Mapping the Great Northern Historical Trail

by

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Abstract

Mapping the Great Northern Historical Trail is a project designed to inform the public of a non-motorized trail that has been provided through the persistence of community members and improved by the generous donations of local families and businesses. By using a Thales Mobile Mapper CE gps data collector, aerial photography, and ESRI’s Arcview program, I have located and displayed the portion of paved pathway between Meridian Road and Derns Road in Kalispell, Montana along with signs, benches, and trees associated with the construction of the trail for the enhancement of its service. The background information was provided mainly by one of the founding members of the local chapter of the National Rails to Trails Community, Don Snow. Mapping the trail involved creating an adequate data dictionary and a little creativity in collecting the 2 ¼ miles of paved path with my mountain bike. Interpreting the data demonstrates the utility and accuracy of the mobile mapping unit when differentially correcting it with the Continually Operating Reference Station (CORS) located at Flathead Valley Community College. The expected continuation of this Rails to Trails project and the popularity of similar public trail projects in surrounding communities might be facilitated by some of the mapping strategies that I have demonstrated.
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Introduction

My decision to choose mapping the Great Northern Historical Trail as my gps project could be attributed to numerous factors: 1. Location, 2. Open Horizon, 3. Personal interest and questions about the trail, and 4. demonstrating the capabilities of the MMCE.

The Great Northern Historical Trail proximity to Kalispell and the FVCC campus allowed me to visit the site for several collection sessions. At Meridian Road, the trail is just two miles from the FVCC campus and therefore a perfect candidate based on my ability to easily access the site for data collection and final proofing.

An open horizon should be an important consideration in any GPS project. GPS relies on signals from the sky that can be diluted and refracted by objects between the satellites and receiver. A project without obstructions like trees and buildings is vital to improve the percent dilution of precision (PDOP) and related correctness of acquired positions. The chosen portion of trail is mostly void of abundant signal blocking obstacles. A 6 ft. chain link fence, and a 130kv transmission line, were variables that allowed me to test the vulnerability of the MMCE to multi-path without seriously jeopardizing the core of my data and intentions of my project.

Another attraction to this project was curiosity about the practical aspects of the trail. Prior to this activity I had only viewed portions of the path while driving Hwy 2 west. I frequently wondered about how the trail was established and what improvements complimented the asphalt path? Observations from the highway precluded that a variety of signs and fences had been built to support the trail.

Furthermore separated and unpaved sections carry on between Kalispell and Kila. Visible staking in these portions indicated that the construction continues. By mapping a finished portion, I hope to demonstrate the utility of sub-meter gps for inventory and aiding in the conclusion of the venture.

The major intent of this project is to inform the public as to the best places to access the trail and as to what amenities have been incorporated for its’ enjoyment. I will be focusing my project area between the trailhead in town to the intersection of Derns Road, as this section will likely be most convenient to local recreationalists. The length of this section is roughly 2 ¼ miles long.
Background

Getting reliable locale history on the Rails to Trails program took a bit of investigation. The concept of converting abandoned railway right of ways into safe non-motorized trails is not unique. In eastern states where railways were once the major form of transportation peaking around the 1920’s, old lines are commonly replaced by recreational and alternative travel ways. The Montana Department of Transportation site at http://www.mdt.mt.gov/travinfo/bikeped/biketrails.shtml listed John Hale, a Kalispell resident as the acting president of the Rails-to-Trails of Northwest MT. Though he was involved with the organization soon after the group’s development in 1988; his active involvement as president ceased close to ten years ago and the web site is obviously quite outdated. A conversation with him did however shed light on some of the origins and intentions of the group and more importantly provided contacts who are still directly working on the project. Of these contacts I was able to converse with Don Snow, a Kalispell resident since 1985 whose initial involvement, began in the earliest stages of developing the trail. He is passionate about the program and his insight shed light on many questions and misunderstandings that I had about the Great Northern Historical Trail. Among these misunderstandings from the outdated MTD site, was that the trail originally planned to utilize the entire abandoned Great Northern right-of-way from Kalispell to Marion (21+ miles). This dream has been more or less discarded as being, for the present, financially and feasibly not ascertainable.

