2003 G.P.S. FINAL PROJECT

Presented by: Stephen J. Bodick

Date: November 9, ~ December 11, 2003

Instructor: Robert Beall, Ph.D.
SUMMARY

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A reference to all the images within the report.

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Pathfinder Office 2.90 (SAT 154-17)

Arc View GIS 3.2 (SAT 154-17)

AutoCAD 2000i (SAT 154-17)

Google.com (SAT 154-17)
In this document I prepared, for your viewing pleasure, I plan to focus on how the idea came about, data collection, equipment used, programs used, data dictionary info, problems encountered and how they were solved, and illustrations of all of the work done.

When the word came out in class that we had to come up with a final project mapping idea, the first thing that came to mind was mapping the features of my own property. There only inlayed one problem, my parcel contained roughly 10.7 acres and the project outline instructed me that we had to have 20 or so acres that our project revolved around. The second thought that came to mind was the neighbor has 70 or so acres that I could map. With all of that land available to me the ideas just kept coming and coming. First the thought of roads and property corners, and buildings, after that the sky was the limit for me. With the ideas in my head, I decided to put them all into a data dictionary, the next step was to map the land.

The parcels are located roughly 13 miles east of Kalispell off of Yoeman Hall Road. They are located in sections 21 and 22 of township 29 North range 20 West. The field property is in section 21, where the two smaller parcels are in section 22. With the field covering roughly 60 acres, it was plenty of area to base my project around although there were many more features within the two smaller parcels that I decided to include them in my project. I began my mapping part of the project on the 16th of November, the mapping aspect took me roughly three hours and fifteen minuets to complete. With the skyplot and Pdop chart indicating that the morning hours and afternoon hours until roughly 2:50 would be the best time of the day for mapping, I started mapping at 12:01p.m. and finished a little after 3:10 p.m.

To map the parcels I used a GeoExplorer III (# 7) manufactured by the Trimble Navigation, Ltd. located in Sunnyvale, California. The GeoExplorer operated and performed extremely well. With the conditions that day being overcast and cold, the receiver had no problem maintaining satellite reception. The accuracy level was outstanding given the fact that I did not have an antenna to use during the process of collecting data. The day after all of the data was collected, it was time to download the data off of the GeoExplorer using the serial clip connected to computer seventeen in the G.I.S. lab or S.A.T room 154. With all of the connections made, I then fired up GPS Pathfinder Office and proceeded to transfer the data from the hand held to the computer and saved it to my H drive as r111617B.ssf.
The following day I proceeded in differential correction of the file r111617B.ssf using the Montana State Department of Transportation base station. The process of differential correction took place in the Pathfinder Office program. To locate the Differential Correction feature I needed to click in the Utilities dropdown and you will find the feature there. Once the Differential Correction feature is clicked you will have to route to your file of choice, the next step is to set up the route for your corrected data to go to after being corrected. First you need to correct the data using the local search, Internet, or browse command and either select the base station you prefer or the correction files that pertain to the data file being corrected. Once the transfer has gone through you need to go to the drive and file that you routed the corrected files to be able to open them.

Before all of the previous information can be done, I first needed to set up a data dictionary to the specifications I chose. Consisting of points, lines, and areas, which all need to have certain features and attributes. From there all of the features must have a specific time interval and line type. The data dictionary is then built in the Pathfinder Office program under the utilities dropdown. I based my data dictionary on things that I have wondered about such as acreage, and one thing that I thought would be neat to map like roads and irrigation lines. Other planning also needed to be done in order to produce a top quality image. Things such as researching the best time of day to collect data due to the number of satellites in view, and the Pdop value at the given time coinciding with the best time for the satellites in view. All of this information needs to be taken into consideration in order for the GeoExplorer to work properly, and relay reliable data to the computer for the production of top quality images.

In the construction of my data dictionary, I first decided that the roads needed to be constructed first because that is how you access the parcels, next would be the property lines and areas, third was the irrigation which consisted of lines and points. The points being the motors, and the lines being the pipe on the ground. Fourth, were the survey monuments that had been set around the parcels and the type of monuments that were set. Fifth, were the buildings that are on the parcels and the type of building. Last is the hay field that is on my parcel of ground and the acreage of the field, also a generic feature for a point, a line, and an area, in case of an extra feature being needed.

