

LAB TASK: EXPLORING SPATIAL ANALYSIS (PART 3)

BEFORE YOU START, READ ALL INSTRUCTIONS UNTIL THE LAST PAGE.

Situation/case/problem:

In Part 2, you have already created the exclusion zones for the new store. The buffered areas are the areas that must be avoided. Next conditions to consider are: *“Must be at least 2 miles from a competitor store”*; and *“Must be within 1 mile of a major highway”*.

In this part (Part 3), you will work on several proposed sites and do some analysis until you eventually find the best location for your new store.

1. Find total sales per store

Your team has done some research and determined several possible sites based on existing shopping mall criteria including

- Store vacancy
- Store size
- Lease rates

You will now evaluate these locations in terms of proximity to your exclusion zones. The proposed sites were created as a spreadsheet of addresses with geographic coordinates. You will add this table to your map and then display the table as point locations on the map.

- a. From the Catalog window, add **Sites\$** sheet from the **Proposed-Sites** spreadsheet in your Analysis folder. Open and observe the table. The coordinates are in NAD83 geographic coordinates. Your current map is in UTM coordinates with units of meters.
- b. Create a new events layer from the X and Y values in the Sites\$ table. Specify the input coordinate system as NAD83. *(Hint: To find NAD83, expand Geographic Coordinate Systems > North America.*
- c. Add the data *(of course you need to export the event layer first!)* to your map and change the symbol so that you can clearly see the *Proposed_Sites* points.
- d. Remove the Sites\$ table and Sites\$ Events layer from your table of contents. Save your map document.

2. Find suitable locations

- a. Use Select By Location to select features from **Proposed_Sites** that intersect the **Stores_Buffer** layer. (*Uncheck the 'Apply a search distance... '*).
- b. Now you have selected a set of proposed sites within 5 miles of each of your two stores.
- c. Switch the selection to meet your criteria (to select the proposed locations that are more than 5 miles from a store). Now create a layer of the selected points and name it as **Proposed 5 Miles Selection**. (*Hint: Right click the Proposed_Sites layer > Selection....*).
- d. Clear your selected features; turn off the **Proposed_Sites** layer; and change the symbol of the **Proposed 5 Miles Selection** to ease your visualization.

From these remaining points, you will select the locations that are more than 2 miles from the competitor locations.

- e. From the **Site_Selection** geodatabase, add the **Competitors** feature class to your map. Change the symbol.
- f. Use the 'Select By Location' to select the **Proposed 5 Miles Selection** features that are within 2 miles of the **Competitors** features.
- g. Switch the selection for the **Proposed 5 Miles Selection** layer. Now you should have four selected proposed sites as shown in the following figure.



- h. Now, create another selection layer from your selected features, and rename it as **Suitable Distance Selection**. This layer now contains all the proposed sites that meet your distance criteria from existing stores and competitor locations. Clear the selected features and save your map document.

3. Locate sites close to highways

The next step of your analysis is to further refine your proposed sites to contain only those sites that are within 1 mile of a major highway.

- a. From your Analysis folder, add the **Major Highways** layer file to your map.
- b. Use Select By Location to select the features from the **Suitable Distance Selection** layer that are within a distance of 1 mile from a **Major Highways** feature. You should have two selected locations that are within 1 mile of a major highway. Save your map document.

4. Find demographic profile of candidate locations

Your final step of the analysis is to determine which of the two possible sites has the demographic profile most similar to store number 2, which is your top-performing (highest total sales, remember?) store.

- a. Create buffer for the two points in the **Suitable Distance Selection** layer. Use following parameter:
 - Input features: **Suitable Distance Selection**
 - Output Feature Class: **Suitable_Distance_Buffer** in your **Site_Selection.gdb**
 - Linear Unit: 5 Miles
- b. Next, you will intersect your buffer polygons with the block groups. Run the Intersect tool and use the following parameters:
 - Input features: **Suitable_Distance_Buffer** and **Block_Groups** layers.
 - Output feature class: **Block_Groups_Intersect** in your **Site_Selection.gdb**.
- c. Open and inspect the attribute table for the **Block_Groups_Intersect** layer, and scroll to the Street field.

