Building geodatabase 4.

Geodatabase building steps

Ferenc Végső

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Abstract

In this chapter, we are creating a geodatabase. Examining geodatabase building steps first, creating personal geodatabase, defining layers, making georeferencing, creating new features and editing existing features and finally adding attribute data.

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Chapter 4. Geodatabase building steps

1. 4.1 Introduction

After reading the previous chapters, you can start to create the geodatabase, step by step. The making of the geodatabase will be presented through the creation of an example. We define personal geodatabase (or file database), establishing layer(s) with attributes, we will activate georeference menu, digitizing features and filling attribute table. The next examples we'll show you by ESRI ArcGis ver. 9.3 software. The Quantum GIS[1] (which is a free GIS software) is also suitable to creating geodatabase.

2. 4.2 Creating personal geodatabase

After design of our model and geodatabase, the next step is, define personal geodatabase or file geodatabase.

Before you create a new geodatabase, you first need to decide which kind of geodatabase you want to create. There are three kinds of geodatabase from which to choose:

- A **file geodatabase** stores datasets in a folder of files on your computer. Each dataset is held as a file and can be up to 1 TB in size (and you can optionally configure a file geodatabase to store much larger datasets). File geodatabase can be used across platforms and can be compressed and encrypted for read-only, secure use.

NOTE: If you do not know what kind of geodatabase you want to create, this is a good default choice.

- A **personal geodatabase** stores its datasets in a Microsoft Access .mdb file on disk. The storage sizes of personal geodatabases are effectively limited to between 250 and 500 MB for the entire geodatabase and are only supported on Windows. Users often need larger storage for their datasets, so they choose file or ArcSDE geodatabases.
- An **ArcSDE geodatabase** stores datasets in a number of optional DBMSs including
  - Oracle
  - Oracle with Locator or Spatial
  - SQL Server
  - DB2
  - Informix
  - PostgreSQL

Figure: creating and renaming new personal geodatabase

3. 4.3 Define layer(s)

The next step is defining layer(s) along with its type, projection, and attribute fields in ArcCatalog module.

