# LAB 2 – MAPPING CAMPUS ACTIVITY SPACE

**What you'll learn:** Understand the importance and role of data models in a GIS environment. Familiarize yourself with a variety of tools in QGIS. Explore data creation and attribute tables. Most importantly, through the example of mapping your activity space, you'll learn how to build a base map with techniques that include layering, labeling, and symbology.

**Data:** downloaded from Canvas and as described in Step 1.

**What you'll submit**: 1) A word document in .doc or .pdf format that includes appropriate screenshots and answers to questions in Step 1; and 2) an exported PDF of your final map from Step 5.

**Lab naming conventions:** Tools that you click will be bolded, e.g., **QGIS Menu > File > New** to create a new QGIS project file. Text that you'll type will have quotes around it, such as "MyNewProject.qgs" and names of existing datasets and directories will be italicized, e.g., *DataToUse.zip*. Key terms will be underlined. **Important tips and key instructions will be in bold red font.**

**Note:** This lab will rely on pages 28-47 of your learning QGIS textbook.

## STEP 1: INTERACTING WITH DATA IN QGIS

To begin this lab, set up your workspace (refer to instructions in Lab 1). Navigate to your root folder, and create a new folder called "Lab 2." Inside this folder, create a folder called "downloaded-data." This is where you will keep all data for this lab.

Once your workspace is set up, follow the instructions on pages 28-47 of the *Learning QGIS* textbook to complete Step 1. You should work in a QGIS map document that is titled "[LastName]_alaska-map" and saved in *Lab1*.

In a word document that you will submit along with the base map you complete in the next sections, answer the following questions.

> **QUESTION 1:** Provide a screenshot of a **Bookmark**, centered on Alaska.
>
> **QUESTION 2:** Using the **Measure** tool, what is the Euclidean distance (e.g., "as the crow flies") in kilometers between the westernmost and easternmost points of Alaska?
>
> **QUESTION 3:** Open the **Attribute Table** for Alaska. Inspect the "AREA_MI" field. Notice that you can click the field header to sort the

column. About how many square miles is the largest feature in this shapefile? How many square miles is the smallest?

**QUESTION 4:** Provide a screenshot of your attribute table with the updated field, “small_area.”

## STEP 2: DOWNLOAD DATA FROM CANVAS

Now that you’re familiar with some basic features in QGIS, we can make something a little more complex. Begin by creating a new map document and saving it as “[LastName]_lab2”. Next, download the appropriate data from Canvas into the *downloaded-data* folder for Lab 2. The data is located on the **Assignments** page. You’ll need to unzip the file to access the contents. The zipped file contains shapefiles of the following:

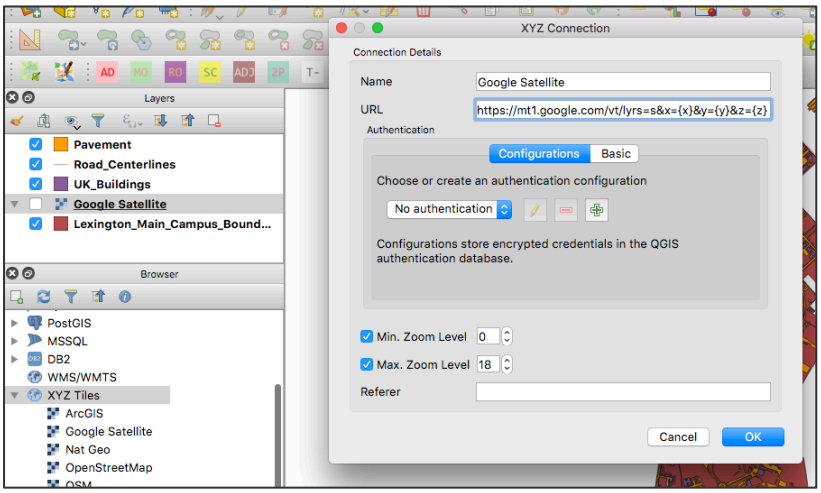
- Campus boundary
- Campus pavement
- Campus roads
- Campus buildings

Load each of these shapefiles into QGIS using your preferred method (refer to Lab 1 or the *Learning QGIS* textbook for tips). After doing so you should see four shapefiles stacked upon one another in the data frame.

## STEP 3: LOADING GOOGLE SATELLITE IMAGERY

In future labs we will do more to stylize raster data, but for today, we are simply going to use QGIS’s core functionality to load satellite imagery from a web server. This is a fairly simple process but be sure to **Copy+Paste** everything exactly.

