CEEN 114 Geomatics

Winter 2018

Lab 5 – Creating and Editing Spatial Data in ArcMap

Introduction

In the previous lab, you learned to navigate around ArcMap, add three different types of spatial data, and use a few of ArcMap's tools. The XY data and the shape files both showed vector data and the elevation data set was shown with a raster data set. You used a few of the tools built in to ArcMap. By the end of this lab, you should be able to explain or do all of the following:

- Making a folder connection
- Adding data from many source
- Adding Basemaps
- Zoom to Layer
- Zoom to Selection
- Full extent zoom
- Zoom in and out
- Create a vector shapefile representing real world features
- Create attribute information
- Perform a select by attribute and by location query
- Know the different types of data structures

Additional Data formats – The Geodatabase

Suppose you take family pictures when you're home to visit over summer break between semesters. You take 100 pictures. Each of those pictures captured different moments; perhaps with different clothes, backgrounds, poses, etc. When you're finished. You decide you want to share those pictures with your grandparents. You transfer all of those picture files onto a computer then organize them all in a single folder called "family pictures." You then email that file folder of pictures to your grandparents and tell them "all of the pictures are in this folder."

A geodatabase is a sort of file folder for spatial data. When you collect spatial data and need to store it or share it, you put them in a geodatabase. Just like with the pictures, all the spatial information is inside the geodatabase. The file folder that contains pictures is not, itself, a picture. The geodatabase is not, itself, spatial information. Inside the geodatabase you can find all kinds of spatial data, vector and raster, in addition to metadata files that help direct the use of the data (we will discuss metadata later in the course).

Review of ArcMap Skills

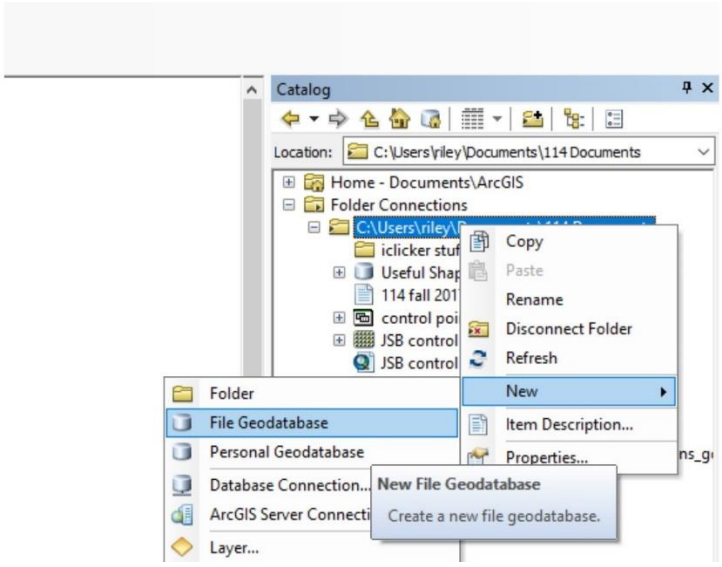
Follow this link. When you get to the google drive page, right click on then download the entry that ends with gdb (geodatabase). Remember to store this somewhere you have made a folder connection to in ArcMap or else create a new folder connection to the data. You will need to unzip the data before you can use it. Sometimes the subfolders are also zipped and you will need to unzip those as well.