Figure: defining new layer (name, type, projection, attribute fields

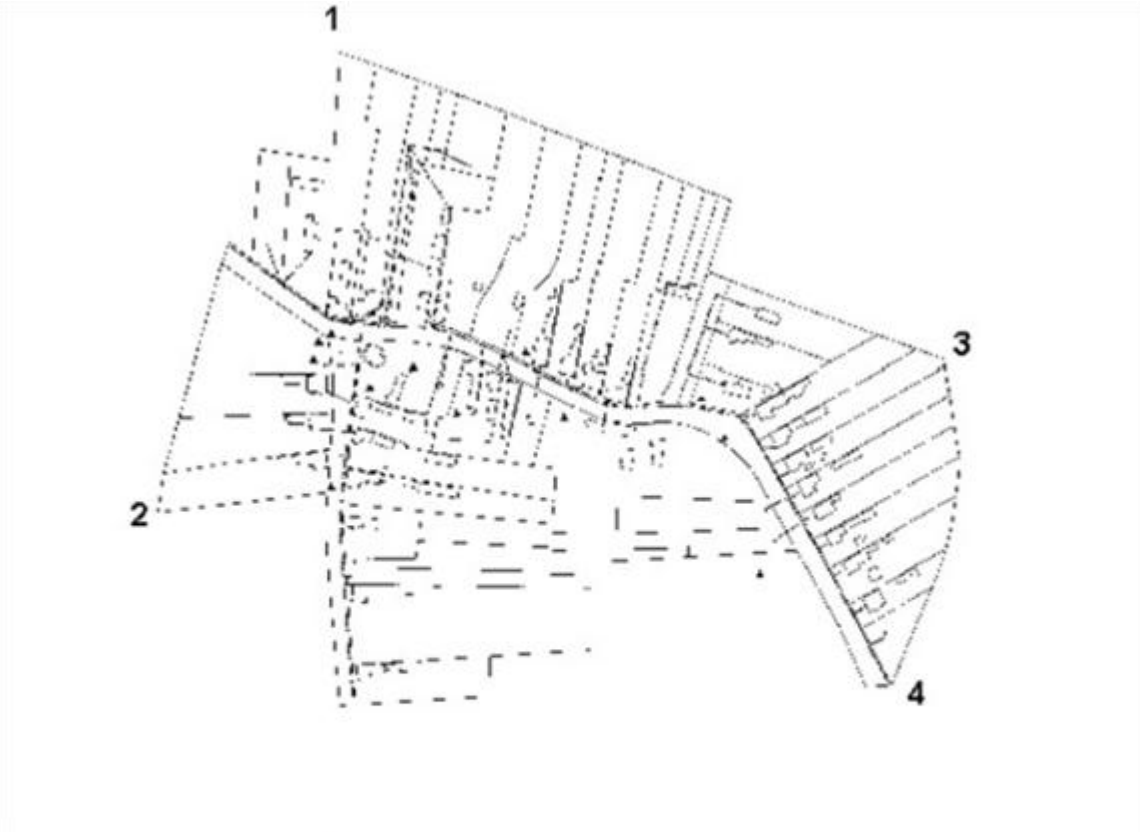
4. 4.4 Georeferencing

After defining your layer(s), you can start ArcMap project and add new, empty layers to your project.

[1] http://www.qgis.org/

Figure: start ArcMap project

If you want to create new features, you must georeferencing your raster map. For georeferencing you need known (reference) points on your map.



Point	Y cord	X cord
1	600138.80	199960.40
2	600050.60	199737.80
3	600431.30	199811.00
4	600406.30	199653.20

When the georeferencing menu activated, you must digitize reference points and give it its known coordinates (reversed order in Hungarian EOV).

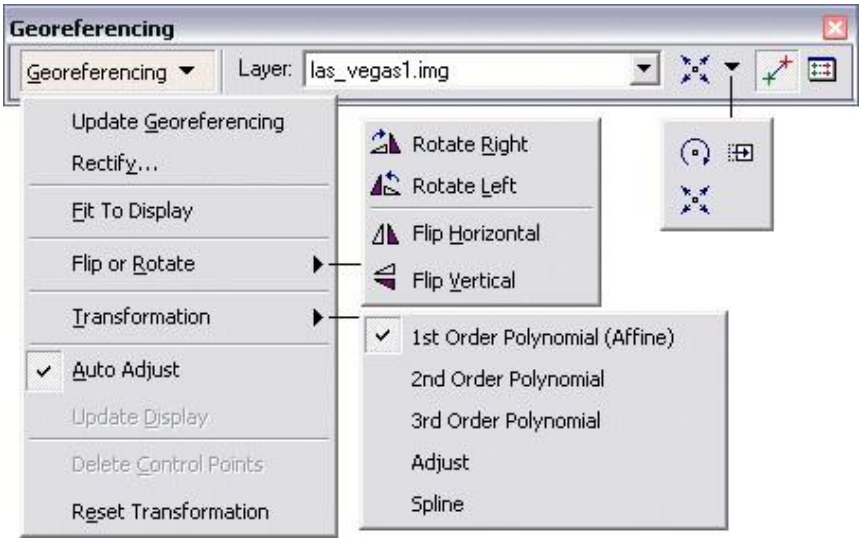


Figure 1. Georeferencing toolbar

Figure: digitizing control points

If it's down for all reference points, click on Link Table.

In the link table, you can evaluate RMS error. If the RMS error is acceptable, you can start to rectify your map.

Figure: example of link table

Figure: map rectifying menu

When rectifying is ready, remove the raster map from layers and add new, rectified map to your project.

5. 4.5 Creating features

You've got now georeferenced map, so can start with creating (editing) new features. First, you should add () your empty layer(s) to your project, defined in ArcCatalog.

The next step is activating Edit menu.

Before you start to create new features by digitizing, need to set up Task, Target and Snapping. You can Start or Stop editing process at any time.

The Task means, the editing action what you want (create new feature, modify feature etc.). The Target means, to choose which layer want you editing.

The snapping environment can help establish exact locations in relation to other features. The snapping environment can also be used to move a feature to a precise location in relation to another feature. Setting the snapping environment involves setting a snapping tolerance, snapping properties, and a snapping priority.