In the **Browser** panel, **Right+Click > XYZ Tiles** and select **New Connection**. The following window will pop up:



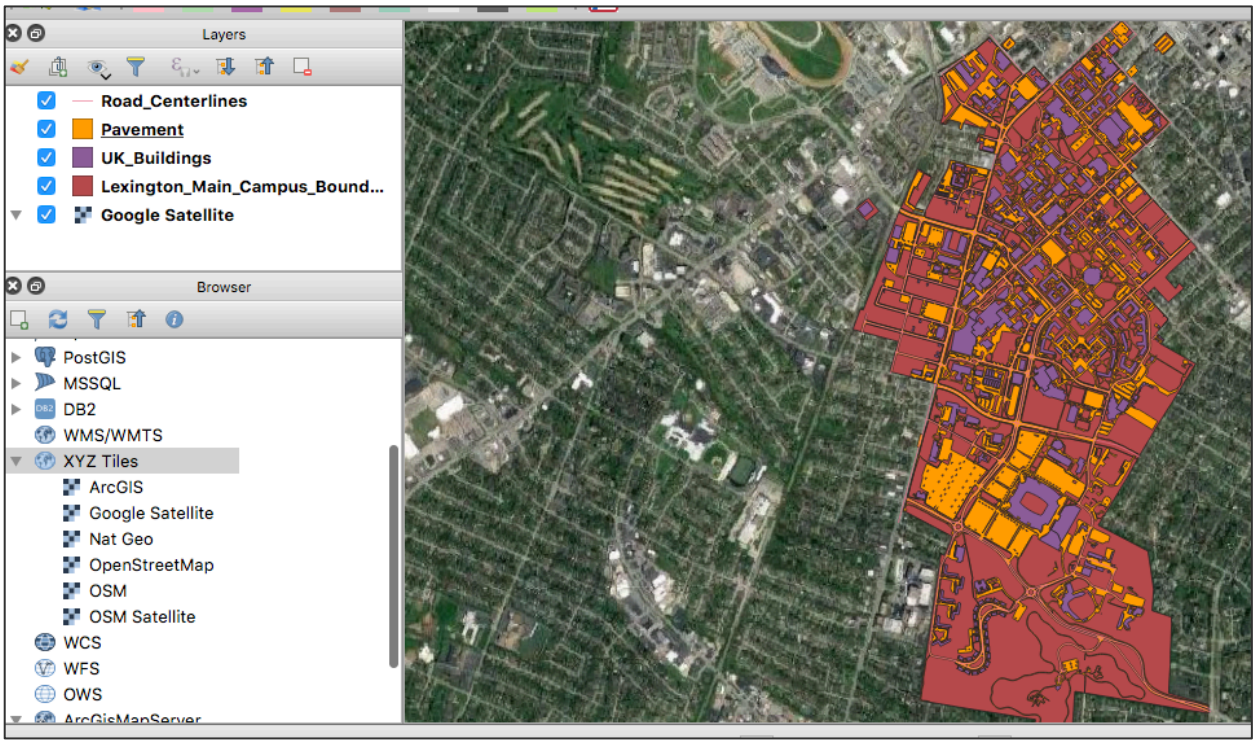
**In the *Name* field, type "Google Satellite," and then copy and paste the following text exactly as it appears into the URL field:**

https://mt1.google.com/vt/lyrs=s&x={x}&y={y}&z={z}

This should form a new connection to Google's proprietary imagery via the XYZ Tile Server provider. Read more below if you are interested in seeing what other kinds of basemaps you can add with this feature:

> GIS Stack Exchange: https://gis.stackexchange.com/questions/20191/adding-basemaps-from-google-or-bing-in-qgis/217670#217670

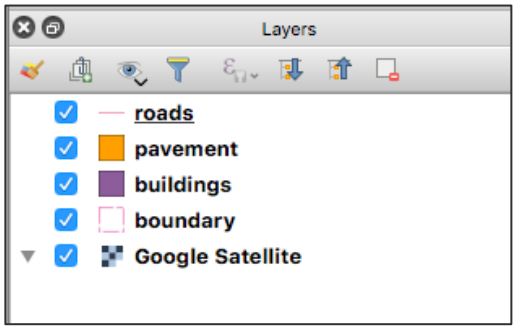
Once the connection is established, you can add the satellite imagery by **Double clicking** on "Google Satellite" in the **Browser**. The imagery may take a minute to load, but once it does, you should see something resembling the following in your data frame:




## STEP 3: STYLIZING VECTOR LAYERS

Stylizing layers, or adjusting their Symbology, is a crucial part of GIS. In this step we'll be stylizing the four layers that we've loaded into QGIS in order to prepare them for use as a base map. A base map is simply the background detail for a map; it is not part of any analysis, but rather exists to orient the map audience.