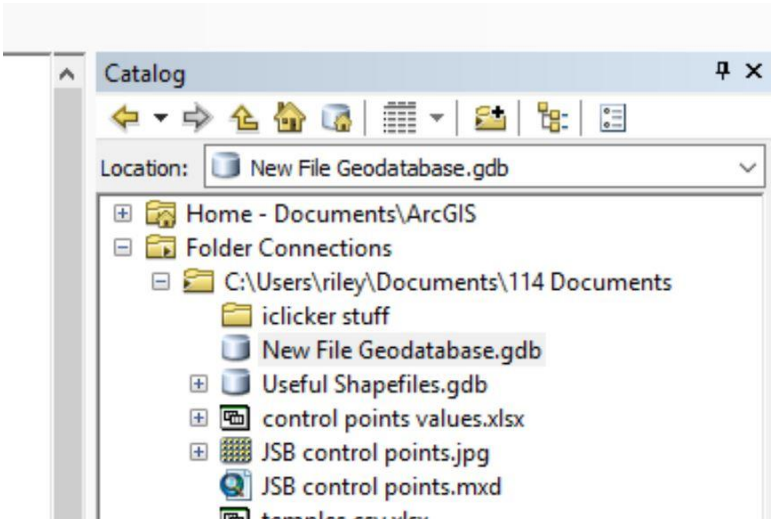
https://drive.google.com/drive/folders/0BySt JjVZ7c7mdTRGQ2JUS3BWWE0

Like with a typical file folder in ArcCatalog, you can open the geodatabase and view the subfolders and files contained inside. Explore the layout of this dataset. Use the skills learned in last lab to measure distances.

Creating Spatial Data

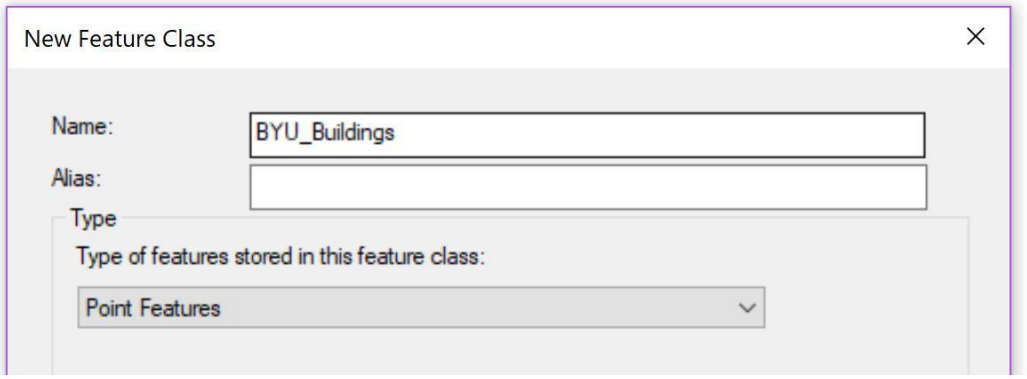
You can use ArcCatalog to create geodatabases and shapefiles and use ArcMap's tools to fill them data. In ArcCatalog, on the right hand side of the screen, right click on the folder you are storing your data for the lab in (IE that you have a folder connection to). Choose new then new file geodatabase. A new entry in the folder will appear called 'new file geodatabase.gdb'. You can rename the geodatabse anything you would like.