Here is a copy of the data dictionary.

"STEPHEN BODICK ", Dictionary, "GPS FINAL PROJECT"
"ROAD", line, ",", 1, seconds, 1, Code
"ROADS", menu, normal, normal, Label1
"BEAR LN ", default
As for problems, there were very few that I encountered. I had a few problems with multi path errors in the timbered areas. All of my points showed up exactly where I expected them to be, and were the shape and design I gave them in the data dictionary. Areas had no significant problems that I could recognize, all of the areas came out to around the correct acreages. One of the largest problems I encountered was Pdop, it happened in the last 15 or so minutes of collecting data, it seemed that the GeoExplorer stopped beeping. To solve the problem I then went into the configurations, then GPS, and changed the Pdop value from 4 to 5, that seemed to solve the problem. I really never ran into any major problems that caused me any grief or loss of time in the field.

The image shown above is projected in WGS 84. The data is NOT corrected and shown exactly how I first saw the image in Pathfinder Office.
This image is the corrected, it is displayed in the WGS 84 datum and the points were shifted about 10 feet in the direction of 184.3436 degrees.

This is the final product after exporting the r111617B.cor file out of Pathfinder in WGS 84 and opened it in AutoCAD as r111617B.dwg, from there I did all of my editing and saved it as a DWG and a DXF. I then exported the file from AutoCAD to ArcView and opened it using the cad reader option under file extensions.
This is the final image after the file was opened in ArcView using the Cadreader helper under file, extensions. The points were brought in and changed to different symbols after the drawing existed. This is a very interesting, as well as a useful feature to have in the program.

This is the 1991USGS Orthophoto taken of the area known as Columbia Falls South. The image is displayed in WGS 84 datum as with the map image that has been placed on top of the photo. All the property lines matched up correctly and displayed properly.
## Metadata Form

<table>
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<th>Origination</th>
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<tbody>
<tr>
<td><strong>1. Author</strong></td>
</tr>
<tr>
<td>Stephen J. Bodick</td>
</tr>
<tr>
<td><strong>2. Date</strong></td>
</tr>
<tr>
<td>11/16/2003</td>
</tr>
<tr>
<td><strong>3. Title</strong></td>
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<tr>
<td>2003 <em>G.P.S. FINAL DOCUMENT.</em></td>
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<td><strong>4. Data Layer</strong></td>
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<td><strong>5. Coverage</strong></td>
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<td><strong>7. Source of data</strong></td>
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<tr>
<td>Geo Explorer 3 (#7)</td>
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### Source Map Information

| **8. Map Type**                                  |
| AutoCAD lt 2000i                                 |
| **9. Original Map Scale**                        |
| 1 = 50                                           |
| **10. Digitized Map Scale**                      |
| none                                             |
| **11. Map Medium**                               |
|                                                  |
| **12. Map Projection**                           |
| WGS 83                                           |
This project has become very interesting as well as fun. I’m not saying that I didn’t have my share of troubles in the field or in the lab, many times I spent hours upon hours in the lab trying to figure out why one particular aspect didn’t seem to work properly. In the end I hope it will all pay off as far as a grade goes, but for now it is already paying off, I have become more knowledgeable with the equipment operation, and have reached a point of comfort when using equipment in the field or programs in the lab. This exercise was a great learning experience, we (my neighbor and I) will now have a better understanding of our properties and the things that can be done to the property to both benefit us, as well as the land.

The land in the following parcels are rich in timber and cropland, with this knowledge we will be able to plant crops that will be more productive to the farmer, and harvest trees to better manage the forested areas within our parcels. I highly recommend this type of project to the future classes of Flathead Valley Community College. Go out to some farms or ranches in the Flathead Valley and ask if they will let you map their property, chances are that the answer will be yes. Heck, the owner of the property would be just as interested in the outcome of the map as you would be. Also, it may just benefit the farmer to better understand the layout of his land and how he or she can be more productive with what they have.
This image illustrates the Pdop values throughout the day of November 16, 2003. The same day that I conducted the data collection part of this project.
This illustration depicts the location of the satellites within view on the day of data collection.

This illustration depicts the number of satellites that will be in view at certain times of the day, for my project the time period between 12:00 p.m. and 1:50 p.m. had the highest number of satellites in view.