Part II

Working with spatial data

7

Digitizing

Using existing map layers such as streets for guides, in this chapter you learn how to create and edit spatial data. You learn how to create and digitize new vector features and add their attribute data. Many advanced digitizing tools are available to assist you, making the work easier and more precise. You also adjust vector data spatially to make it align with a basemap layer. For example, you learn how to import and adjust a computer-aided design drawing for use in a map layer.

Learning objectives

- *Digitize polygon, line, and point features*
- *Add attribute data for vector features*
- *Learn advanced editing tools*
- *Spatially adjust features*

Tutorial 7-1

Digitizing polygon features

You create a new polygon feature class and then add features to it using heads-up digitizing (with your head up, looking at your computer screen).

Open a map document

1. Start ArcMap and open Tutorial7-1.mxd from the Maps folder. The Tutorial7-1 map document shows a map of the Middle Hill neighborhood of Pittsburgh. You use the Commercial Properties and Street Centerlines layers as references for digitizing commercial zones.

2. Save your map document to the Chapter7 folder of MyExercises.

Create a new polygon feature class

1. Open the Catalog window.

2. In the Catalog tree, browse to MyExercises, the Chapter7 folder.

3. Right-click Chapter7.gdb, click New > Feature Class.

4. In the Name field of the New Feature Class window, type **CommercialZones**.

5. For Type, select Polygon Features and click Next.

6. Expand Projected Coordinate Systems > State Plane > NAD 1983 (US Feet), click NAD 1983 StatePlane Pennsylvania South FIPS 3702 (US Feet), and click Next three times.

7. Type **ZoneNumber** as a new field, select Short Integer as the Data Type, and click Finish.

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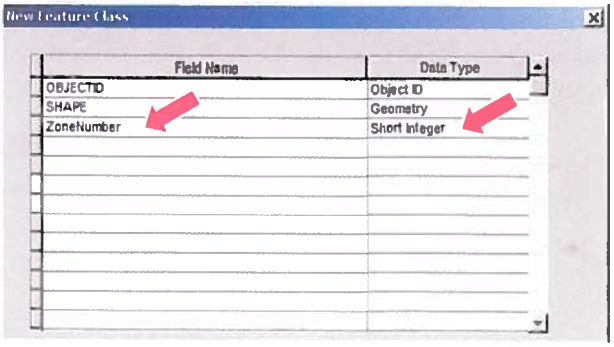


The result is a new polygon feature class added to Chapter7.gdb and the table of contents. While CommercialZones appears in the table of contents, of course nothing displays for it because at this point there are no features in this new map layer. Next, you digitize new features, starting with some practice polygons.

8 Close the Catalog window.

Start editing with the Editor toolbar

1 Click Customize > Toolbars > Editor. The Editor toolbar appears. You can move it or dock it anywhere in ArcMap. Dock it on top of the ArcMap window below the Standard toolbar.

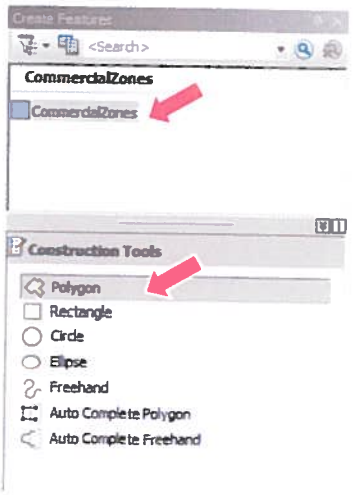
2 On the Editor toolbar, click Editor > Start Editing.

3 Click CommercialZones as the layer to edit and click OK and Start editing.

4 From the Editor toolbar, click the Create Features button . The Create Features and Construction Tools panels appear on the right of the map. You can adjust these panels by dragging the boundary between them.

5 Click CommercialZones in the Create Features panel, and then click Polygon in the Construction Tools panel.

6 Close the Create Features panel.



Practice digitizing a polygon

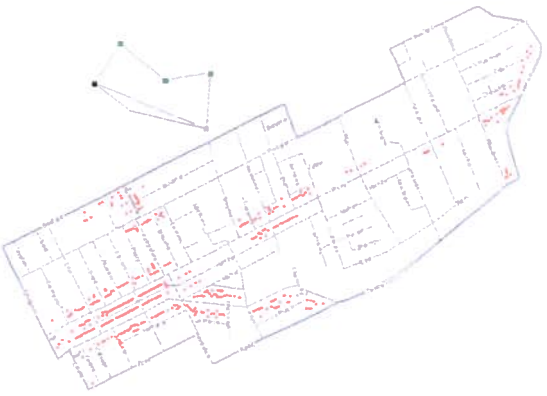
1 In the table of contents, click the List By Selection button and make CommercialZones the only selectable layer.

2 On the Editor toolbar, click the Straight Segment button .

3 Position the crosshair cursor anywhere on the map outside the neighborhood boundary and click to place a vertex.

4 Move your mouse and click a series of vertices one at a time to form a polygon (but do not double-click!). If you click near an existing feature, you find that your new vertices snap to existing vertices of other features. You learn how to turn this behavior on and off later.