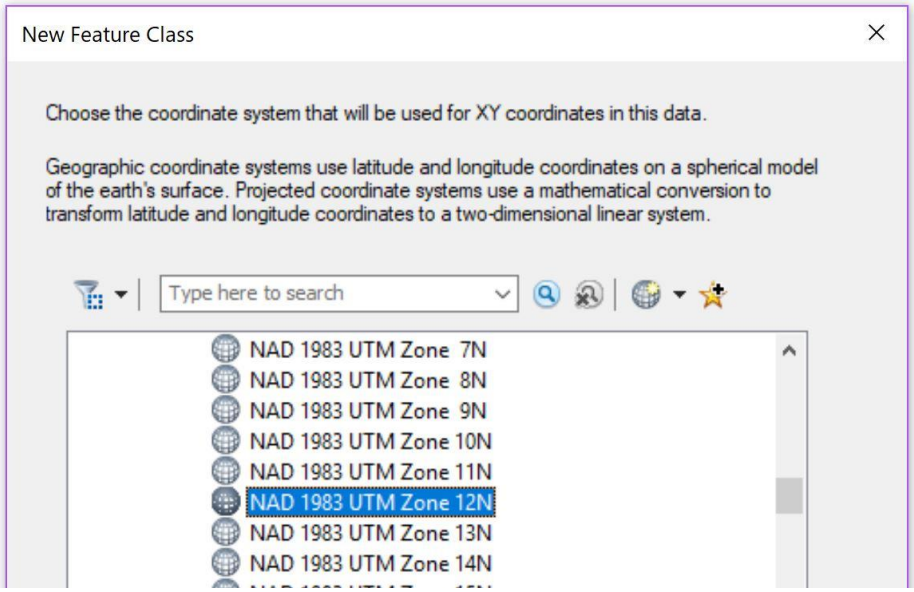


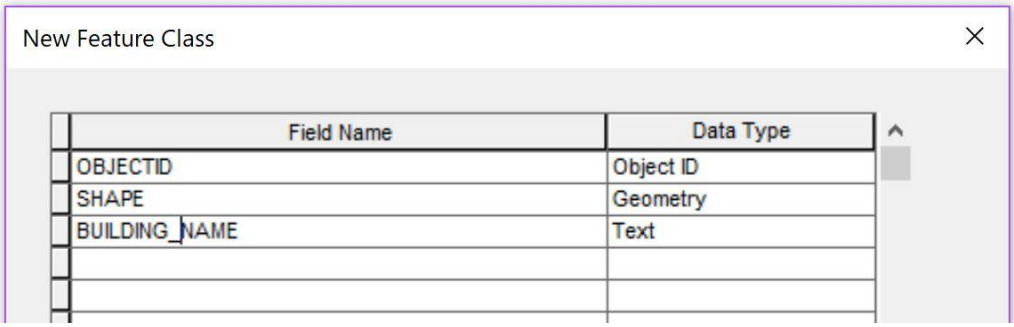


Right click on geodatabase then New -> Feature Class. On the first screen, change the name to BYU_Buildings. Spaces are not allowed in the names of shapefiles so you must use the underscore. Also

change the type of data (usually default to polygon) to point data. On the next screen, Choose Projected Coordinate Systems -> UTM -> NAD 1983 -> NAD 1983 UTM Zone 12N. Skip the next two screens that ask you specific tolerances and keyboard settings. On the 5th screen, you can specific what columns to include in the attribute table for this data. Under the entry marked 'Shape' enter 'Building_Name' including the underscore (spaces still not permitted in names). To the right of that, choose text as the type of data that will be stored in those cells.