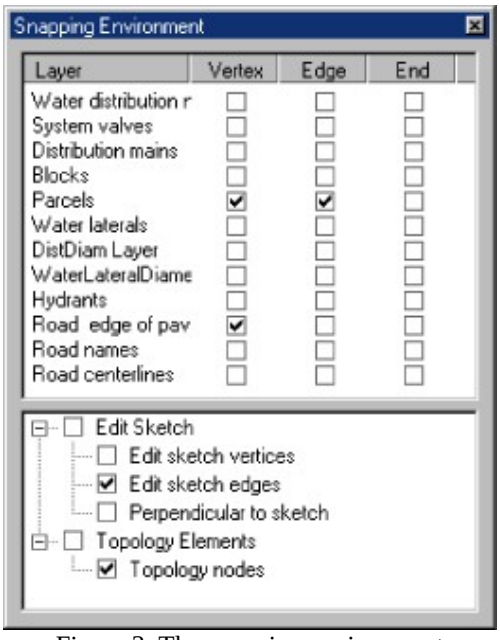
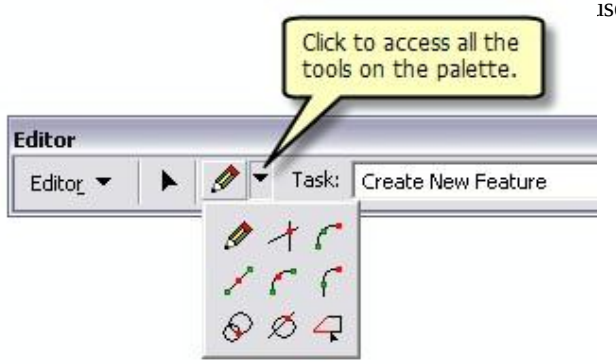


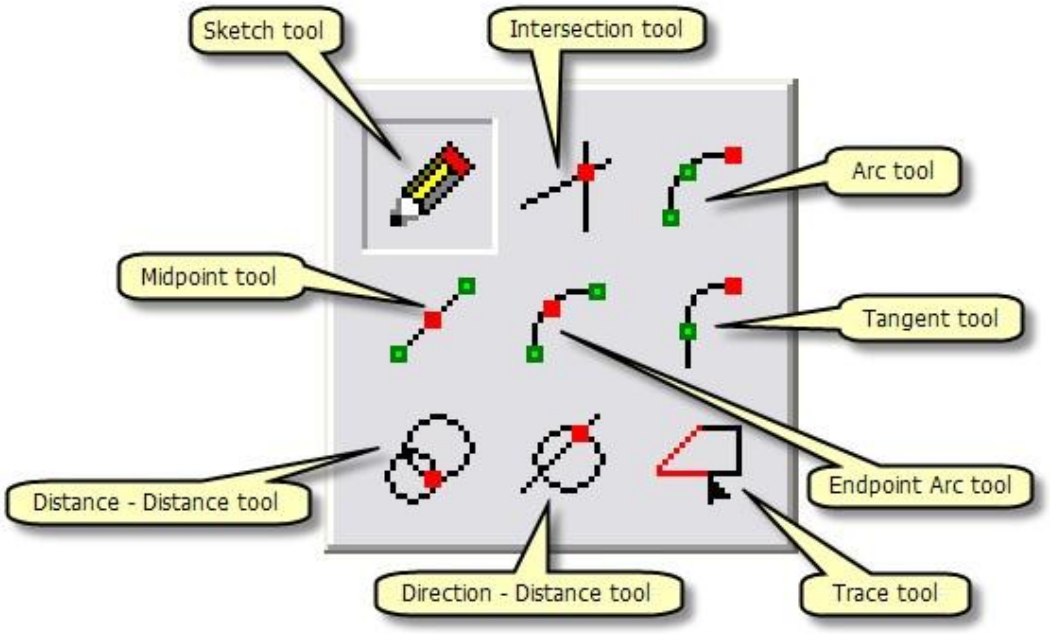
Figure 3. The snapping environment

The snapping tolerance is the distance within which the pointer or a feature is snapped to another location. If the element being snapped to—such as a vertex or edge—is within the distance you set, the pointer automatically snaps to the location. 

ıse the tools on the Editor toolbar tool palette.

