

Mid-term Exam: Updated reference map for the Sinajana Mayor's Office (75 pts)

The mid-term exam is a take-home exam that will require you to carry out a request for a map that you will create using your repertoire of GIS skills – just as you would if you worked as a GIS Technician for the Government of Guam, a private company, or a non-governmental organization. In order to produce this map you may have to edit existing data layers, create new features or new layers, carry out different types of spatial analyses, and, ultimately, produce an effective, visually-appealing map layout. Use available resources, such as the GIS Tutorial II and Getting to Know ArcGIS books, ArcGIS Help, as well as online resources (e.g., ESRI's website) to help you accomplish this task.

You will be provided with a set of GIS layers to assist you in accomplishing the required task. You will be responsible for determining which layers will be used, and in which manner. These layers are as follows:

- Municipality boundaries (shapefile: Municipality_Boundaries)
- Streets (shapefile: Streets)
- Building footprints (shapefile: Building_Footprints)
- Public facilities (shapefile: Public_Facilities)
- Parks (shapefile: GovGuam_Parks)
- Digital Elevation Model clip – Sinajana (GRID: dem07_sin)
- Quickbird satellite image (IMG: qb_sin)

Overview of task

You are a GIS Technician for a private consulting firm that was hired by the Mayors' Council to create updated reference maps for each of the municipalities on Guam. These maps, which will highlight up-to-date municipality boundaries, streets, building footprints, parks, and important public facilities, will serve as reference maps for the Mayors' Offices and their staff as they plan various activities throughout their municipalities. Your supervisor asks you to start small and begin with the municipality of Sinajana, with the first map including only the portion of the municipality to the west of Rt. 4.

Creation of a File Geodatabase

Much of the vector GIS data available through the Government of Guam is stored using ESRI's Shapefile format. Your company has recognized the benefits of the Geodatabase data storage model and has asked you to first create a File Geodatabase and import the shapefiles and raster data provided by the Government of Guam into the geodatabase. You will be using the Guam Geodetic Network 1993 HARN spatial reference system as the common spatial reference system for all of the data in the geodatabase. You may need to reproject some of the data into this system prior to importing into the geodatabase.

You will also have to determine the best way to organize the data within the geodatabase (as stand-alone feature classes, within one or more feature datasets, a combination of both).

Creating and editing features

The streets layer obtained from the Department of Public Works is a few years old and there are several new streets that are not represented in the layer. You will next need to create line features to represent the new streets within Sinajana (see list below). Use the feature construction tools available in ArcGIS to create these line features, from simple straight lines to true curves when appropriate; *be sure that the new streets snap to existing streets and that existing street features are split where new streets intersect them*. Include the names of the new streets to the attribute table of the streets layer, and any other attributes you can provide.

- **Aggag Court**, south off of Chalan Canton Tutujan, between Papato Lanes
- **Kindo Circle**, northeast off of Pale Kieran Hickey Dr., just north of Avenida Herman De Leon and directly across Bien Avenida Ct.
- **Chato Court**, southeast off of Kindo Circle
- **Eron Lane**, northwest off of Kindo Circle (meeting up with Pale Kieran Hickey Dr)
- **Mansanita Court**, running north off of Bien Venida Avenue between Gado Lane to West and Chalan Gumayuus to East

You have also been asked to include the municipality and the length attributes for each of the street features. While you will only be working on the streets in Sinajana for this task, and may otherwise have been able to get away with manually entering the municipality for each feature, you will use your knowledge of ArcGIS spatial analysis tools to add the municipality to the attribute table for all streets features on Guam in just a few steps.

Creating a map layout

Create a map of only those features within Sinajana (i.e., no features should be visible in adjacent municipalities, except for the municipality boundaries themselves). This map will hang on a wall in the Mayor's Office, so it will need to be at least 28 inches wide and 36 inches tall. In your map layout, highlight the municipality of interest in comparison to adjacent municipalities, include street name labels, and label the surrounding municipalities.

You must symbolize the main roads (e.g., the routes) differently from the minor roads. You also need to utilize different colors to symbolize the parks and the building footprints of the public facilities; you should also label these features. Use the appropriate overlay analysis tool, whether the union, intersect, or spatial join tool, to append the public facility attributes to the building footprints; this is one method that will allow you to label the building footprints with the appropriate public facility name. (There are

other ways to get to this same endpoint, but your supervisor wants you to become familiar with these tools!)

And, finally, include summary statistics for use by the Mayor's Office, including the total area within the municipality, the total number of buildings, the total area of building footprints, and the total length of the streets. Feel free to include other statistics that you think may be helpful. In general, be creative and produce an aesthetically pleasing, effective map that includes all the necessary map elements (e.g., title, north arrow, legend, scale, etc.)

Documenting the process

In addition to producing a map, you will produce documentation of the process you used to complete the task. This documentation (no less than one page and no more than 3) should include a brief description of the task, the layers used, and the steps taken to produce the final product. Develop the documentation in a professional manner, as if you were going to submit it to your supervisor. While you will not be required to create or update metadata for the GIS layers you used to complete the task, this is something that would (or at least should) be required under normal circumstances.

Bonus (5 pts): You may notice that the municipality boundaries do not conform to the streets with which they apparently should be aligned. While your company is not responsible for changing the official municipality boundary layer, you can make edits to the layer in order to align the Sinajana municipality boundary with the streets when appropriate; this will allow you to create a more accurate, and more visually appealing map. (HINT: create a map topology and edit shared boundaries using the appropriate map topology editing tools)

Bonus (5 pts): By default the labels for the municipality names will be placed in the center of the polygons; in order to make the map look more professional, place the labels along the municipality boundaries instead of within polygon (HINT: think outside the box – literally!)

Scoring: You will be graded on 1) your ability to complete each component of the task request, 2) the proper documentation of the steps you took to complete the task, and 3) the visual appeal and effectiveness of the map layout