The idea for an alternative trail began in 1988 when Burlington Northern announced to local officials that they intended to abandon their section of tracts between Foyes Lake and Somers. Stated as a key element in the trail project’s origins, Mark Koenecker, was then on the Flathead County Parks Board. He aided in ascertaining funds for purchasing the historic land for a safe recreational trail. When it came time to negotiate the purchase of the intended holdings, the asking price was so far below what was expected by the board that they were able to use the money for both acquisition and improvements. Thus the first section of historic railroad was paved for the public in the Flathead Valley from Somers to the intersection of Hwy 82 and 93. The Montana Transportation Department later extended this portion to its current dead-end at the meeting point of Ashley Creek making this section nearly 5 ½ miles long.

In the local of my mapping project, the 0.9 mile section of the path east of Derns Road was first to be graveled. The Meridian based connected portion followed sometime soon after
and in 1992 was paved up to about the 1 mile marker. The later negotiations with the railroad for the section of trail in town were not so easy as before, since Burlington Northern still maintains a semi-active “Y” station to where the tracks end behind Fun Beverage. A “Y” station has been explained to be a portion of track where a train can reverse positions of the lead engine. Burlington Northern required $40,000 for a 20 year lease on the portion to be made publicly accessible. Much of this funding (~70%) has been provided through matching dollars from the highway department, set aside to improve the safety of highways for pedestrians and cyclists. It is hoped by the city planners that before the lease is up the railroad will no longer have any interest in the portion of tracks that split downtown, as there only customer in the vicinity is reportedly Equity Feed and Grain.

PLANNING

Mission planning for my data collection through the Trimble web site, promised no lack of available satellites during daylight hours. In my proposal I had inaccurately viewed an outdated sky plot and PDOP map which lead me to believe that the afternoon had occasional spikes in percent dilution of precision. This was far from true as displayed by the correct almanac.

My original data dictionary as tested on 11-15-05 contained too many text descriptions that proved cumbersome to enter in the field. Utilizing the menu function in my data dictionary proved much more efficient. At first I had hoped to collect the same positions of right-of-way
marking survey caps on the ground to compare the repeatable accuracy of the MMCE. Later I changed my mind, expecting my comparison to be better measured by collecting certain vertical metal trail barriers that were 3 feet high as opposed to at ground level. An evaluation for recorded position variance is listed in the results section of this report.

Besides choosing barriers over survey caps, I chose to omit the fence data that I had begun to collect because it paralleled the 9’ wide path and distorted the clarity of my displayed data when viewed at scale depicting the full area.

**Materials and Methods**

Collecting my data was intended to be done in two separate sessions. One in which I would collect point data of benches, trees, and signs as well as the parking area data while on foot. The other session would be the trail data to be collected via mountain bike so as expedite my movement and prevent a gigantic file due to collecting too many positions at a snails pace. In the bicycle segment I used the hockey puck antennae attached to the front of my bicycle via a telescoping shovel handle and some duct tape.

The purposes of the antenna’s mounting technique was too prevent covering the receiver with my body while riding, and too arrange an easily accessible unit that could be conveniently detached from the bicycle to capture additional point information. Whenever I needed to access the MMCE receiver to change layers etc, I would simply take the unit out of the handlebar bag lay it on top and perform the functions while comfortable resting my elbows on the handle bars, never blocking the antenna. The telescoping shovel handle allowed me to remove the antenna from the bike so that I could leave the bike and walk off the trail when necessary. The design performed exceptionally, proving to save much time and disk space.

Data problems occurred that demanded revisiting the project area with the MMCE twice more. Collecting the road data was potentially hazardous on busy Meridian Rd., so I opted to pick a Sunday afternoon when traffic was light to gather the centerline data there. Somehow I
lost my shapefiles related to the designated parking areas for the trail. Though small in total area, the dilemma was worthy of one last gps session.

**Results and Discussions**

The data collected is best portrayed by the following maps. Arcview’s info button lists the individual point features and attributes on a spatially oriented display. A list of donated items and sponsors substitute for the accumulative exhibit.

![Figure 1: Project Area with Features](image)
Figure 2: The Meridian side of the Great Northern Historical Trail

Figure 3: The Derns Road side of the GNHT
Comparison of Merged Data:

As stated one of my project goals was to see how points collected on different days, fit together on a map to compare the accuracy of my point data. Several environmental factors may have influenced the results, making it impossible to pinpoint exactly which of these variables caused the inconsistencies of barrier locations. Solar flares may have muddled the CORS post processing data causing a shift in computed location. It is possible that multipath errors reflected off of the adjacent 6’ tall chain link fence caused false position interpretation by the receiver. Also I collected some points on 11-29-05 with position averaging enabled after 20 vertices were recorded and on 12-04 with 30 vertices averaged in order to see if it would indeed be more accurate. Obviously more than one session at each set of barriers would be necessary to absolutely confirm results. The only statement that can be positively confirmed by my resulting corrected data is that there is a difference.

