**Lab 2 | GPS Data Survey**

**Introduction**

In this lab you will conduct a short, but complete GPS survey. This will give you some practice walking through the planning, implementation, and exporting of you field collected data using GPS. You will be collecting data and mapping features in the nearby Learning garden. It is a simple, yet comprehensive example of a GPS survey.

Throughout the lab, some instructions may be more detailed than others; if you have done them before in either a lab or in class, you will not find step-by-step instructions.

**Instructions**

Complete the hands-on exercises described throughout the lab and answer any questions in **bold**.

**Deliverables**

Answer the questions throughout the lab and produce any outputs, as instructed. Your lab document should be typed, well organized, and submitted based on the “how to” guidelines provided in the course syllabus.

\*You will want to print out this lab for reference while out in the field\*

***Part I – GPS Survey***

*Step 1.* Establish a project

The project will include mapping the location and condition of the Learning Garden on PCC’s Sylvania Campus

*Step 2:* Mission Planning

Go to [http://www.gnssplanningonline.com](http://www.gnssplanningonline.com/) to plan the best time to collect the data.

*Step 3:* Creating a base map

You will need a base map for your data collection in the garden. You should already have the Sylvania buildings in your unit. You may also want to include topography (contour lines), which are included in the RLIS dataset (be sure to clip them to campus).

 *Step 4:* Create a data dictionary

* Using the Data Dictionary guide provided on the last page of this lab – visit the learning garden on Sylvania campus and modify the dictionary to represent the features present at the garden.
* Come back to computer lab & create the data dictionary using Pathfinder office (following the steps below)
* Open Pathfinder and define the project path if necessary.
* Create a New project.
* Make sure the coordinate system is set to lat/long WGS84.
* Go to Utilities, Data Dictionary Editor.  Name the data dictionary, (something like Lab2dd), under “Version” select TerraSync v5.00 and later, and save it to your project folder.
* Create the data dictionary
* Save
* Go to File > Export ASCII File. Save your data dictionary as a text file (.TXT). You will submit this as part of your lab.
* Close the data dictionary
* Connect a receiver to your PC, making sure it connects to Windows Mobile
* Upload the data dictionary to the receiver using Utilities, Data Transfer, Send tab; Transfer All. Make sure you see the Transfer Completed window telling you that 1 File(s) Successfully Transferred.
* Disconnect the GPS receiver by unplugging the USB cable.

*Step 5:* Collect GPS data

* Head to the garden.
* Collect your point features.
	+ Planter: Map a corner point on 4 planters (choose a consistent location, like the SE corner).
	+ Facilities: Map at least 2 facility points.
* Collect your line features.
	+ Pathways: Map 5 pathways in the garden (each as straight lines, no turns!)
* Collect your area feature.
	+ Boundaries: Map the perimeter of the whole garden, cob structure, oven, and barn/storage
* Close all files and turn off TerraSync.
* Head back to the lab.

*Step 6:*  Download the data

* Connect the cable to your PC, and connect the device. Download the files using Utilities, Data Transfer, Receive tab.
* Look at your files in Pathfinder (you may need to select the option to view uncorrected data to do this).  When you are sure they are there, delete the files and the data dictionary from the receiver. (The path is My Computer/Mobile Device/TerraSnyc and delete all of the “R” files).

 *Step 7:* Filter and Export data to shapefiles.

* Under Utilities, Export, browse to the files, ensure the export folder is correct, and select Sample ESRI Shapefile Setup as the export setup.
* **Make sure the coordinate system is correct** in the export utility window (it should be lat/long WGS84). If you need to change it, click on Properties and the Coordinate System tab to change the export project; additionally, in this tab click Browse and select the correct projection file for your data. Remember, you will not be able to assign an ArcMap projection file in Pathfinder – this will be done in ArcMap.
* Still in the Properties, click on Position Filter and make sure “Uncorrected” is checked; make sure “Filter by GPS position Info” is checked and make Minimum Satellites “3D (4 or more SVs)”, Maximum PDOP of “6”.
* Click on the Attributes tab and select the following attributes to be exported into your shapefile (be sure to note all of the possible attributes; these are crucial for your metadata):
	+ PDOP
	+ HDOP
	+ Correction Status
	+ Receiver Type
	+ Date Recorded
	+ Time Recorded
	+ Data file name
	+ Total positions
	+ Filtered positions
	+ Height
	+ Vertical precision (point)
	+ Horizontal precision (point)
	+ Standard deviation
	+ Position (check the help menu to see what these are and how they will be coded in the shapefile attributes).
* Note where these files will be stored and change it if you wish. Click OK to the Properties window and OK to export.
* Read the dialog box to make sure that your features were exported. Some of the positions may have not met your filtering criteria. If this is the case, do the export again and raise your PDOP filter value until you get an export.

*Step 8:* Create a Map

* Open ArcMap and create a folder to your flash drive
* Add a background image (aerial photo) for the base map of the garden
	+ Download the zipped lab file (lab2.zip) and extract the files to your flash drive
	+ Add the Sylvania garden image to your map
* Save the .mxd doc
* Load your shapefiles from the GPS Survey
* Use the Project tool to assign the correct projection to each file, if needed. (If they don't line up within ~30 meters then you may have exported the files with the wrong projection information.)
* Create a map with all of the required elements.
* Display your features by attribute if the attributes were different (i.e. if some of the planters needed attention).
* Export your map to PDF.
* In the file menu for the attribute tables, go to Export. Export the attribute tables for all of the features as a TXT and change the file extension to .csv.
* Open the files using Excel and make a single excel file with multiple sheets – one for each attribute table. Name each sheet as the feature the table goes with.

*Step 9:* Answer the following questions:

1. **After completing your data collection, what would you change in your data dictionary design?**
2. **How closely did your most accurate point come to landing on one of the features (use the measurement tool in ArcMap)?**
3. **How similar is this error to the error suggested in your horizontal precisions and why do you think they aren’t the same?**
4. **How closely did your least accurate point come to landing on one of the features (use the measurement tool in ArcMap)?**
5. **How similar is this error to the error suggested in your horizontal precisions and why aren’t they the same?**
6. **Which features were mapped more accurately and why? (Note this may be related to data collection technique as much as GPS signals).**

*Step 10:* Turn in one lab PDF document containing:

* + **your answers from step 9;**
	+ **a map showing all of your shapefiles and the image with all of the map elements (title, scale, legend, north arrow, your name);**
	+ **a table displaying the attributes;**
	+ **a .txt file of your data dictionary.**

**Lab 2 | GPS Survey | Data Dictionary Guide**

**Instructions**

Use this outline as a starting point for your data dictionary. Before creating the dictionary, go to the Learning garden on Sylvania campus and make adjustments as necessary.

* Create a point feature called Planter
	+ Under Default Settings, set minimum positions to 30 and logging interval to 1 second.
	+ Under Symbol, choose a symbol
	+ Add a menu field (attribute) called “Plant Condition.” Make it required, and add the menu items Healthy (make this the default), Needs Attention, Needs Replacement.
	+ Add a date field that is auto-generated
* Create a second point feature called Facilities
	+ Under Default Settings, set minimum positions to 30 and logging interval to 1 second.
	+ Under Symbol, choose a symbol
	+ Add a menu field called “Type”. Make it required, and add the menu items like spigot, hose, trash can, debris bin, etc.
* Create a line feature called Pathways
	+ Set logging interval to 1 second.
* Create an area feature called Built
	+ Set logging interval to 1 second
	+ Add a menu field called “Type”. Make it required, and add the menu items like garden boundary, cob structure, oven, storage, etc.