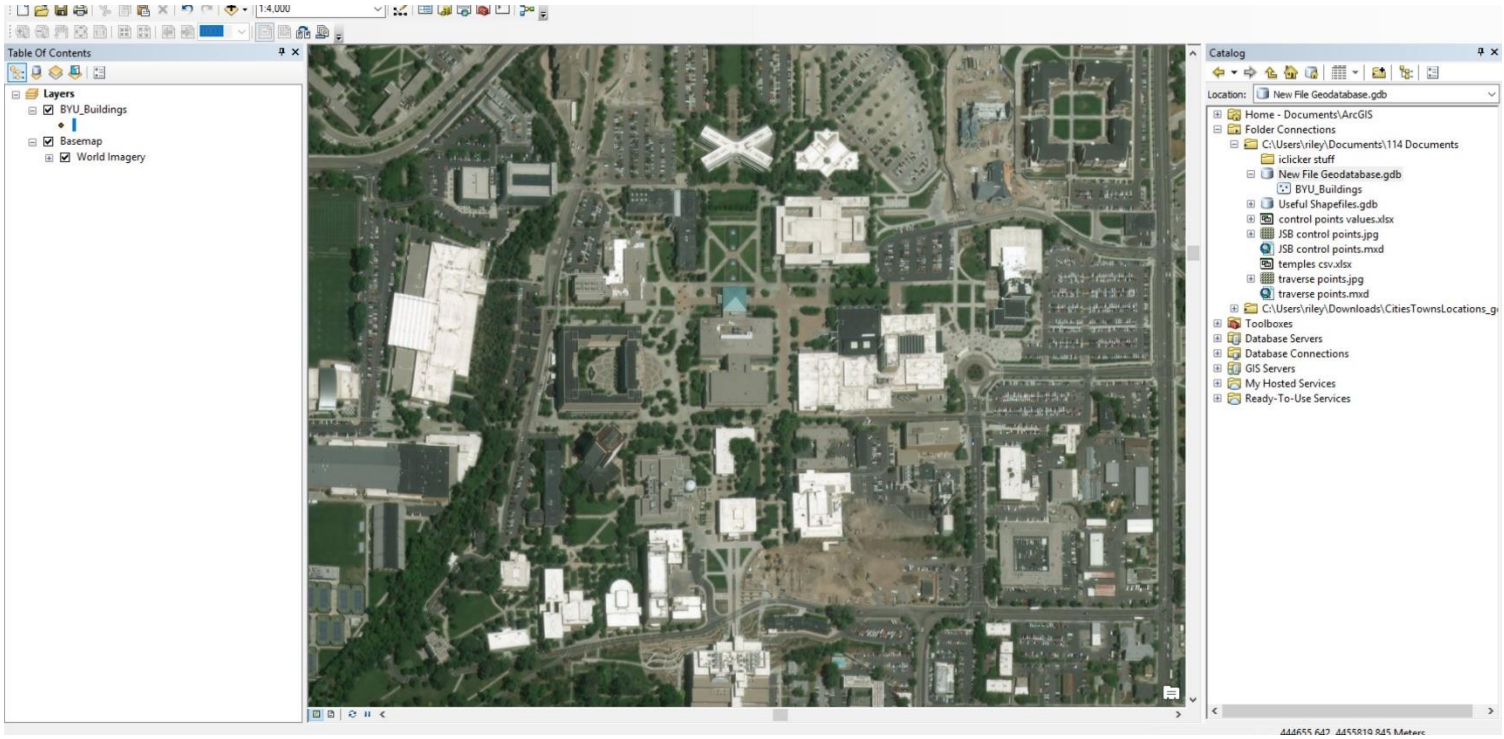




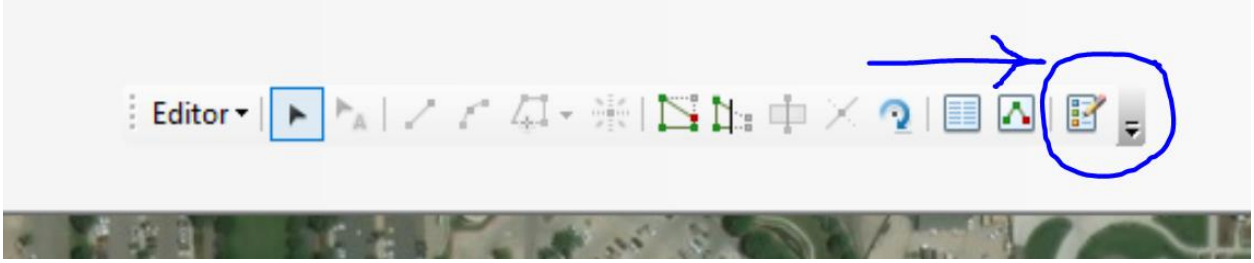


Using ArcMap to fill the shapefile with spatial data

Your new feature class should appear on the table of contents. If you have not already done so, add a basemap. Zoom to BYU. To save time, you might consider adding the traverse points csv file from last lab and using the 'zoom to layer' function (right click on the layer in the table of contents the choose zoom to layer). If you do, remove this layer from the project before proceeding so that they are no longer visible in the screenshots you will submit. You should have a view like the following:



