

Final Report
Montana Department of Transportation
FY01 Intelligent Transportation System (ITS)
Integration Component of the ITS Deployment Program

Project Description:

Project Identification Number and Name: State of Montana

Project Location: Montana

Submitted by (Agency): Montana Department of Transportation
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Executive Summary

The Montana Department of Transportation (MDT) developed a public road information system framework for approximately \$823,000 (see Appendix A). The Global Positioning System (GPS)/ITS framework allows:

- Montana counties to use the data for the 911 emergency response systems;
- Montana counties with road inventory data collection systems to utilize this data for validation and updating their systems;
- The Montana State Highway Patrol to use the data for the proof of concept of the Automated Vehicle Location system (AVL).

Project Scope and Objectives

Background

There are approximately 74,800 miles of public roads in the State of Montana. About 62,800 miles fall within the jurisdiction of county, city, and federal governments.

MDT partnered with the Montana Association of Counties (MACo) to collect GPS spatial data and coordinates on select roadways. Thirteen counties participated in the data collection process.

MDT Research, Inventory and Mapping (RIM) section in the Planning Division provided quality control on data submitted. Personnel from the Information Services Division provided training, hardware and software integration, and the data management resources for project implementation.

Project Objectives

- Develop and implement a standard framework for data collection, storage, and retrieval of public road information.
- Develop a memorandum of understanding (MOU) between MDT, MACo, and local governments. The MOU defines the standard framework, the rules for first-time data collection, and data maintenance into the future. (see Appendix C)
- Provide a central repository for public road data for state and local agencies.
- Cleanse and incorporate collected data into the statewide GIS-T framework.
- Document issues and resolutions with cooperation between public sector agencies.
- Document lessons learned.

Issues and Resolutions between Public Sector Agencies

MDT

- Groups within MDT were reluctant to support the project due to accuracy concerns of the newly collected data, the collection methods, and the impact on existing data. Agreements with the groups were developed to protect historical methods and data. Integration of the new data with the historical data was addressed on a case-by-case basis.
- Due to the size and scope of the project there was a lot of distancing from the project in case it failed. The groups were invited to participate in the project from helping with training to assisting with the QA/QC processes. The groups had a vested interest in success by participating throughout the project.

Transportation I-team

- The I-team wanted counties to be paid for their existing data. Group discussions determined that existing data sets were collected using different methodologies. This put these data sets outside the scope of this project.
- The I-team wanted assurances that the data collected could be used in the state transportation model. MDT proved that the new data model can be used by the GPS collection process.

MACo

- MACo lead in helping overcome any issues with the counties. MACo's support reduced skepticism of the project.

County Commissioners

- All county commissioners needed to support the project and trust MDT as the lead agency. MDT participated in county conferences to address questions and concerns. The counties needed an inventory of roads open to public travel.

The issue needing addressed was, "did the counties trust MDT to follow through with what was being proposed?"

MDT has used GPS collection methods since 1997. MDT listened to the county concerns and addressed the concerns within the project.

MACRS (Montana Association of Road Supervisors)

- MACRS wanted every detail about the road collected. Through meetings, this was shown to be unrealistic.

Lessons Learned

MDT

- How was the data going to be efficiently collected?
The software developed allowed collectors to collect GPS coordinates utilizing historical data which helped correlate the proper attributes with the road data. Three road ids were available for collectors. The first was the id used by MDT, the second was the road id used by the county, and the third id was the local name of the road. This created a translation mechanism between MDT systems and the county systems.
- How was the data going to be integrated with the current MDT systems?
MDT has a Linear Referencing System (LRS). The LRS is a mile post offset system utilized by MDT management systems. This system is easy to collect data for because it doesn't require sophisticated equipment.
- What guarantees that the data was correct?
This project spent a considerable amount of time on quality assurance and quality control (QA/QC) to guarantee the new data was accurate. Acceptance was achieved by showing the data against aerial imagery.

Transportation I-team

- How would the data be transformed into the state transportation model?
At the time the project started the state transportation model was in its design phase. Collecting points with three different ids, work created by any method can be utilized by the model. The final state model centers on ESRI's UNETRANS model. MDT provided data for this model.