5 Double-click to place the last vertex.



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Move a polygon

1 On the Editor toolbar, click the Edit tool ▶.

2 Click and hold down the mouse button anywhere inside your new polygon.

3 Drag the polygon a small distance.

Delete a polygon

1 Click anywhere inside your new polygon.

2 Press the DELETE key on the keyboard.

YOUR TURN

Practice creating new polygons using the Polygon, Rectangle, Circle, and Ellipse tools from the Create Features, Construction Tools panel. Delete your practice polygons when finished.

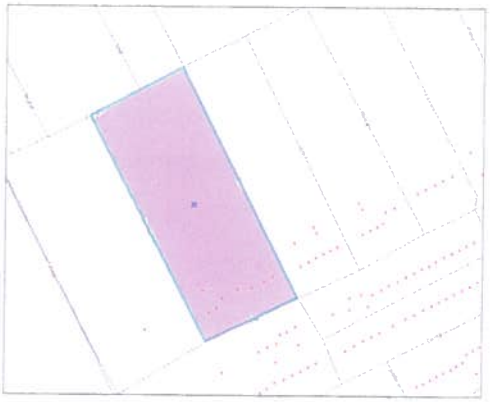
Edit polygon vertex points

Next, you learn how to work with vertices. You move, add, and delete vertices from a polygon.

1 Click Bookmarks > Erin Street. Your map zooms to a few city blocks surrounding Erin Street.

2 Click the Create Features button and from the Construction Tools panel, click Polygon.

3 Click the Straight Segment button and draw a new polygon feature as shown in the image, snapping to street centerline intersections of Davenport, Webster, Erin, and Wylie.



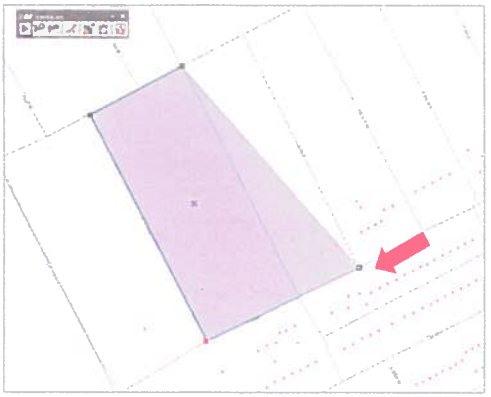
4 On the Editor toolbar, click the Edit button.

5 Double-click the new polygon. Grab handles—small squares—appear on the polygon at its vertex locations.

Next, you see that you can edit the shape of a feature by moving a vertex.

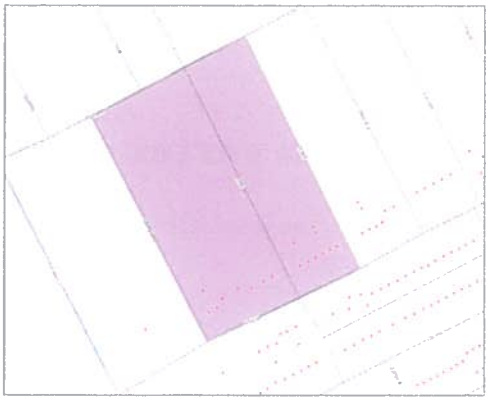
6 Position the cursor over the lower right vertex point.

7 Drag the vertex to the street intersections of Wylie and Trent. The polygon's shape changes correspondingly.



8 Drag the upper right vertex to the intersection of Webster and Trent streets.

9 Click anywhere on the map or polygon to confirm the new shape.



Add and move vertex points

Next, you practice editing digitized polygons and learn how to add, delete, and move vertices.

1 Double-click inside the polygon. Grab handles appear on the polygon and the small Edit Vertices toolbar appears.

2 On the Edit Vertices toolbar, click the Add Vertex button .

3 Move the mouse along Wylie Street between the two existing vertices and click. This adds a new vertex at the location of the cursor. Now you can move the new vertex to change the polygon's shape.

4 Position the cursor over the new vertex, then drag the vertex to the intersection of Wylie and Erin streets.

5 Click anywhere on the map to confirm the new shape.

YOUR TURN

Practice adding and moving vertex points for the intersections of Webster and Erin streets and Webster and Seal streets.

Delete vertex points

1 Double-click inside the new polygon.

2 Click the Delete Vertex button .

3 Place your cursor over the vertex point between Webster and Erin and click.

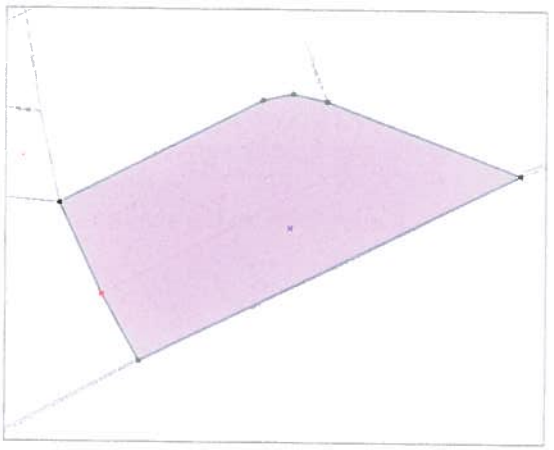
4 Click anywhere on the map to confirm the new shape.