For each block group polygon, there is a street address from the associated proposed site buffer polygon. You will now summarize your demographic data based on each address. This will allow you to compare the demographic profile of each proposed site and choose the site that best matches store number 2.
- d. Summarize the Street field using the following specifications:
 - Calculate the sum for each Demographics.AGE and Demographics.INCOME attribute.
 - Save your new output table in the Site_Selection.gdb and name it **Proposed_Sites_Summary**.

Remember, for Store number 2, most people were in the 20-39 year-old age group and the dominant income level was greater than \$50,000.

e. Compare the attributes for both locations.

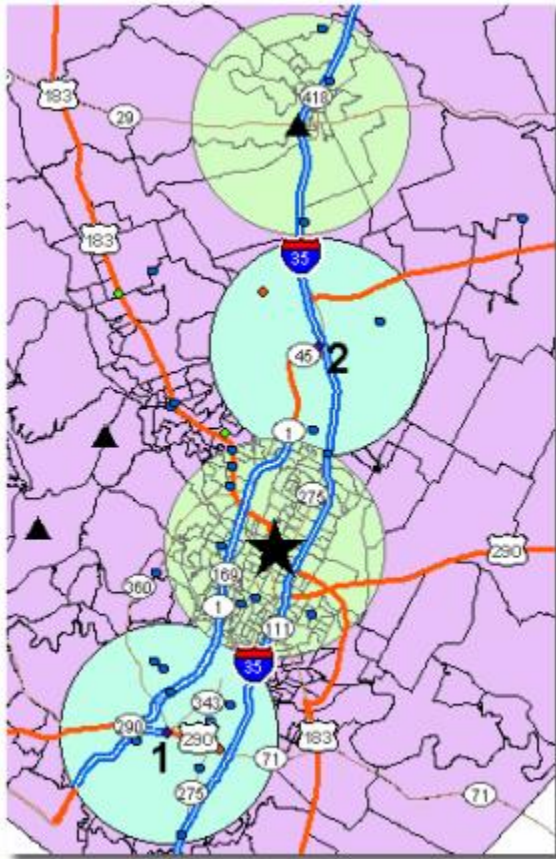
- Which proposed location has an age and income profile similar to store number 2? _____

f. Use the Identify tool to locate the site matching 8120 Research Blvd, Austin, TX 78757

g. Clear your selected features

h. Select the point in the map for your final proposed site. (*Hint: Make **Suitable_Distance_Selection** the only selectable layer*).

i. Your selected proposed site should look like the following figure. Don't forget to save your map document.



5. Forecast future results

In this step, you will add the new proposed store location to your **Stores** layer. You will then associate each store to the closest customers. This will allow you to simulate potential revenue distribution among your chain of three stores

- a. Add your selected proposed location point to your **Stores** layer
(Hint: Start editing; Select Site_Selection workspace; Use Copy and Paste to add the new point to your Stores layer; Save edits and stop editing)
- b. Use a spatial join to associate the customers and their attributes with the store closest to them. *Hint: Right-click the Customers layer > Joins and Relates > Join*
 - Choose Join data from another layer based on spatial location
 - For item 1: choose **Stores** layer
 - For item 2: choose 'Each point will be given all the attributes of the point in the layer being joined that is closest to it'.
 - For item 3: browse to Site_Selection.gdb; name your output as **Customer_Forecast**.

Now you have a new feature class, and each customer has an attribute value of the closest store.

- c. Symbolize the **Customer_Forecast** layer using the following specifications:
 - Use the Categories renderer
 - Symbolize based on Street attribute
 - Add all values
 - Uncheck <all other values>

Your simulated stores and customers are now displayed for a chain of three stores. From this point, you could extend your analysis to calculate simulated revenue for each store. Save your map document.

Task: Now that you have completed all the three parts of Exploring Spatial Analysis exercise, this is what you need to do:

1. Go through all the steps again, read every line, make sure you understand what is going on.
2. Then, draw a ONE PAGE mind-map that explains everything you have learned from this three-part exercise.
3. Your mind-map MUST include Input, Output, Process, and brief explanation.
4. The mind-map MUST be drawn by handwriting only. Be as creative as you wish. Draw whatever you like, as long as it is relevant.
5. This is individual submission.
6. Deadline is tomorrow, 16/11/2016, before 6pm, in my office.
7. The mind-map can also be changed to any other form of diagrams whichever suits you best.
8. There is NO CLASS this afternoon (15/11/2016). Please use the time to finish your mind-map. I will not be responsible for anyone coming to class (told you, read until the last page :p)