County Commissioners

- What guaranteed the data would be accepted?
Historically, the counties submitted their road data to MDT via paper maps and cad files for the gas tax payment system. Some roads submitted did not qualify as open to public travel. The GPS units were mounted on vehicles doing the data collection. This validated that the data being submitted was on a public road.

Counties

- MDT established a FTP site for data submission and subsequent cleansed data. The data submission to the ftp site is secure and only the collectors can submit data. The data collectors were trained to backup their

data daily. This allowed for the possibility to submit the data by mail if necessary. After county data was collected and the QA/QC was done, the data was deposited back on the ftp site for the county to review. Annually, MDT places updated data on the ftp site for the counties and other agencies to use.

- The county commissioners learned that good data alone does not make a GIS system. This project was a data collection process that allowed each agency to use the data in their processes. Some counties were disappointed that they did not receive a polished GIS data set that would meet their particular business needs. That was outside the scope of this project. The state transportation model will pursue a single GIS transportation system for the whole state.

Innovative financing or procurement and/or public-public partnering techniques.

- MDT and MACo partnered together to achieve a common goal which produced a cost effective project. GPS data collection done by the private sector tends to run three times more expensive than this project cost. The counties and MDT absorbed some resource costs to insure a successful project. Some of the counties had GPS projects that were not successful and could not afford another failed attempt to inventory their roads.

Everyone realized a good road inventory was needed. The benefits collecting data in a common methodology is still being realized. Data can now be easily shared between bordering counties. E911 systems can now integrate between counties.

Conclusion

This project was very successful and impacted the entire state. The counties participating in the collection process have a common GPS methodology to collect their road data. MDT has a complete inventory of roads open to public travel using the same methodologies. The state transportation GIS has data from MDT and counties to create a single state GIS data set. The key to the success of this project was the work done getting all parties on board with the project.

Appendix A



MONTANA DEPARTMENT OF TRANSPORTATION
INFORMATION SERVICES BUREAU

Statewide GPS
Project Development

Revised April 23, 2002

Prepared By

Information Services Bureau
and Road Inventory and Mapping Section

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Introduction

The Statewide Global Positioning System (GPS) Project is a joint undertaking between the Montana Association of Counties (MACo), the Montana Department of Transportation (MDT), and the Counties to collect GPS coordinates on eligible routes across Montana.

Purpose

The purpose of the Statewide GPS Project is to accurately collect, share and exchange digital spatial road information in the State of Montana.

MDT will provide the data repository. The data will be in a standardized format enabling sharing of data.

Users will have the ability to access and use digital, geographic, ground-transportation databases to meet their Intelligent Transportation System's (ITS) needs. Laying this groundwork will eventually support a wide variety of transportation-related applications such as 911 emergency response and ITS Automated Vehicle Location (AVL) technology.

MDT Contacts

Skip Nyberg is the Project Lead. If the following individuals are not available, please contact Skip for assistance at 444-7266.

File Transfer questions (ftp or zip disk)

Skip Nyberg 444-7266

Equipment and program questions:

Zia Kazimi 444-6111

Richard Fioriti 444-9239

Quick Plan questions – Satellite Collection Forecast

John O'Mara 444-6307

Terry Gustafson 444-9228

Global Positioning System (GPS)



GPS is a worldwide radio-navigation system formed from a constellation of 24 satellites and their ground station. They orbit the Earth twice a day at an altitude of about 12,000 miles. Twenty-four hours a day, these satellites continuously broadcast high-frequency radio signals containing position and time data, enabling anyone with a GPS receiver to determine their location anywhere on Earth.

Every point on Earth can be identified by a specific address. By using two sets of numbers, referred to as coordinates, which represent the exact spot where a horizontal line (latitude) crosses a vertical line (longitude), you can represent any location precisely. GPS receivers report and record your current position in longitude, latitude and elevation (X, Y, and Z coordinates).

GPS uses these satellites as reference points to calculate positions accurate to a matter of meters (*Resource Grade*). With advanced forms of GPS (*Survey Grade*) you can make measurements to better than a centimeter. GIS can use GPS as a form of data collection.

Examples of *resource grade* GPS usage within the department include:

- gathering the coordinates for all State-maintained roads in Montana
- wetland inventory
- traffic signal coordinates
- traffic counter locations

Geographic Information System (GIS)

GIS is a computer system for assembling, storing, manipulating, and displaying data which contains physical locations (geographic coordinates) of features and information about those features (attribute data).