YOUR TURN

Practice changing the shape of the new polygon by moving, adding, and deleting vertices. When finished, delete the polygon.

Digitize commercial zones

1 Click Bookmarks > LaPlace. This shows the commercial block centroids in this city block. The image shown has the polygon drawn that you are about to roughly digitize.

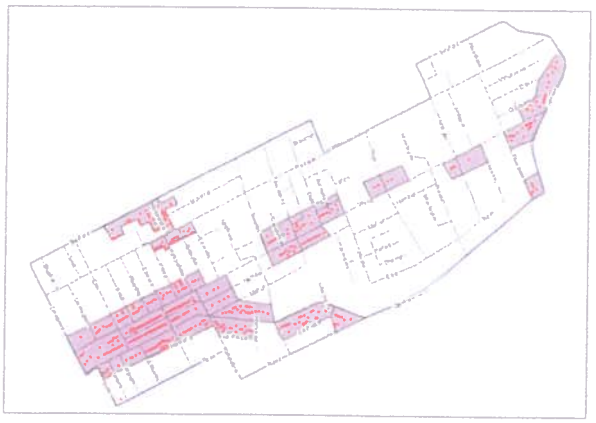


2 In the Construction tools panel, click Polygon.

3 On the Editor toolbar, click the Straight Segment tool and digitize the LaPlace street polygon by clicking one vertex at a time and double-clicking to finish. Wherever possible, use street centerlines as a guide for digitizing your polygon.

YOUR TURN

Zoom in to a part of your new polygon and use the Add, Delete, and Move Vertex tools to refine the polygon's shape. Use the Pan tool on the Tools toolbar to move around your polygon's boundary and eventually refine all of it. You need to alternate between the Edit tool, confirming a change, and the Pan tool. Click the Full Extent button and then zoom in to a cluster of commercial points to digitize another polygon. Repeat until you have digitized all polygons seen in the following image. When you complete the final polygon, click Editor and save your edits.



Edit feature attribute data

Now that you have digitized the commercial polygons, you assign zone numbers to them.

1 Open the CommercialZones attribute table.

2 Click in the first cell of the ZoneNumber field, type **1**, and press ENTER.

3 In sequential order, continue numbering the remaining cells in the ZoneNumber field.

4 Click Editor, Stop Editing, and Yes to save your edits.

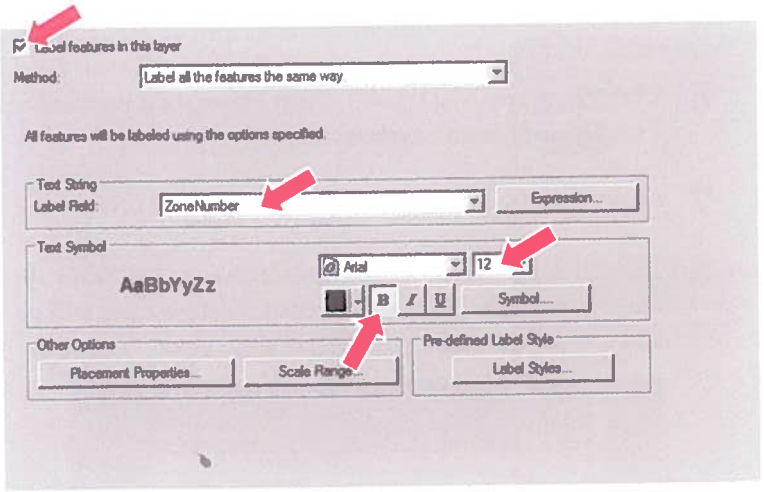
5 Close the attribute table.

Label commercial zones

1 Turn off the Commercial Properties layer.

2 In the table of contents, right-click the CommercialZones layer and click Properties.

3 Select the Labels tab and type or make selections as shown.



4 Click OK. Your label numbers may not match those in the following image, depending on your order of digitizing.

5 Save the map document.

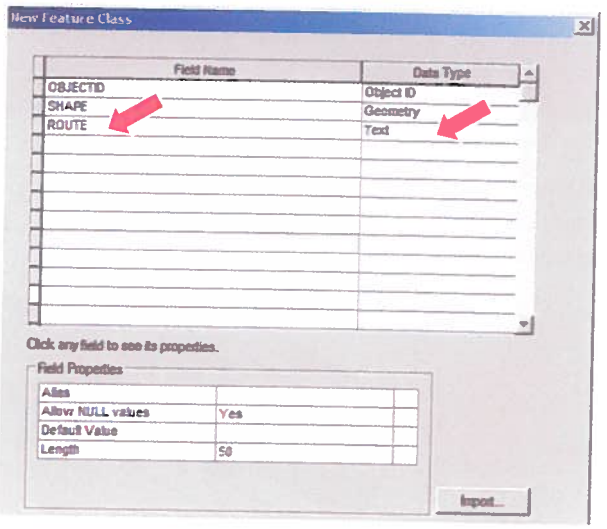
Tutorial 7-2

Digitizing line features

City planners often work with transportation experts to decide bus route and stop locations. Existing street centerlines can be used as a base layer to digitize bus route locations. In this exercise you create the bus routes that are in the Middle Hill neighborhood of Pittsburgh.