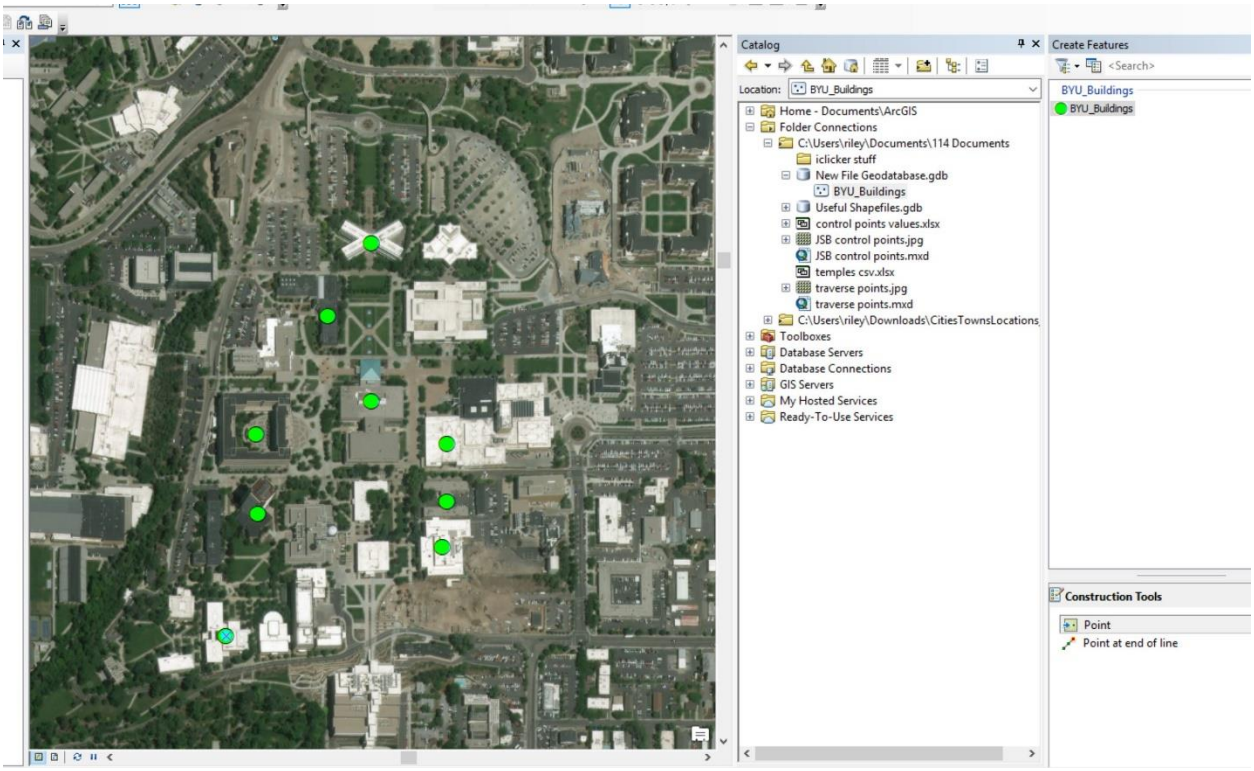
Find the new shapefile you created ***in the table of contents.*** You will not be able to choose the following options if you right click on the layer in ArcCatalog. Do the following: Right click on BYU_Buildings -> Edit Features -> Start Editing. The Editor toolbar should appear somewhere on your screen (if it doesn't, go to the menu on the top of ArcMap, choose customize -> toolbars -> editor then the toolbar will appear). Right click on the farther right option on the menu called Create Features.



The editor menu will now be available on the farthest right portion of the screen. Click on the BYU_Buildings file (should be visible toward the top) and then choose Point (under construction tools toward the bottom of the menu). When you hover your mouse over the map, the cursor will be hollow and you should see a dot underneath the cursor. You can use the undo function like normal while using

the editor or wait until the end and delete points manually if you make mistakes. Click only once on the following buildings:

1. CB, FB, WILK, HBLL, ASB, JFSB, JKB, SWKT, JSB



If you have followed the steps correctly, your map will look like the picture above. When you are finished, go back to the editor toolbar. Click on editor then save edits. You may now close the create features menu on the right.