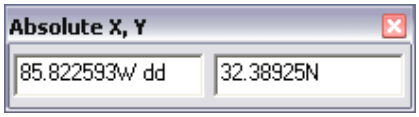


possibilities:



5.1. 4.5.1 Creating point features

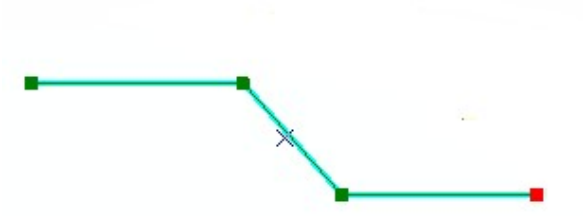
You can create points several ways:

- on- screen digitizing 
- at exact coordinates 

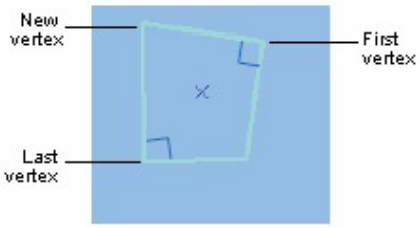
- relative to location (ΔY,ΔX)
- by intersection two lines 
- midpoint of line 
- intersection by two circles 
- intersection of line and circle 

5.1.1. 4.5.1.1 Creating lines and polygons

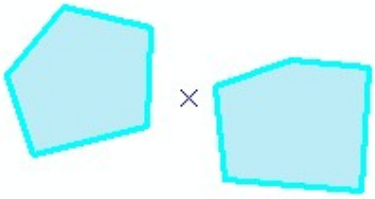
- on – screen or head up digitizing 



- creating curve by three points 
- creating tangent curve to a line 
- tracing the line with another 



- creating perpendicular feature (useful for building)
- hands free drawing



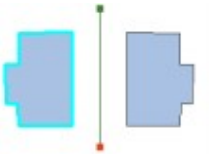
- digitizing scattered (multipart, but logically cohesive) polygons

5.1.2. 4.5.1.2 Creating derived features

The derived features based on existing individuals.

The main possibilities are:

-  round point, line or polygon. The buffer will be stored as new feature in the same layer



- mirroring around given line. The line will be disappearing after mirror operation
- new feature by combining existing features

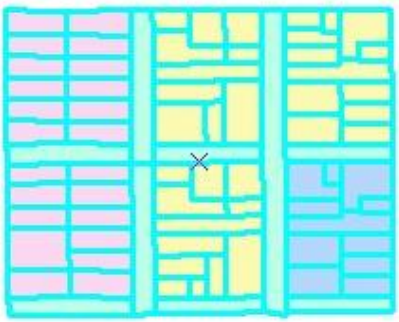


Figure 4. Existing polygons

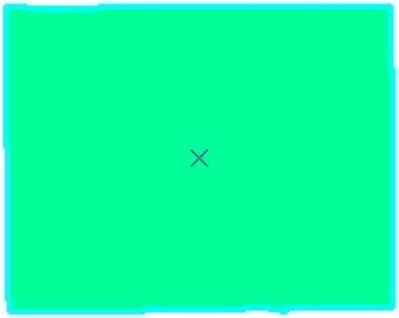


Figure 5. The new polygon

- creating new polygon by intersecting existing polygons

Figure 6. Before intersect

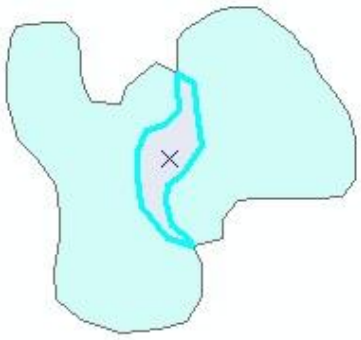
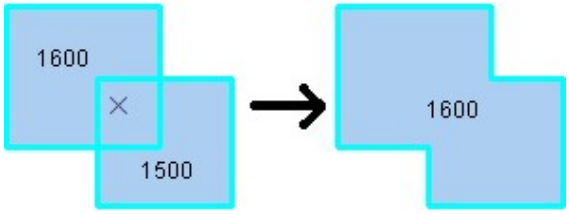


Figure 7. After intersect

- merging polygons (you should decide about inheritance of attribute data)