Let's begin by renaming these layers: their names are a bit clunky. **Right+Click** each layer and rename it in your **Layers Panel** so that the names resemble the following:



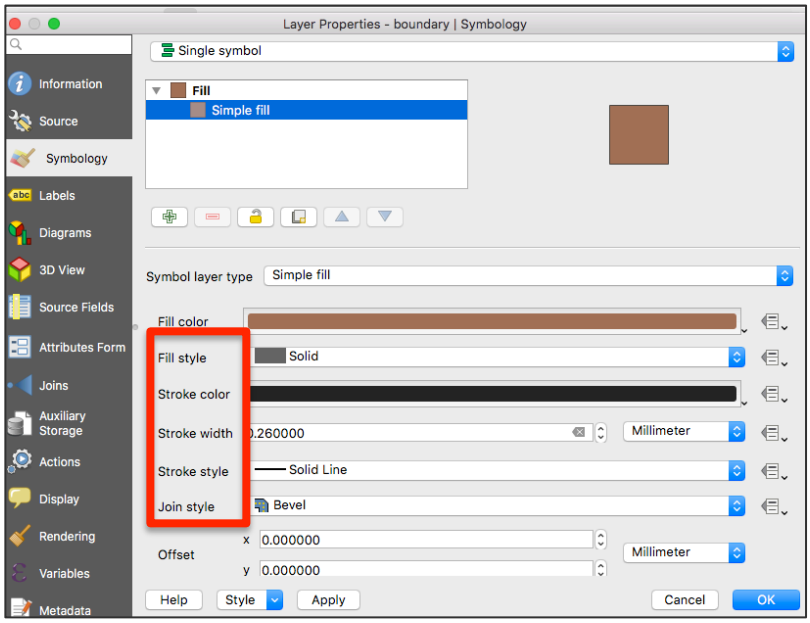

**Be sure that the layers are in the proper order or else you may not be able to see them all.**

Next **Right+Click** on the *boundary* layer and select **Properties**. Right now, the *boundary* layer is filled in with an opaque color, which we don't really need for the purposes of our base map. In **Properties**, be sure the drop-down bar at the top is set to **Single symbol**, and click **Fill > Simple fill**. You should see the following screen:

We're gong to adjust a few things here: the **Fill color,** the **Stroke color**, the **Stroke width,** and the **Stroke style**.

Begin by clicking on **Fill color** and dragging the **Opacity slider** all the way to 0%. We don't need to see any fill here. Click **OK**.

Next, click **Stroke color** and set the HTML notation to #c8258f. Set the opacity to 60% and click **OK**.




**The HTML notation is a useful way of selecting and copying colors. What you copied and pasted was a "color hex code" that uniquely identifies the color you selected.**

Now set the **Stroke width** to 0.8.

Finally, click **Stroke style** and select **Dash dot line**. Click **OK.**

We now have a styled boundary of campus that looks a little nicer than the automatically generated one we got from QGIS.

Using what you learned above, complete the following stylizations in the other 3 layers:

- Set the *buildings* **Fill color** to hex code #ffffad
- Set the *pavement* **Fill color** to #e3e3e3
- Set the *pavement* **Stroke color** to #9e9e9e
- Set the *roads* **Color** to #707070
- Set the *roads* **Width** to 0.46
- Set the *Google Satellite* **Transparency** to about 60%