Create a line feature class for bus routes

1. Open Tutorial7-2.mxd from the Maps folder and save it to the Chapter7 folder.
2. Click Windows > Catalog.
3. In the Catalog tree, browse to Chapter7.gdb in the Chapter7 folder.
4. Right-click Chapter7.gdb, click New > Feature Class.
5. In the Name field, type **BusRoutes** and select Line Features for Type.
6. Click Next and NAD_1983_StatePlane_Pennsylvania_South_FIPS_3702_Feet as the Current coordinate system.
7. Click Next three times.
8. Type **ROUTE** as a new field, select Text as the Data Type, click Finish, and close the Catalog window. The new bus route feature class will be added to your table of contents and you are now ready to digitize the routes.



Symbolize the bus route features

1 In the table of contents, click BusRoutes's line symbol to open the Symbol Selector window.

2 Change the bus routes color to Ultra Blue, width 1.15.

Prepare area for digitizing and start editing

1 Click Bookmarks > Centre Avenue Route to zoom to area as shown in the image.

2 On the Editor toolbar, click Editor > Start Editing.

3 Click BusRoutes > OK.

4 On the Editor toolbar, click the Create Features button.

5 In the Create Features panel click BusRoutes > Line in the Construction Tools panel.

Set endpoint and vertex snapping

Here you turn on only endpoint and vertex snapping so you snap to the endpoint of the street segment only. This makes digitizing the bus routes faster.

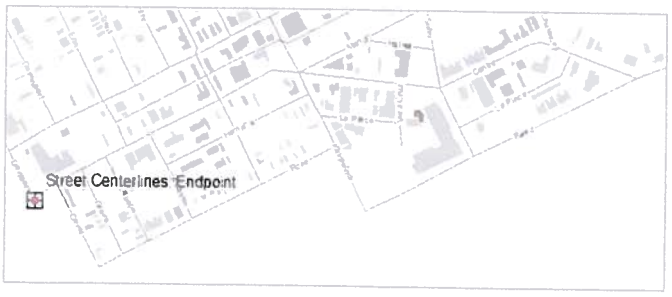
1 Click Customize > Toolbars > Snapping.

2 Deselect the point and edge buttons so only the endpoint and vertex buttons are on.

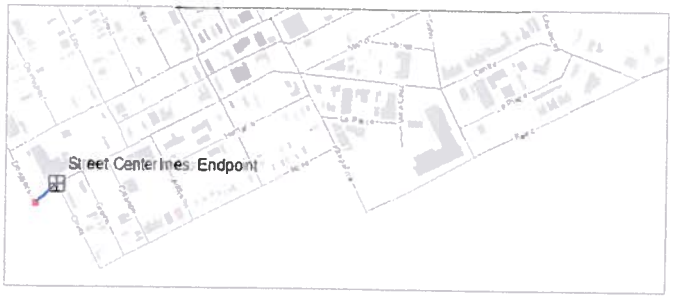
Digitize by snapping to features

1 On the Editor toolbar, click the Straight Segment tool.

2 Click the endpoint of the left-most Centre Avenue street centerline to choose the route's starting point.



3 Move the cursor to the next street endpoint (Centre and Covet) and click.



4 Continue snapping to street intersections along the bus route shown in the image and double-click to finish the route at the intersection of Centre and Reed streets.

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Enter bus route number

It is often easiest to enter the data for a feature as you digitize it. Here you enter the bus route number for the route that you just digitized.

1 In the table of contents, right-click BusRoutes and click Open Attribute Table.

2 Type **81A|81B|84A|84C** as the ROUTE.

OBJECTID *	SHAPE *	ROUTE	SHAPE_Length
2	Polyline	81A|81B|84A|84C	2889.83128

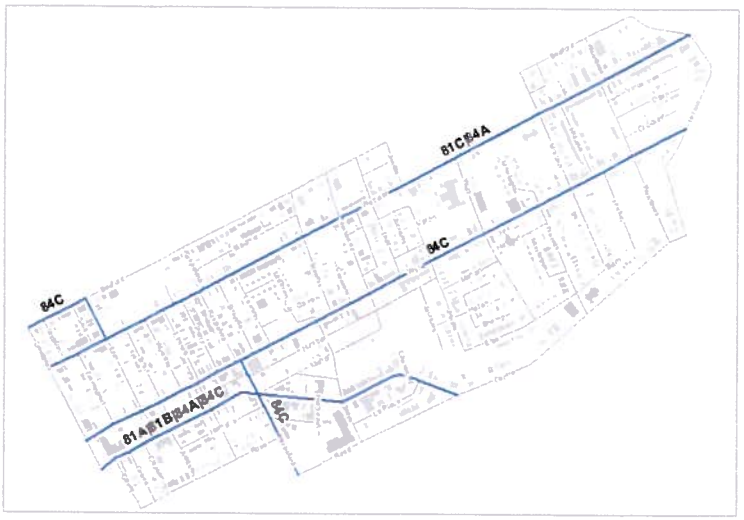
(1 out of 1 Selected)

BusRoutes

3 Close the BusRoutes attribute table.

YOUR TURN

Digitize bus routes for Bedford/Erin, Webster, Wyle, and Kirkpatrick streets. Use spatial bookmarks to zoom to the route locations. Enter the route numbers and label as shown in the figure. Be sure to digitize one line for each route. When finished, stop editing and save the edits to your bus routes. Save the map document.