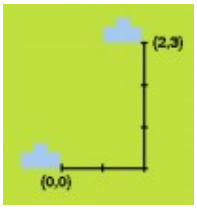
- paralleling features

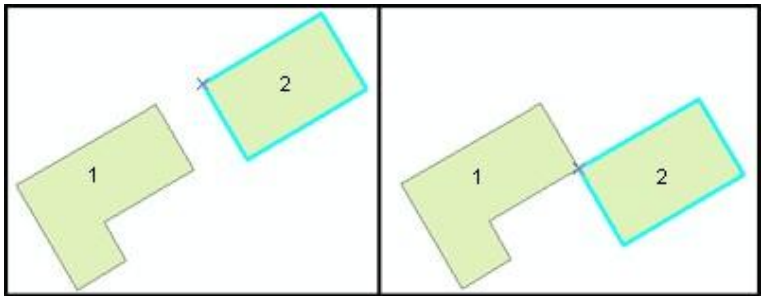
- rounding features by several ways 

It is a good idea to frequently saving your work during editing. When you feel you are finished, then Stop editing. You can repeat this editing process on remain layers.

5.1.3. 4.5.1.3 Editing existing features

It is necessary to change position and size of features, as the time is changing.

- moving
  - moving to a given position 

  - moving exact to another feature 

- rotating

Figure 8. Before rotating

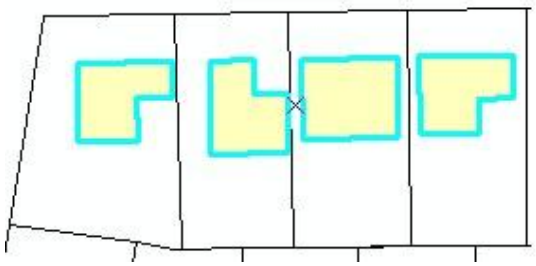


Figure 9. After rotating

- copying and pasting feature or selected group of features

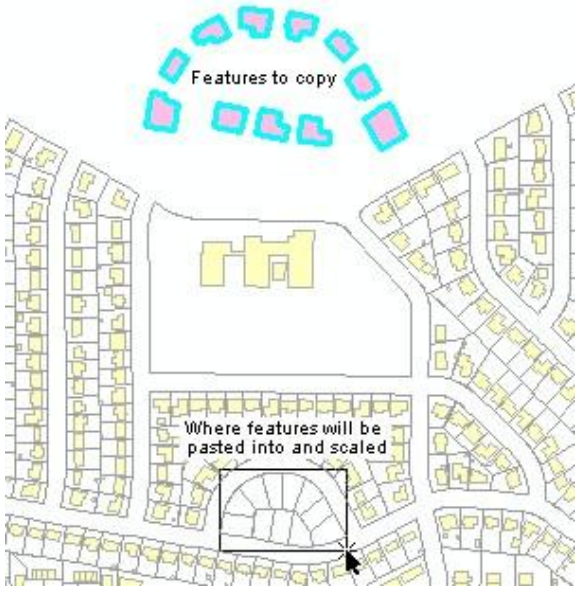
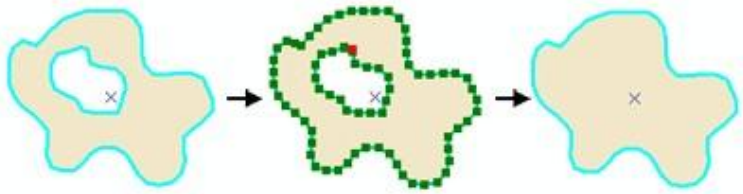


Figure 10. Copy

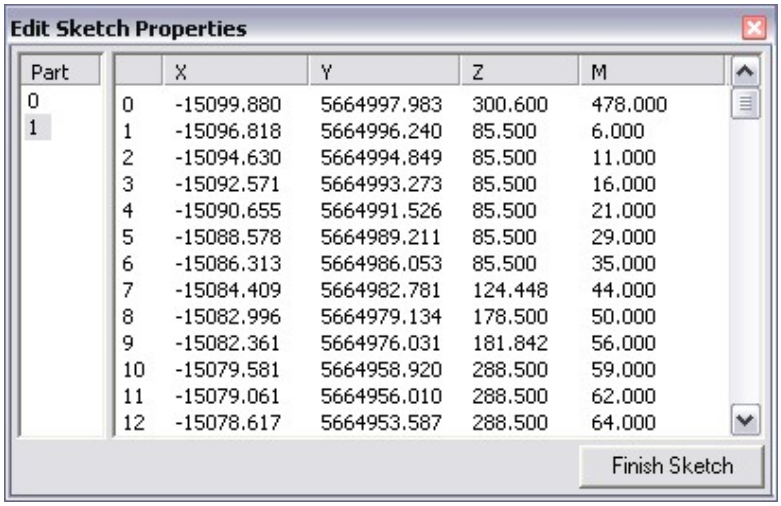
Figure 11. Paste (and scale)