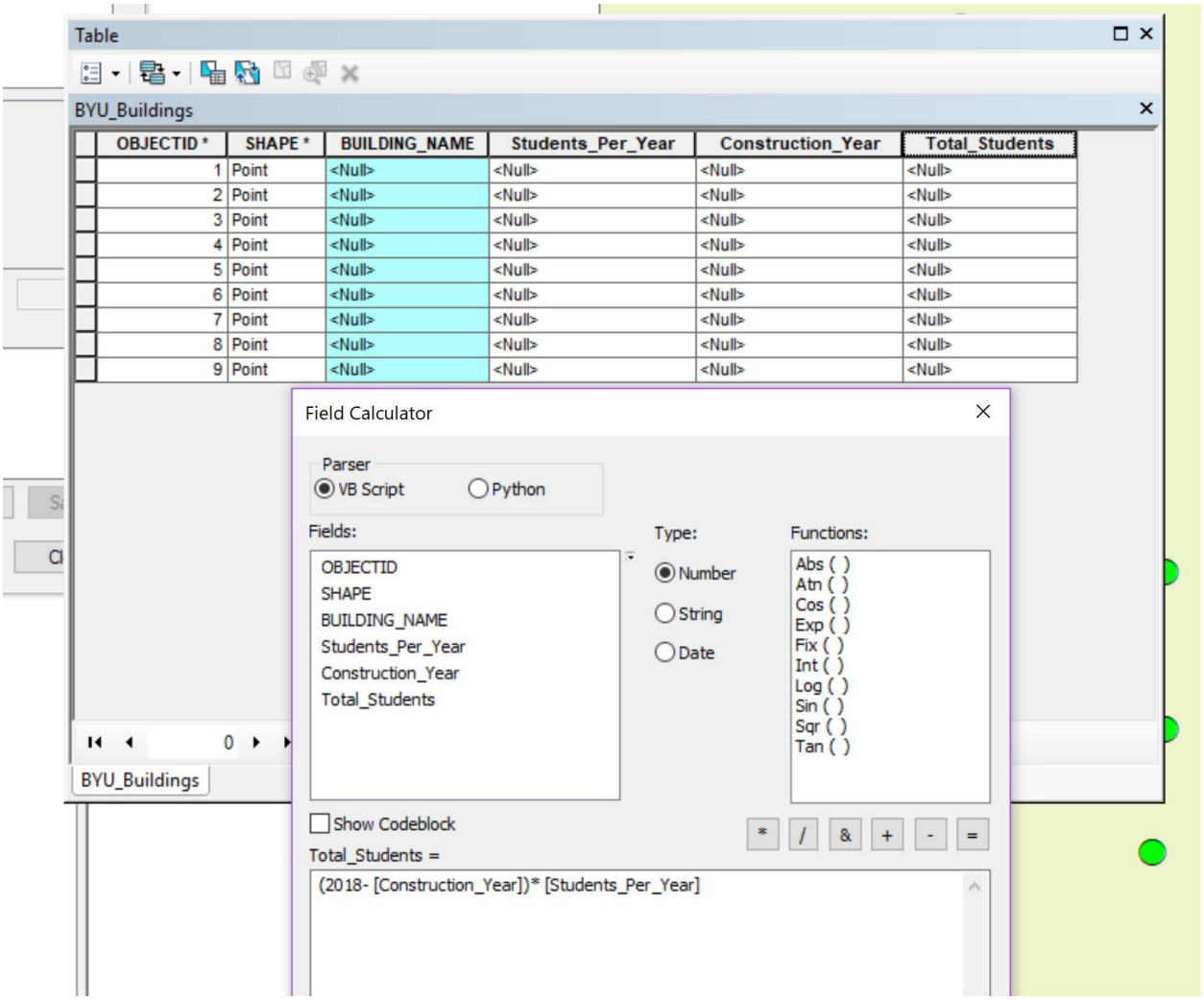
Populating the Attribute table

In addition to marking the physical locations of data, a GIS can read and create attribute information. Reopen the editor menu if necessary. We are going to use ArcMap to manipulate the attribute table of the shapefile you just created.