Tutorial 7-3

Digitizing point features

In addition to bus routes, point features for bus stops are needed for planning purposes. In this exercise, you digitize bus stop locations as points.

Create a point feature class for bus stops

1 Save your map document as **Tutorial7-3.mxd** to the Chapter7 folder.

2 Click Windows > Catalog.

3 In the Catalog tree, browse to Chapter7.gdb.

4 Right-click Chapter7.gdb, click New > Feature Class.

5 In the Name field, type **BusStops**.

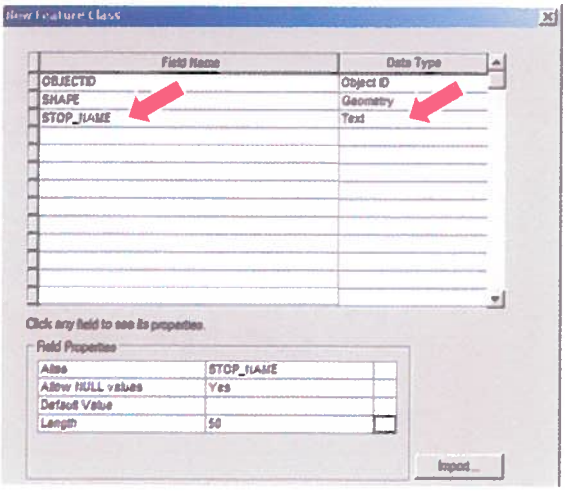
6 Select Point Features for Type and click Next.

7 Click NAD_1983_StatePlane_Pennsylvania_South_FIPS_3702_Feet and click Next three times.

8 Type **STOP_NAME** as a new field, and select Text as the Data Type.

The BusStops point features are added to your map document and you are ready to digitize them.

9 Click Finish and close the Catalog window.



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Turn snapping off

Bus routes in the Middle Hill neighborhood are offset from the street centerlines so you need to turn feature snapping off.

1 Click Customize > Toolbars > Snapping.

2 Deselect the endpoint and vertex buttons to turn all snapping options off.

Prepare the map and digitize points

1 In the table of contents, click the legend symbol for the BusStops layer. Change the symbol to Circle 2, the color to Mars Red, and the size to 8, and click OK.

2 Zoom to the Centre Avenue Route bookmark.

3 From the Editor toolbar, click Editor > Start Editing.

4 Click BusStops > OK.

5 On the Editor toolbar, click the Create Features button.

6 Click BusStops in the Create Features panel and Point in the Construction Tools panel.

7 Click to place the following approximate bus stop points along the Centre Avenue route:

8 When finished, click Editor > Stop Editing > Yes to save the BusStop points.

YOUR TURN

Digitize bus stops for Bedford/Erin, Webster, Wyle, and Kirkpatrick streets. Use spatial bookmarks to zoom to the route locations. Enter the fictitious bus stop names (for example Centre and Soho) for a few random stops. When finished, stop editing and save the edits to your bus stops. Add the CommercialZones polygons that you created in tutorial 7-1. Does it appear that the bus routes and stops serve the commercial zones? Save the map document.

Tutorial 7-4

Using advanced editing tools

There are several advanced editing tools. Here you try the Trace, Cut Polygons, Smooth, Generalize, and Rotate tools, all of which affect the shape of digitized polygons.

Create a new polygon feature class

1. Open Tutorial7-4.mxd from the Maps folder and save as **Tutorial7-4.mxd** to the Chapter7 folder.
2. Click Windows > Catalog.
3. In the Catalog tree, browse to Chapter7.gdb.
4. Right-click the Chapter7.gdb folder, click New > Feature Class.
5. In the Name field, type **CampusStudyArea** and select Polygon Features for Type.
6. Click Next and NAD_1983_StatePlane_Pennsylvania_South_FIPS_3702_Feet as the Current coordinate system.
7. Click Next three times, click Finish, and close Catalog. The new CampusStudyArea feature class is added to your table of contents and you are now ready to digitize a polygon around Carnegie Mellon University's main campus.

Trace tool

Tracing is a quick way to create new segments that follow the shapes of other features. Tracing is particularly useful when the features you want to follow have curves or complicated shapes, because snapping is more difficult in those cases.

1. On the Editor toolbar, click Start Editing > CampusStudyArea > OK.
2. Click the Create Features button.
3. Click CampusStudyArea from the Create Features panel and Polygon from the Construction panel.
4. Close the Create Features panel.

5 On the Editor toolbar, click the Trace button .

6 Click the intersection of Boundary and Forbes and drag your mouse to the right, move the cursor to the Intersection of Forbes and Morewood, follow Morewood, then Forbes again, Margaret Morrison, Tech, Frew, Schenley, and then back to Boundary.

7 When you are close to the beginning intersection of Boundary and Forbes, double-click to finish. You can click the Undo button to start over as needed. The finished polygon nicely follows straight and curved segments. Your final polygon should like the image on the right:

Cut Polygons tool

Campus planners might want the Morewood boundary to be a separate polygon. The Cut Polygons tool creates two polygons from one original polygon.