- deleting

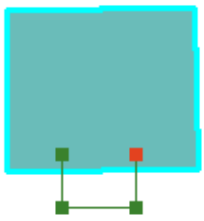


- adding line segment(s)

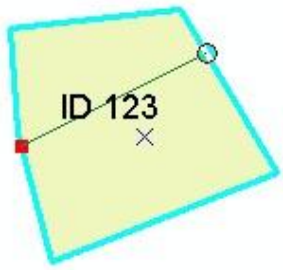
- moving line segment(s)
- editing line segment coordinates manually

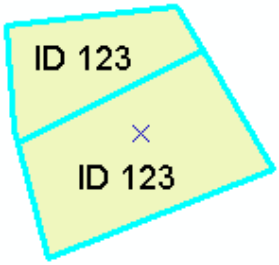


- modifying polygon shape

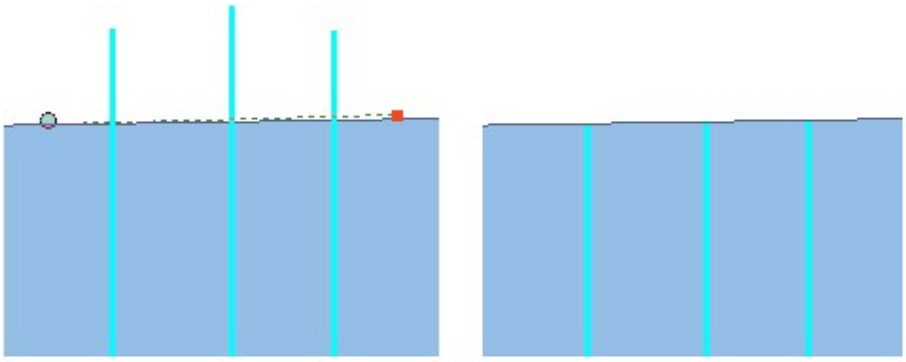


- dividing polygon(s)