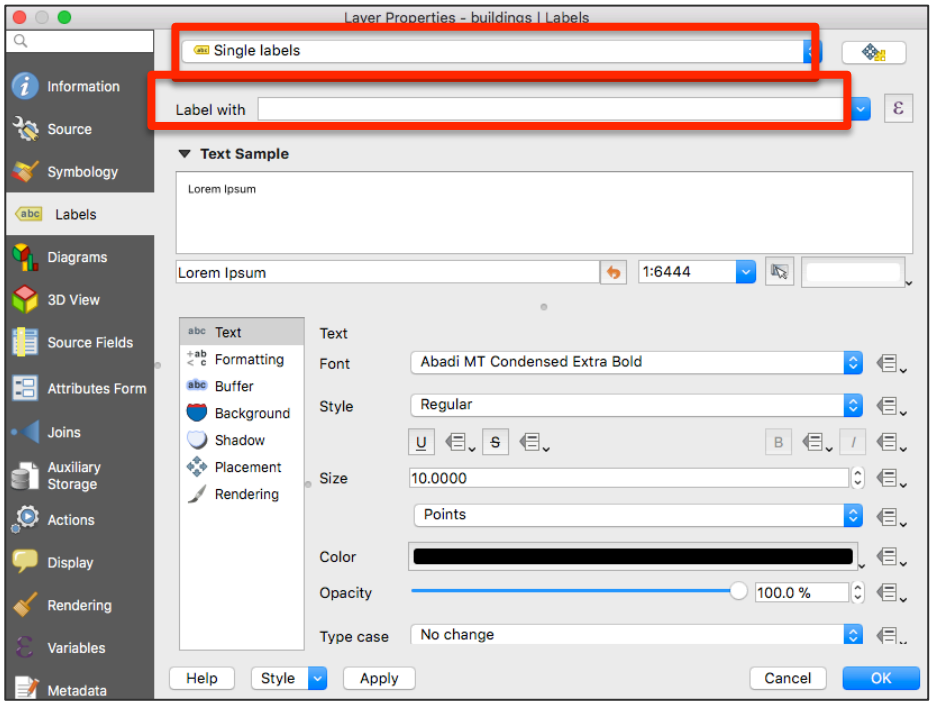
Now you should have a base map that more or less resembles the image to the right. It's by no means perfect, but we'll discuss ways to improve a base map like this in future labs.

For now, let's add some labels to get a sense of what we're looking at!

## STEP 4: LABELING

Labeling in QGIS can be tricky. Let's start with buildings. Begin by opening the **Attribute Table** for the *buildings* layer. Inspect the fields and consider which one would be the best to use for naming our buildings. It's obvious in this case, but depending on your data, it won't always be.

Close the attribute table and open the **Properties** window for the *buildings* layer, navigating to the **Labels** tab. From the drop-down menu, select **Single labels**.

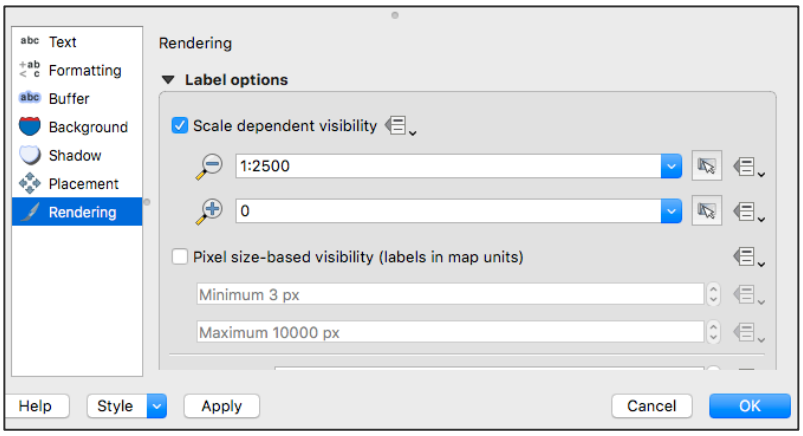



On the next drop-down bar, choose **Label with >** "BLDGNAME". Select **Okay** and zoom back out to the extent of campus (by using the **Zoom to layer** button, a bookmark, by hand, etc.)

Yeesh!

This does not look good: we've got tons of labels that are so crowded we wouldn't know what to do with them if we were paid for it. Thankfully, there are a few things we can do to make these labels look a little better.

Re-open **Properties > Labels > Rendering**. Check the box for **Scale dependent visibility** and set it to 1:2500.



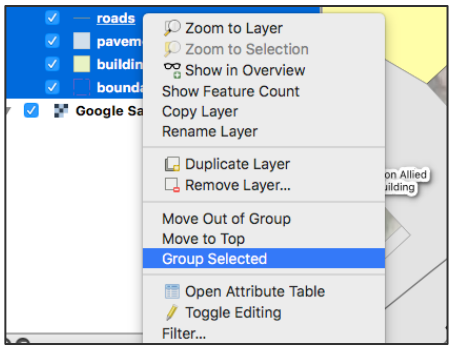

This will prevent labels from appearing beyond a certain zoom.

Next, play around with some of the other options on your own. I suggest adding a background and including a rule for when the line wraps (this can be done in **Labels > Formatting**) – maybe even a drop shadow if you're feeling crazy. Again, these are basic edits – we're going for skills exposure, not cartographic excellence here. See below for an example:

Let's do the same thing for the *roads* layer, with a couple of small changes:

- Change the font to Arial and the style to Bold Italic
- Change the size to 8
- Change the type case to "All uppercase"
- Change the placement to "Curved"

Once that is complete, **Select** all four layers at once and **Right+Click > Group selected**. Rename the new group "campus-basemap". **Right+Click** *campus-basemap* and select **Export > Save as layer definition file**. Navigate to your *Lab 2* folder and save the file as "campus-basemap".