1 On the Editor Toolbar, click the Cut Polygons tool .

2 Click the left intersection of Forbes and Morewood streets, and then double-click the right intersection of Forbes and Morewood streets as shown in the image below. The result is two new polygons.

3 On the Editor toolbar click Editor > Save Edits.

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Smooth tool

The Smooth tool smooths sharp angles in polygon outlines to improve aesthetic quality.

1 Click Bookmarks > Schenley Park.

2 On the Editor toolbar, click the Create Features button > CampusStudyArea > Polygon, and click the Straight Segment button.

3 Digitize a new polygon with 20 to 25 vertices as shown in the image.

4 On the Editor toolbar, click the Edit button and click inside the polygon.

5 On the Editor toolbar, click Editor > More Editing Tools > Advanced Editing. This adds a new Advanced Editing toolbar.

6 On the Advanced Editing toolbar, click the Smooth tool , type a maximum allowable offset of **10**, and click OK. This adds many shape vertices to create smooth curves between the polygon's vertices.

7 Click the Edit tool, double-click inside the polygon, and move vertex points to better match the park outline. **Add or delete vertex points as needed.**

8 Click outside the polygon to confirm the new shape.

Generalize tool

Generalizing creates features for use at small scales with less detail while preserving basic shapes.

1 On the Editor toolbar, click the Edit tool, and double-click inside the new traced polygon.

2 On the Advanced Editing toolbar, click the Generalize tool, type a Maximum allowable offset of **50**, and click OK. The result is a polygon with fewer vertices, no two of which have a line segment between them of less than 50 feet.

You can click the Undo button to try a different offset.

3 Click the Edit tool, double-click inside the polygon, and press DELETE.

4 On the Editor toolbar, click Editor > Stop Editing and save your edits.

Specify a segment angle and length

You have learned how to use a basemap or an aerial image as a guide to digitize new features. You can also digitize features by specifying an exact length and angle. In this exercise, you create a performance stage in the middle of Schenley Park that is exactly 80 by 40 feet.

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1 On the Editor toolbar, click Editor > Start Editing > CampusStudy Area > OK.

2 Click CampusStudyArea in the Create Features panel and Rectangle in the Construction Tools panel.

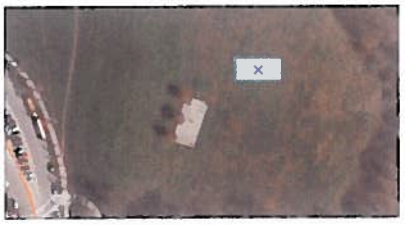
3 Click anywhere in the middle of Schenley Park.

4 Move your cursor to start drawing a polygon, right-click, and click Direction.

5 Type **0** and press ENTER.

6 Right-click, click Length, type **80**, and press ENTER.

7 Right-click, click Width, type **40**, and press ENTER.
Your rectangle is 80 feet long and 40 feet wide and its direction is to the right (ArcMap measure angles counterclockwise with zero being east or to the right).



Rotate and move a feature

The stage you created is almost finished. Next you rotate and move it to the actual location in the middle of the park.

1 Click the Edit tool and click the performance stage rectangle polygon.

2 On the Editor toolbar, click the Rotate tool .

3 Click on the outline of the rectangle and drag to rotate it to match the location of the performance stage on the aerial map.

4 Click the Edit tool and move the stage on top of the stage in the aerial map.

5 Click Editor, Stop Editing, and Yes to save your edits.

6 Save your map document.

Tutorial 7-5

Spatially adjusting features

The ArcMap spatial adjustment tools transform, rubber sheet, and edge match features in a shapefile or geodatabase feature class. In this exercise, you transform an outline of a building so that it correctly overlays the building in the aerial image.

Prepare the map

1 Open Tutorial7-5.mxd from the Maps folder and save as **Tutorial7-5.mxd** to the Chapter7 folder.

2 Click the Zoom to Extent button to see both the aerial map and the building. The Hamburg Hall layer, originally a CAD drawing exported as a shapefile, is not in proper alignment or scale with the buildings shown on the aerial image. Next, you adjust the building layer so that it properly aligns with the aerial image.

3 In the table of contents, right-click Hamburg Hall > Data > Export Data and save this as a new feature class called **HamburgHall** in Chapter7.gdb.

4 Add the new polygon feature to the map document and remove the original Hamburg Hall layer.

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Move the building

1 On the Editor toolbar, click Editor, Start Editing.

Make sure the Create Features layer is Hamburg Hall.

2 Click the Edit tool, click inside the Hamburg Hall feature, and drag it to the following location on the image:

3 Zoom in to better see the Hamburg Hall feature. The building is too large and is upside down.

YOUR TURN

Rotate the Hamburg Hall feature 180 degrees.

Add displacement links

To align the feature with the aerial image, you use a transformation tool.

1 On the Editor toolbar, click Editor > More Editing Tools > Spatial Adjustment. This opens the Spatial Adjustment toolbar.

2 On the Spatial Adjustment toolbar, click Spatial Adjustment > Adjustment Methods > Transformation - Similarity.

3 Click the New Displacement Link tool .

4 Click the upper left corner of the Hamburg Hall building feature.

5 Click the corresponding location on the aerial image.

6 Continue adding displacement links to the building feature and the aerial image, as shown in the following:

Edit displacement links

If you select the wrong position on the building or map, you can use the edit displacement tools to adjust your picks.