Another comparison is worth showing, and that is the difference between uncorrected and differentially corrected points. The spike in the railroad tracks shows the most dramatic change in the positions after differential correction, but a shift in the path location is also rather apparent. In the case of the path I believe the shape of the uncorrected path to be more consistent with the real deal.
Comparison
List of Donated Trail Improvements:

Trail partners include the City of Kalispell, Flathead County, the Flathead Electric Co-op, and businesses and residents of Flathead County. Flathead Electric can be attributed to the 6 feet tall chain link safety fence separating the trail from the railroad tracks near on the Meridian side of the project. Other financial donators of significant amounts are listed on a ceramic plaques attached to a concrete wall at the beginning of the trail at the Meridian Rd intersection. This list shows the contributors of trail associated features like benches, milepost signs, and trees.

<table>
<thead>
<tr>
<th>Benches</th>
<th>Donated by</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wood with backrest</td>
<td>Block Surveying</td>
</tr>
<tr>
<td>Wood without backrest</td>
<td>Francis C. &amp; Margaret ______</td>
</tr>
<tr>
<td>Wood with backrest</td>
<td>Mann Mortgage</td>
</tr>
<tr>
<td>4 Metal w/ backrest</td>
<td>None listed</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Trees</th>
<th>Donated by</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ponderosa Pine</td>
<td>Battee Excaviting</td>
</tr>
<tr>
<td>Ponderosa Pine</td>
<td>Goosebay Equipment</td>
</tr>
<tr>
<td>Ponderosa Pine</td>
<td>Kodak American Greetings</td>
</tr>
<tr>
<td>2 Ponderosa Pine</td>
<td>Missing Plaques</td>
</tr>
<tr>
<td>Ash</td>
<td>Fun Beverage</td>
</tr>
<tr>
<td>Ash</td>
<td>Mann Financial</td>
</tr>
<tr>
<td>Ash</td>
<td>Kalispell Regional Medical Center</td>
</tr>
<tr>
<td>Ash</td>
<td>Coon Hollow Forge</td>
</tr>
<tr>
<td>Unknown deciduous</td>
<td>Northwinds</td>
</tr>
<tr>
<td>Unknown deciduous</td>
<td>WCS &amp; T</td>
</tr>
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*Numerous other trees and benches are displayed on the map that are perceptibly added improvements to the trail, but have no plaque indicating a specific donator.*
Conclusions

The Great Northern Historical Trail is the perfect solution for one of Kalispell’s most prominent transportation problems. As a cyclist, I continually deal with the frustration of dealing with motorized traffic (including sucking its exhaust) when riding from point a to be. Ventures like the Great Northern Historical Trail hold the transportation department accountable for all transportation. This trail insures the safety of and promotes the use of healthy alternative travel and makes the city a better place to live. Much of our real freedom as Americans stems from our freedom of mobility. By utilizing existing easements this trail models forward progress in insuring this freedom, without infringing upon the rights of private property owners. Though currently fractured and disconnected the trail is expected to join with the oncoming Hwy 2/93 bypass. Right now Montana’s congressmen have set aside $35 million for this project that, pending another $35 million, will branch from a point near where the Somers bike trail ends at Ashley Creek and parallel much of the existing mapped trail to Hwy 2 west. The following photo illustrates a lath marking the edge of right of way for this proposed bypass. Though unfortunate that the bypass will infringe on the scenic views, quiet atmosphere, and fresh air currently enjoyed on this trail, the concept of an attached non-motorized path has positively been adopted and this marks a step in the right direction for the community.

Recommendations

Though definitely not capable of precise boundary or construction grade surveying, the Thales MMCE unit has proven to be proficient in spatially orienting items for data reconnaissance. The ability to organize and label this data with an adequate data dictionary simplifies both field survey and office interpretation. My aim in mapping the trail and features
associated with it goes beyond directing public awareness of the trail. Perhaps the future expansion can benefit from the inventory of signs and other trail improvements. Referencing this project might aide in the planning and assessment phases of the new construction.

References:

Bob Snow (Rails to Trails of Northwest Montana)- telephone interview for background information.

Almanac – Trimble web site @ http://www.trimble.com/gpsdataresources.html

7 ½’ aerial photographs – NRIS/Montana/gis.gov

CORS Data - @http://www.ngs.noaa.gov/CORS/download1/ (ufcors)