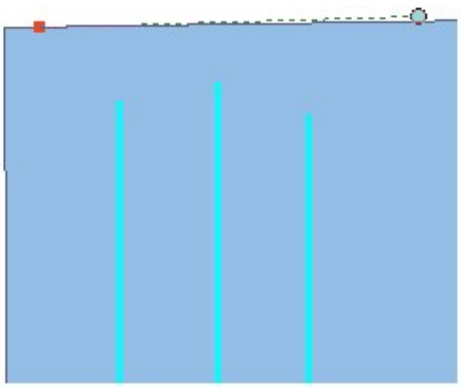


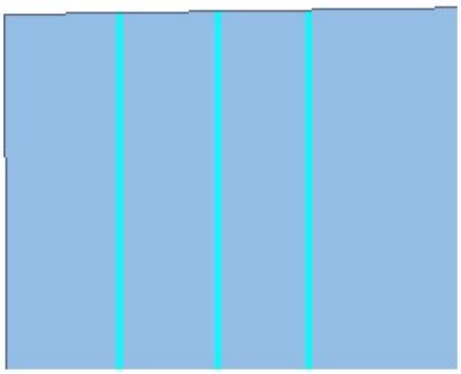


- dividing line 

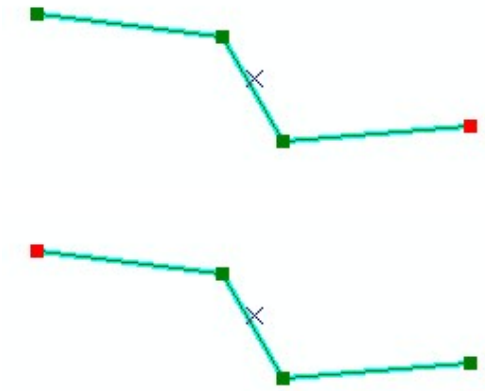
- cutting lines 

- extending lines

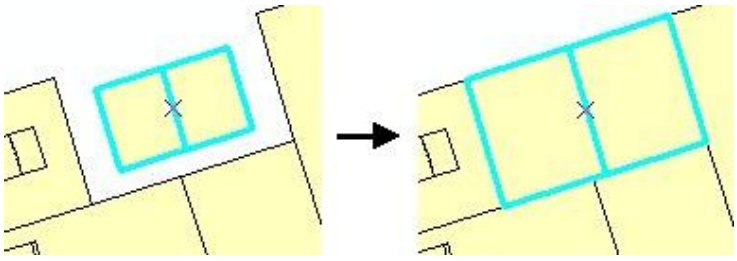


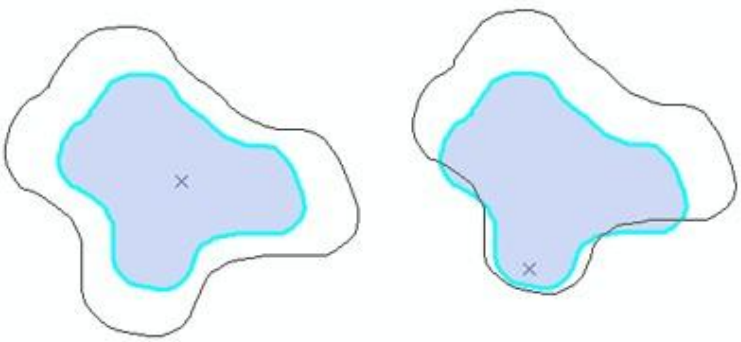


- changing the direction of line



- rescale features (rescaling with fixed point – the x on the figure)





- clip

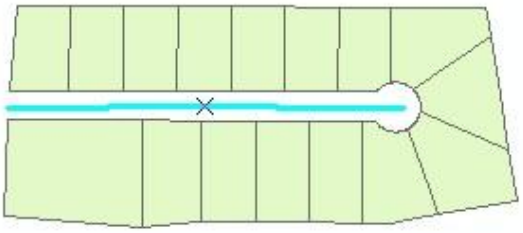


Figure 12. The original scene

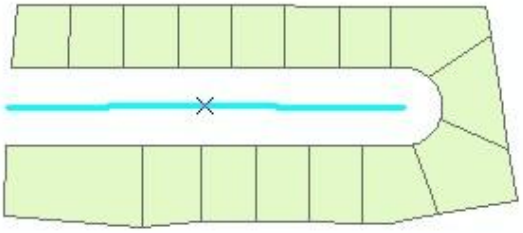


Figure 13. The cutting edge (created by buffer)