Road Networks are the heart of MDT's GIS system.

An example of a type of analysis performed using GIS capabilities is proximity analysis --> examining how one set of features relates to another. For example, a road database could be analyzed in conjunction with a database of stream locations, bridge locations, railroad crossing, etc.

Examples of questions GIS could answer include:

- Which roads are located within one mile of a specific stream?

- Display high-accident areas.

- Display bridge locations.

- Display all railroad crossings within two miles of schools.

- Display all road sections where the sufficiency rating is below 7.

- Show the location of city or school bus stops.

- Display the location of speed zone changes along a highway.

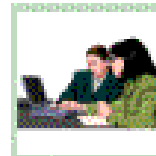


Please see **Definition of Terms** in the back for unfamiliar terms.

Overview

Pre-Inventory Process

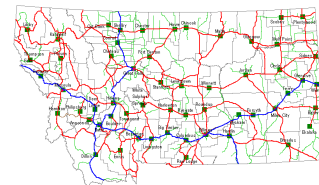
MDT's Road Inventory and Mapping employees prepare the laptops by loading all necessary files on the laptops. This should be a one-time process.



The GPS Collectors (usually the County Teams) use a checklist to ensure they have all of the equipment and that it is all operational before leaving.



A reference map is used to help plan and prepare for the inventory process. The GPS Collectors identify the routes that they will drive that day. The map contains MDT route IDs that the GPS Collectors need to use.



The GPS Collectors check the Quick-Plan software to see when is the best time to collect data for various roadways. This information is used to determine how to drive the routes for the best satellite coverages (to get good GPS readings).



A check list (page 19) is used to help set up the equipment and prepare for the inventory process.



Data Collection

The GPS Collector will open a file that contains background maps for each county. Roads are displayed on the background maps.



As the data collection process continues throughout the day, the GPS Collectors should create a new file every four hours and save their current file. MDT recommends saving files with no more than four hours of work in case a file is corrupt. It's easier to redo four hours work than a full day.

Data Backups

At the end of the work day the files are backed up to a zip disk and cataloged. The disk and catalog will be retained by the county which collects the data. The disk will be used as the master in case of loss or errors in the submittal process.



Data Submittal

Once every week the data is submitted to MDT's Road Inventory and Mapping Section. After initial check to make sure that all the fields are populated, the data can be submitted to MDT by either copying the file via the internet on MDT's ftp site; or, the data may be copied to a zip disk and mailed to MDT. The ftp site is _____.



For the first submittal, MDT recommends collecting eight hours of data then submitting the data either via the internet or on MDT's ftp site. The Road Inventory and Mapping Section and Information Services Bureau personnel will review the data to ensure QA/QC and help the GPS Collectors where it appears that they had trouble or misunderstood.

Data Acceptance

Data collected is considered accepted after quality assurance and quality control (QA/QC) has been performed by MDT staff. If the data is in error from not following policy and procedures, then the collection will be redone at the expense of the contractor; for other issues, MDT may request the collection to be redone at MDT's expense. Other issues could include such things as a short in a cable or a bad spot on the hard disk.

Skip

Do you want me to include a flow chart here or more information on how our QA/QC proceeds?
If so, Skip, would you e-mail that info to me. Thank you.

Skip will have this by 4/29/2002.

What Roads to Collect Data on

This collection effort includes:

- *All roads open to public travel*
(General-traveled roads considered public)
- Streets within an incorporated city/town
- Alley ways
- Main roads through oil fields (connectors);
not roads that dead-end at oil rigs or storage tanks.
- Canal roads
- Roads that provide access to picnic, camping or fishing areas
- Trailer-court roads
- Roads with cattle guards

It does not include:

- The National Highway System (NHS)
- The State Primary System
- Private Drives: Farm, ranch, and residential driveways
- Primitive trails
- Field access roads
(provides access to agricultural field(s))
- Roads not passable by a two-wheel drive vehicle
- Roads having restrictive gates, orange paint, and prohibitive signs

The following roads may be inventoried:

- Cemetery roads
(the inventoried road will end at the main gate or entrance)
- College campus roads, if they are part of the City's street network.

