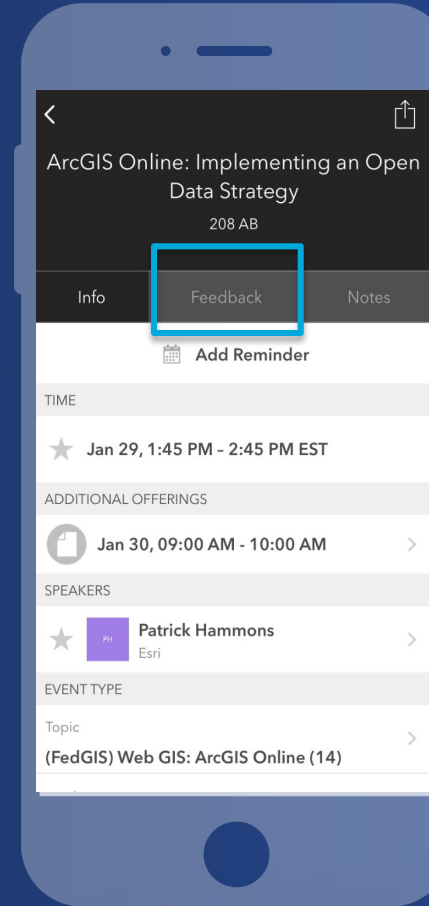
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