Right click on the buildings layer and choose view attribute table. Since you are still editing, you can double click on any of the cells and edit their values. The points are listed, top to bottom, in the order you created them. If you followed the previous instructions exactly, you can follow the order listed above in naming the buildings. After you are finished, save your edits and stop editing.

The top left button in the attribute table opens a menu of options. Click on that then choose add field. Set the type to short integer. Name the field Construction Year. Through google or any other means, find the year each of the buildings was finished and add them to the cells in the proper order. Repeat these steps with a field labeled Admitted Per Year that is also a short integer. Fill the cells in that column with some random number of students admitted to the college housed by that building each year. If you would prefer, you may research accurate numbers to enter.

Create another new field called Total Students that is a long integer type. Right click on the field and choose field calculator. A menu should open giving you the option to use a formula to calculate the value of that field. Type a formula to calculate this value. It should be something like 2018-Construction year*Students Per Year. It should look something like this.

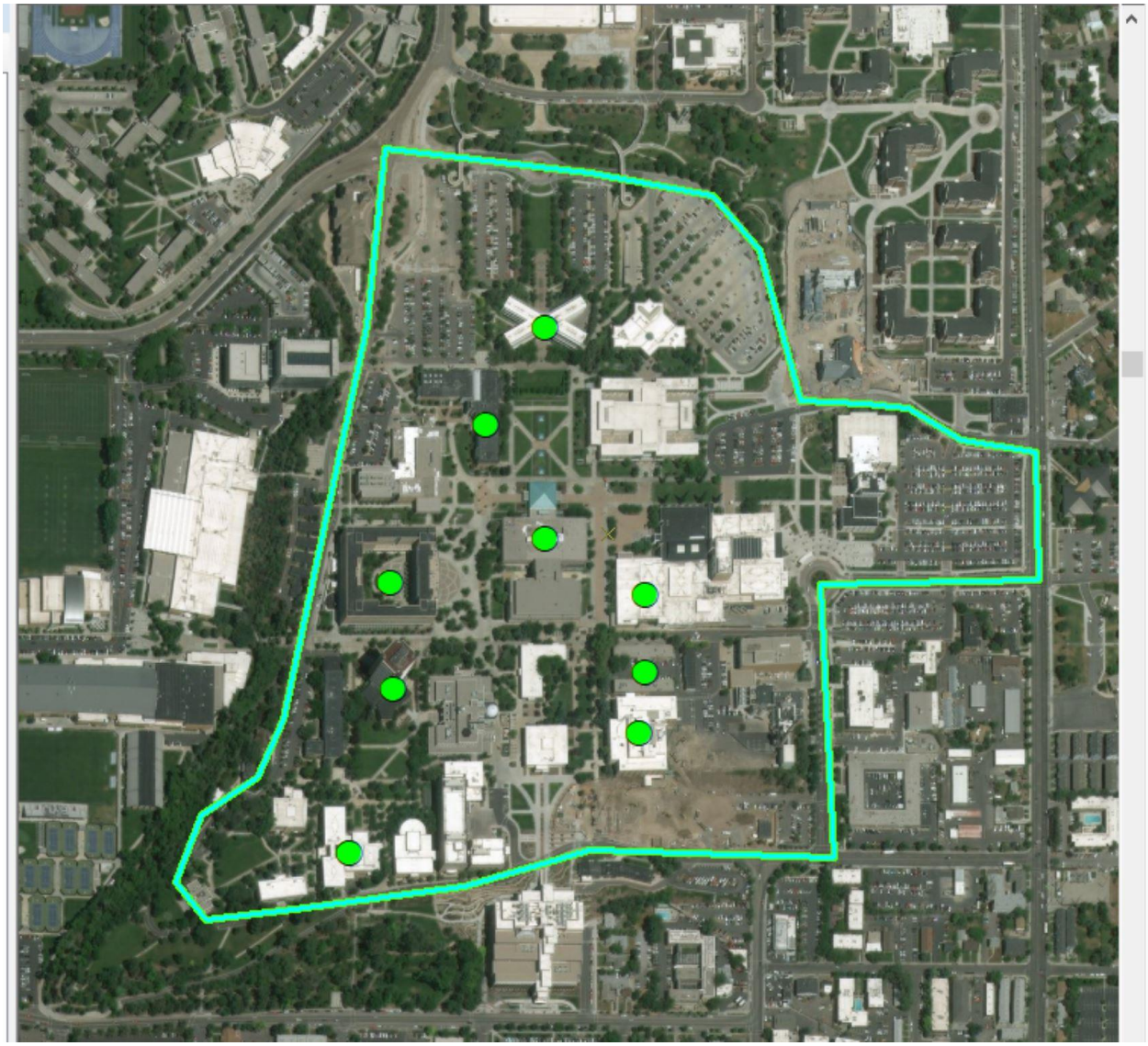


Create a polygon

Follow the previous pattern to create a polygon file that traces the road boundaries of BYU campus. You should generally do the following:

1. Create a new feature class in the geodatabase you created previously.
2. Name the file 'BYU_Roads', set the type to polygon, use NAD 1983 UTM Zone 12N.
3. Do not add additional information to the attribute table.
4. Edit the new shapefile by clicking on edit features.
5. Open create features and choose polygon as the construction tool (experiment with others).
6. Click along many points of the road surrounding campus until you have created a full circle.
7. Refer to the following screenshot for exactly how it should appear.
8. When you have placed all the points marking the road, click on sketch properties (the button directly to the left of the create features button on the editor toolbar)

9. On the top of the Edit sketch properties menu is an option called finish sketch. Click it.