What is Open to Public Travel?

Open to Public Travel is defined as a segment of road available for public use except during periods of extreme weather or emergency conditions, passable by a 2-wheel drive passenger car and open to the general public.

Examples of Roads to Exclude

Not Accessible by Two-Wheel Drive



Primitive Road



Field Access

If what appears to be a field access is actually a connector between two roads, it will be inventoried if it meets the criteria of a Bladed Road. See Definition of Terms.



Restrictive Roads

Under criminal trespass in MCA 45-6-201, a No Trespassing Notice “*must be placed on a post structure or natural object by marking it with a written notice or with not less than 50 square inches of fluorescent orange paint*” and if property has been posted as stated above “*it is considered closed to public access unless explicit permission to enter is given by the landowner or his authorized agent.*”

Note: If these roads are actually public or county roads, the county will need to remove the signs prior to the inventory.

Restrictive Roads (continued)



Posted No Trespassing and fluorescent orange paint.



Examples of Roads to Include

Signs posted along the roadway, no closer than 30' of the centerline of the roadway **restrict access to the land** adjoining the road.

Roads that are well-maintained and clearly serve as major connectors within a county but may have orange paint on posts adjacent to cattle guards will not be considered closed to public travel.

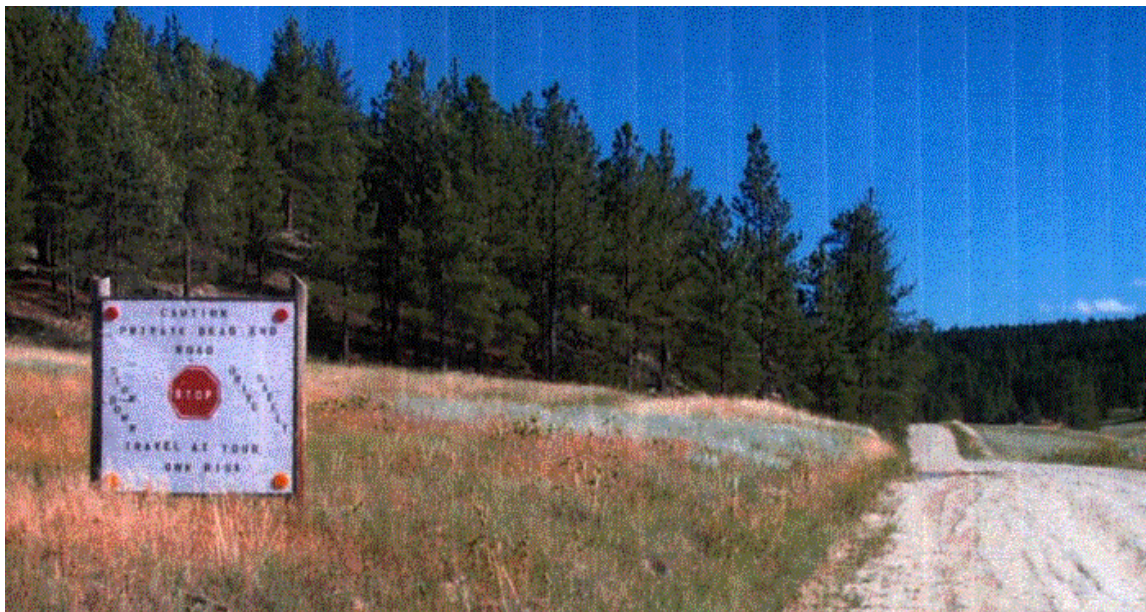
Note: Wire gates used to restrict livestock are not considered to be a restrictive gate *unless* accompanied by orange paint or a restrictive sign.

Even though this sign reads 'Mule Skinner Ln Pvt', it is still open to public access.





This sign reads: Private Dead End Road, Travel at Your Own Risk.