1 From the Spatial Adjustments toolbar, click the Select Elements button.

2 Click one of the displacement links.

3 Click the Modify Link tool .

4 Drag the link to a new position.

5 Drag the link back to its original location.

YOUR TURN

Zoom to Hamburg Hall in the aerial image and use the Modify Links tool to more precisely move the displacement links to the corners of the building as shown in the graphic on the next page.

Adjust the building

1 From the Spatial Adjustment toolbar, click Spatial Adjustment > Adjust.

2 Stop editing and save your edits. ArcMap scales down the Hamburg Hall feature to match the geometry of the feature in the aerial image. If the resulting match is not as good as you would like, select the Hamburg Hall feature, redefine new displacement links, and run the Adjust command again.

3 Save your map document and exit ArcMap.

Assignment 7-1

Digitize police beats

Community-oriented police officers are responsible for preventing crime and solving underlying community problems related to crime. Among other activities, these officers walk "beats," which are small networks of streets in specified areas. Often the beats are designed in cooperation with community leaders who help set policing priorities. Beats change as problems are solved and priorities change. Hence, it is good to have the capability to digitize and modify police beats.

In this assignment, you digitize two new polyline police beats for the City of Pittsburgh Zone 2 Police District based on street centerlines that make up these beats.

Get set up

- Rename the folder \EsriPress\GIST1\MyAssignments\Chapter7\Assignment7-1YourName\ to your name or student ID. Store all files that you produce for this assignment in this folder.
- Create a new map document called **Assignment7-1YourName.mxd** with relative paths.
- Create a new file geodatabase called **Assignment7-1YourName.gdb**.

Build the map

Import or copy the following data into your file geodatabase:

- \EsriPress\GIST1\Data\Pittsburgh\Zone2.gdb\Streets—line features for Zone 2 Police District streets.
- \EsriPress\GIST1\Data\Pittsburgh\Zone2.gdb\Outline—polygon feature for an outline boundary of the Zone 2 Police District.

Create and digitize new features

In your file geodatabase create a new polyline feature class called **PoliceBeats** and assign it the same coordinate system as the Zone2 features, NAD_1983_StatePlane_Pennsylvania_South_FIPS_3702_Feet. Create a new text field called **BeatNumber**. Digitize line segments for the police beats using the guidelines that follow for what streets make up the beats. Populate the fields as Beat1 and Beat2 for each line segment making up that beat.

Hints: Open the feature attribute table for the streets. Move the table so you can see both the table and the streets on the map. Sort the table by field, NAME, and make multiple selections for a given beat in the table by simultaneously holding down the CTRL key and clicking rows corresponding to the beat's street segments. The streets layer is a TIGER file map with TIGER-style address number data, so look for street number ranges in the following fields: L_F_ADD, L_T_ADD, R_F_ADD, and R_T_ADD. With all streets for a beat selected, digitize lines for streets making up beats in the new line features for Beat1 and Beat2. Use the snapping endpoint and vertex tools using street centerlines as a guide.

Street centerline guides for Beat #1 (21 streets)

1 through 199—17th St (four segments)
1 through 99—18th St (two segments)
1 through 199—19th St (one segment)
1 through 199—20th St (four segments)
1 through 99—Colville St (one segment)
1700 through 1999—Liberty Ave (one segment)
1700 through 1999—Penn Ave (three segments)
1700 through 1999—Smallman St (four segments)
1700 through 1999—Spring Way (one segment)
Street centerline guides for Beat #2 (20 streets)
100 through 299—7th St (two segments)
1 through 299—8th St (three segments)
100 through 299—9th St (four segments)
800 through 899—Exchange Way (one segment)
700 through 899—Ft Duquesne Blvd (three segments)
700 through 899—Liberty Ave (three segments)
100 through 199—Maddock Pl (one segment)
700 through 899—Penn Ave (three segments)

Requirements

- Create a layout with three data frames, renaming the data frames and layers. Using Unique Values, show the beats with line widths 1.5 and bright, distinctive colors (Mars Red and Ultra Blue); and show streets as lighter "ground" features.
- In data frame 1, show an overview map zoomed to the Police Zone 2 outline, with existing streets and the newly digitized beats labeled as Beat1 and Beat2 using a callout label from the Draw toolbar.
- In data frames 2 and 3, include maps zoomed to Beat 1 (dataframe 2) and Beat2 (dataframe 3) at the same scale. Label the streets in the detailed maps.
- Include scale bars in miles for the overview map and in feet for the individual beats' maps. Include your name as the author and the current date.
- Click File > Export Map and save your map layout as **Assignment7-1YourName.jpg** with 150 dpi resolution.

Assignment 7-2

Use GIS to track campus information

GIS is a good tool to create campus information or emergency preparedness maps. These maps can be used in many organizations that have large campuses or complicated buildings. For example, airports, hospitals, office parks, or colleges and universities can be confusing, especially to new students and visitors. Visitors might also be unaware of locations of features that would be useful for emergency purposes.