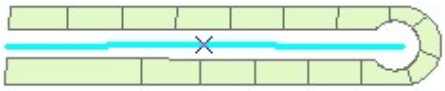


Figure 14. Result of clipping

- stretching of feature

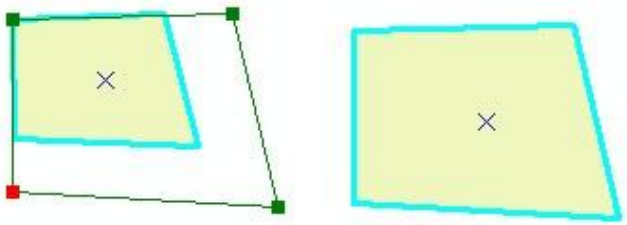


Figure 15. Proportional stretching

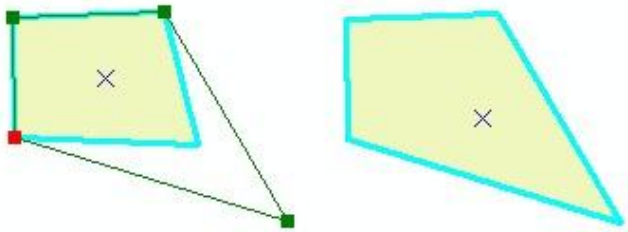


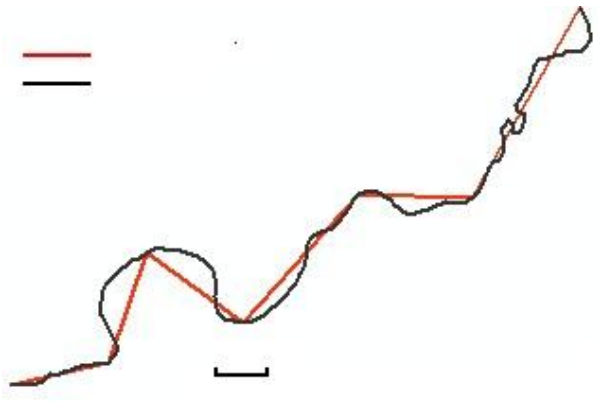
Figure 16. Non-proportional stretching

- generalizing 

Tolerance

generalized line

Original line



- line smoothing 

smoothed line

original line

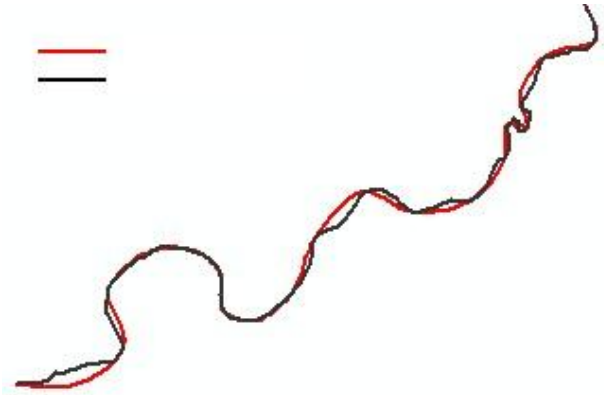


Figure: examples of digitizing

5.2. 4.5.2 Adding attribute data

You can add attribute data immediately during edit session by activating attributes button  and selecting feature:

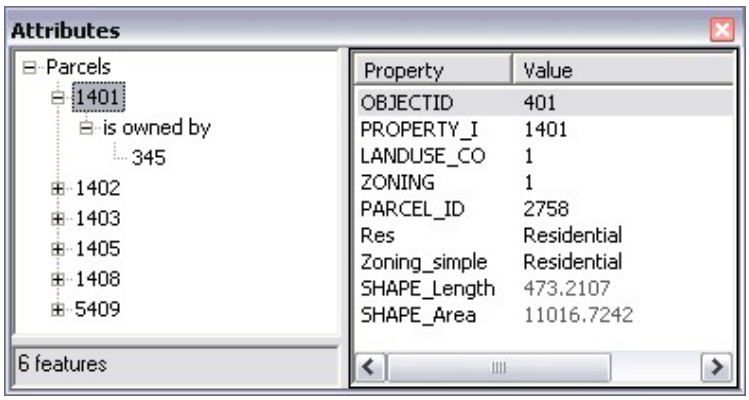
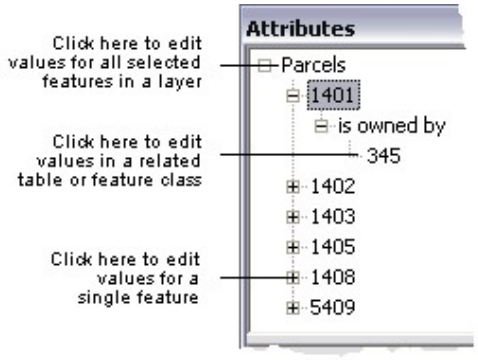


Figure 17. Adding attribute on the fly



After finished digitizing session, you can add attributes by opening Attribute Table and select Start Editing command:

Figure 18. Editing attributes in Table view

Copying and pasting is an easy way to edit the attributes of features on your map. You can copy and paste individual or all attribute values from feature to feature or to an entire layer. For example, suppose you have a polygon representing a forest and you want to apply its attribute values to other forest polygons without typing them in manually. Simply open the Attributes dialog box and copy the forest's attributes. You can paste the values into either an individual cell or paste them all into a feature or into all the selected features in that layer.

Literature

ArcGIS: *Desktop Help 9.3,*