10. Save your edits, stop editing, close any of the additional menus open.



Select by Location

Under the selection menu, there are options for select by location and attributes. Choose select by location. While this tool is quite versatile, we will use only a simple query in this lab. As the name implies, you can use this tool to select parts of one dataset in relationship to their position of features in other datasets you have in your map document. We will explore more of these options later in class.

There are two layers relevant to this tool. The first is the layer you want to select portions of. The second is the layer whose location you're concerned about. For example. If you have a shape file

showing all buildings over 50,000 square feet and you want to choose only the buildings of that size that are one BYU property, you might want to do a select by location query. You would want to select buildings based on their location in the BYU property boundaries.

Under the selection tab, choose clear selected features before we begin. Open the select by location menu. Using the pattern described, selected all of the buildings in your BYU buildings layer that "are within the source layer feature." Intuitively, you should recognize that all the buildings on campus are within the boundaries you drew. If you did this query correctly, all of the dots representing buildings should become highlighted in bright blue.

Deliverables

Provide easily readable screenshots of the following items and label them accordingly.

Submit only the screenshots, labeled, and in this order.

1. Screenshot with the shapefile of points representing schools in Utah visible on the map (from the dataset you downloaded, not the one you're creating).
2. Screenshot with the measure tool giving the distance between any two of the schools in Provo.
3. Screenshot of your newly created geodatabase, with a buildings and boundaries shape file listed beneath, visible in the ArcCatalog window.
4. Screenshot showing the shapefiles of buildings on campus and roads around campus.
5. Screenshot with the attribute table, field calculator window, and the contents/equations of both window visible.
6. Screenshot showing all of the buildings on campus highlighted with the select by location window and query visible.

Grading

5 points/screenshot = 30 points