In this assignment, you create spatially modified and new features for sidewalks, parking lots, handicap parking, and emergency management service locations. These features are shown in the image for this assignment, and you can visit Carnegie Mellon University's visitor map for additional parking and emergency service information: http://www.cmu.edu/about/visit/campus-map.shtml.

Get set up

- Rename the folder \EsriPress\GIST1\MyAssignments\Chapter7\Assignment7-2YourName\ to your name or student ID. Store all files that you produce for this assignment in this folder.
- Create a new map document called **Assignment7-2YourName.mxd** with relative paths.
- Create a new file geodatabase called **Assignment7-2YourName.gdb**.

Build the map

Import or copy the following data and raster image into your file geodatabase:

- \EsriPress\GIST1\Data\Pittsburgh\City.gdb\PghStreets—street centerline features for Pittsburgh.
- \EsriPress\GIST1\Data\CMUCampus\Walkways.dwg—CAD drawing of campus sidewalks (originally extracted from CMU's Facilities Management Services campus drawing). Use the line features of this drawing file.
- \EsriPress\GIST1\Data\CMUCampus\CMUCampus.tif—USGS ortho image of Carnegie Mellon University's campus.

Create new features

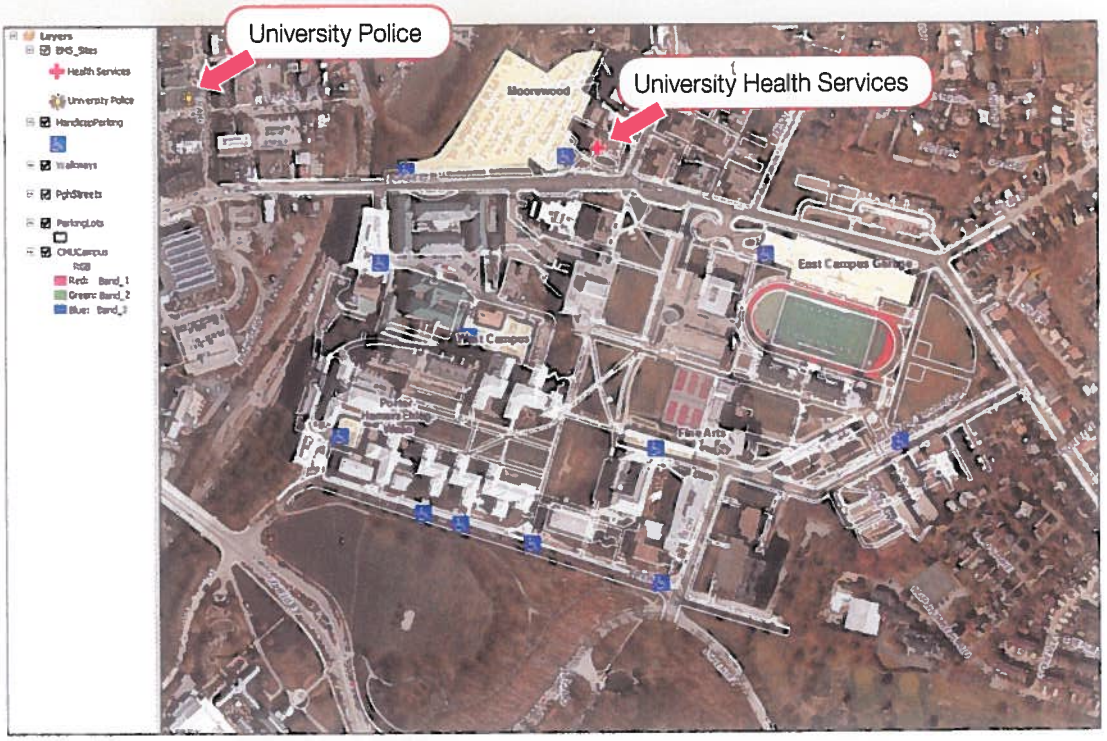
In your file geodatabase, create the following feature classes using the same map projection as PghStreets features, NAD_1983_StatePlane_Pennsylvania_South_FIPS_3702_Feet:

- **ParkingLots** (polygons) with a new text field called **LOT_NAME**
- **HandicapParking** (points)
- **EMS_Sites** (points) with a new text field called **NAME**

7-1
7-2
7-3
7-4
7-5
A7-1
A7-2

Requirements

- Use the Move and Rotate Vertex tools to display the CMU sidewalks to the approximate locations shown as white lines in the next figure's aerial image.
- Digitize the five parking lots shown in the image and enter the corresponding parking lot names. Label the lot name on your map. Display the parking lots as semitransparent polygons so you can see the parked cars in the aerial image.
- Digitize eleven handicap parking locations as shown in the image using the Esri "Handicapped2" symbol.
- Digitize EMS locations for Health Services and University Police as shown and enter corresponding names in the attribute table. Display the points as unique symbols using the Esri "Cross 4" and "Asterisk 2" symbols.
- Display PghStreets with no color but labeled using a small halo mask.



- Create a map layout zoomed to the above features at a scale of 1:4,000. Include a title, legend, map scale using feet, your name, and the current date.
- Click File > Export Map and save your map layout as **Assignment7-2YourName.jpg** with 150 dpi resolution.