Add your newly saved file to the **Data frame** in QGIS. It should be stylized in the exact same way as your current layers.

**Saving layer definition files can be a huge time saver in the long run – especially if you are doing a lot of cartographic heavy lifting on project.**

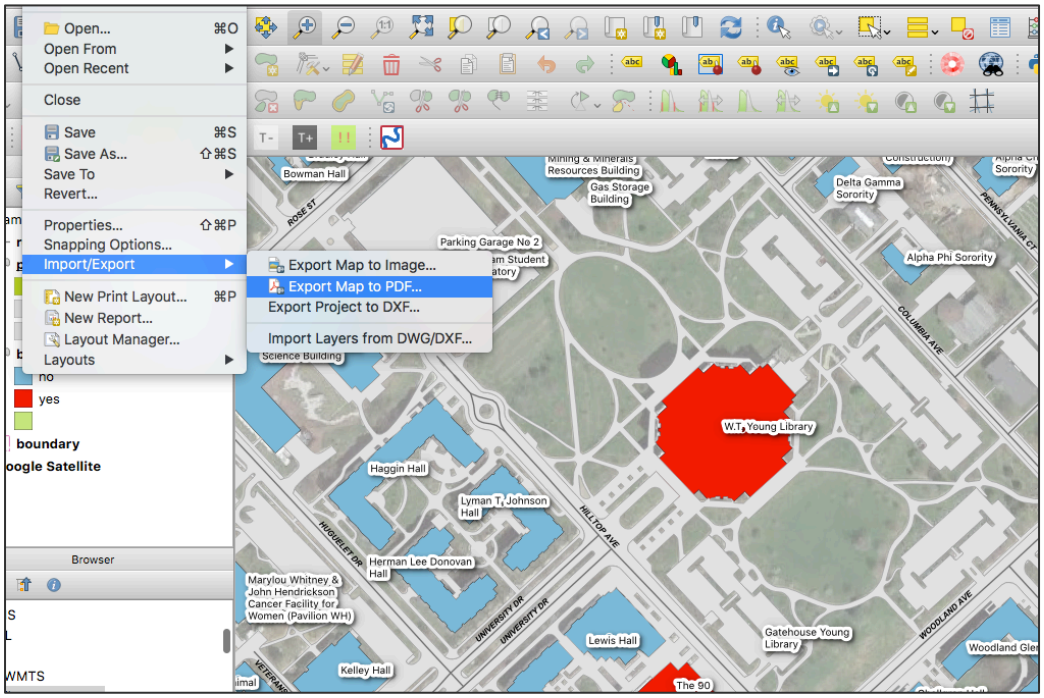
## STEP 5: MAPPING YOUR ACTIVITY SPACE ON CAMPUS

To conclude this lab, you will be selecting 5 buildings on campus where you spend most of your time, and mapping them.

Using the skills learned in Step 1 (and testing out a few new ones), complete the following workflow:

- Locate 5 or more buildings that you would consider part of your weekly activity space on campus, e.g., buildings that you frequent on a weekly basis
- Use the **Field Calculator** in the *buildings* layer **Attribute Table** to create a **new field** called "actspace" – then, populate your selected chosen buildings with the attribute data 'yes' and all the rest with 'no'
    - **Be sure you are creating a new field (as opposed to updating an existing one)**
    - **Be sure you are choosing the proper name**
    - **Be sure you are selecting the field type "Text"**
    - **Be sure to use single quotes when entering 'yes' and 'no'**
- On the *buildings* layer, select **Properties > Symbology** and on the drop down bar choose **Categorized**. On the bottom left hand side of the screen, select **Classify** and then click **OK**. You should see the buildings recolor based on your selected activity space (you may have to **Clear Selection** in order to properly view the updates).

- Make any more adjustments that you think are appropriate to the *building* layer colors or labels – or for that matter, any of the layers' colors or labels – and select **Project > Export > Export map to PDF**. **Your exported map should be zoomed to include 1) a couple of buildings in your activity space and 2) labels.** Feel free to style your map using the **Print Layout Composer**, if you know how, but that is not a requirement for this lab. Save the map in your *Lab2* folder with the title "[LastName]_lab2-map"




## STEP 6: REVIEW AND SUBMISSION

You should submit completed materials for Lab 2 via Canvas by Monday, 2/3 at 11:59pm. The completed materials include:

- A word document in .doc or .pdf format that includes appropriate screenshots and answers to questions in Step 1
- An exported PDF of your final map from Step 5

Be in touch if you have any questions!