**Applied Computing Asisgnment #2: Shoreline Traces**

Due: **Via e-mail to both Professors Schmidt and Cordell**, Monday 9/26 at 5:00pm.

In this assignment we will learn how to georectify historical maps using QGIS and use them to create new vector mapping data. In our in-class lab and in your subsequent homework assignment, you will find the following articles by Jim Clifford , Josh MacFadyen, and Daniel Macfarlane useful if you get stuck on a particular step:

1. Installing QGIS 2.0 and Adding Layers
2. Georeferencing in QGIS 2.0
3. Creating New Vector Layers in QGIS 2.0

In class we used this small dataset and some historical street atlases to georectify maps of the Boston area. Now you know how to import shapefiles into QGIS and read their properties; import a historical map as a raster image; warp that historical map to align with the GIS using control points; and create new point, line, and polygonal spatial data. While these are all useful techniques for historians seeking to understand the contours of the past's landscapes, they are also used every day by geographers in consultation with businesses, government agencies, or municipalities. If, for instance, you want to install a new water pipeline in your town, you may not have digital data about where older public works were installed; a historical survey map might need to be georectified in order to help you plan.

After our lab, you will each choose another historical map of Boston to georectify and trace. The work you do for this assignment will pay dividends later in the semester as well; we'll be using the data you generate as a group for our 3D printing assignment in a few weeks. So please take your time and turn in quality work.

To complete the assignment, you will:

1. Find a historical map of Boston from your assigned time period to georectify, using either the Leventhal Map Center Collections or the David Rumsey Historical Map Collection. If and only if you have a time period after 1920 in which no maps are available, you may use another web site–these maps will be harder to find, but easier to georectify. Here are a few things to keep in mind as you choose:

   • You should find a map at the right scale, which is roughly the scale of the image below.
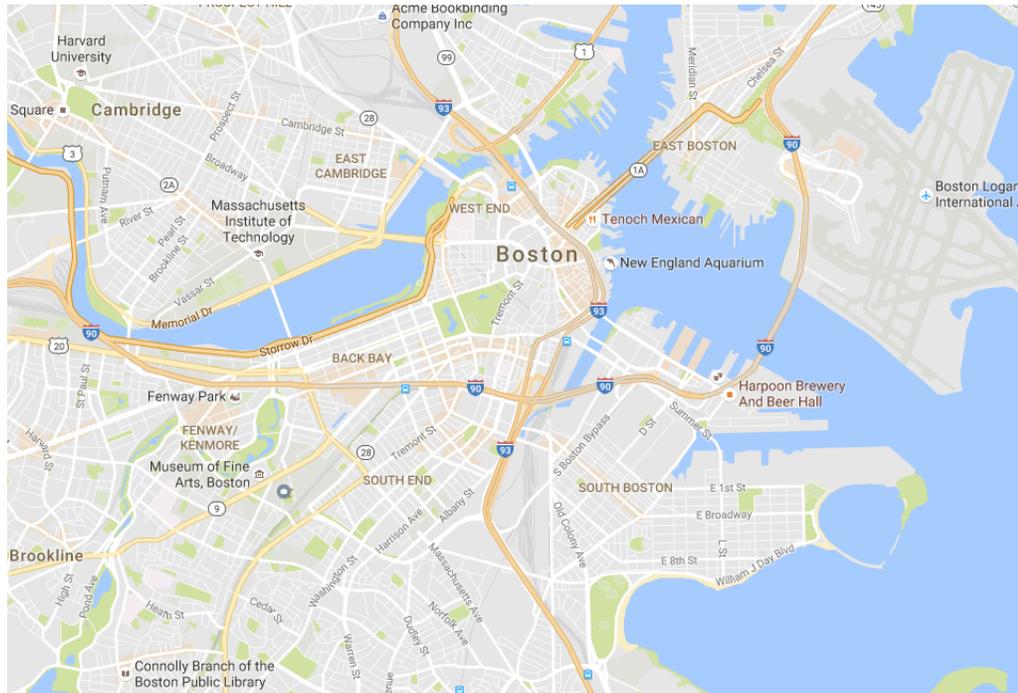
In short, you need to be able to see enough of the Boston coastline for us to spot differences when we compare your work from different time periods, but you should be zoomed in enough that you are tracing Boston, not the whole Massachusetts coastline. We will only be able to meaningfully layer your maps, as we will do in a later assignment, if you've georectified at roughly the same scale.

- You will claim your map using this spreadsheet. You will see that there are limited spots for each time period. If all the slots for a given time period are already claimed, you will need to find a map from a time period that is not already fully assigned. When you choose your map, fill in its title and URL next to your name. If another student has already claimed your map, you'll need to find another one from the same time period.
- You should download a high resolution file for your map. You need to be able to zoom in to a fine level of detail in order to find control points. Plus if you were to publish your maps would look better. If you use the Rumsey Collection, you will need to create a free account in order to download a high resolution map for georectification. Without an account you can only download low-quality images that will not be suitable for this assignment.

2. Import a modern base map, either from the dataset we will use for our in-class lab or using the Open Layers plugin.
3. Import and georectify your historical map. In order for this to work at the level of detail we would want, you should find at least 8-10 control points distributed around the map. If your control points are all clustered together the map will distort too much when you actually apply a transformation.
4. Experiment with different transformations to see which gives you the best combination of close alignment and legibility for your historical layer. Adjust the transparency of your historical map so you can see the modern map below and assess how well your historical map aligns.
5. Once you are happy with your georectified map, create a new polygon layer to store your traced shore-

line. Use the create polygon tool to trace the coastline of Boston using your historical map as reference. Essentially, you are creating a polygon that *covers the land that makes up Boston on your map*, not the water. When you are finished, your shape should look like a flat representation of the city's land during the period of your map's production.

6. When you are happy with your polygon, you should export that layer as a shapefile and email it to Professors Cordell and Schmidt. Do not e-mail the full georectified image, which will be huge! **To save a shapefile, export your vector layer into a new folder and zip the folder; this folder will have several individual files in it (a `.shp` file, a `.prj` file, etc).**