Procedures

General

There are basically three data items of coordinates that will be collected. They are the:

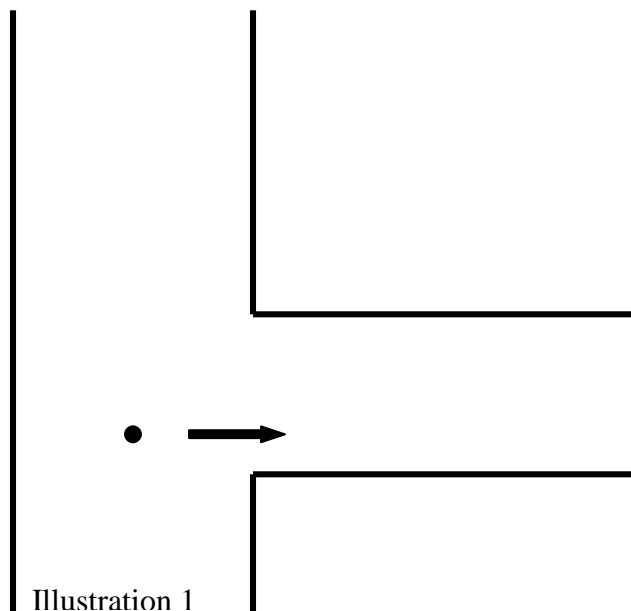
- Road Segment
- Beginning of the Road (Begin Node)
The physical start of a road – usually an intersection or junction.
- End of the Road (End Node)

The road may be inventoried by starting either at the beginning or the end, but the direction of travel must remain the same from start to finish.

The beginning of the road is the center of the junction where the road begins or where the road starts being considered ‘open to public travel’. (see illustration #1)

The beginning of the road is identified with a “B” as found on MDT’s county map sheets or the county maps displayed as a background in the collection software. The beginning of a road is usually at an intersection.

The end of the road is identified with an “E” as found on MDT’s county maps sheets or the county maps displayed as a background in the collection software and may end at any given location.



When two county roads intersect at a ‘T’ junction that forms a triangle (see illustration #2), only one of the two connectors will be inventoried. Either of the two may be selected; however, when one road shows more signs of being used, it should be the one inventoried.

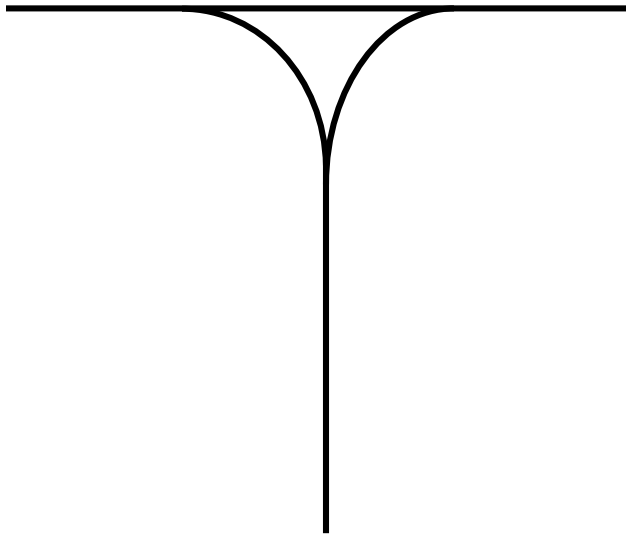


Illustration 2

The end of the road is either the center of the junction where the road ends or it is where the road no longer meets the criteria as established above.

A signed name for the road will be collected if physically posted; otherwise, the GPS Collector will make every effort to obtain road/street names from cities and counties prior to the actual inventory.

The existing MDT road number is determined either through the MDT county map sheets or the county maps displayed as a background in the collection software. These route numbers are per MDT's TIS Base Route System. For new routes, a number 1 will be typed in the MDT-ID field (see the Data Dictionary, page 17).

New routes will begin at a logical junction with another route and will always be anchored on at least one end by another route. When the new route serves as a connector between two routes, the new route may begin at either end.

If a road crosses a city/urban boundary and the boundary is not easily identifiable, it must be inventoried as a single route. Where there are two route ID's existing on either side of the boundary, as shown on the MDT maps, they will be given a single route ID.

For example: In Great Falls 10th Avenue is an X route through most of Great Falls, but turns into a U route heading out of town. The entire route can be identified as the X route or U route. Looking at the map before driving the route is important.

Where MDT maps show a single route ID as dead-ending at one location and then continuing at a different location (as seen with city streets), each route segment will be given a new route ID.

Where the MDT maps show a cluster of roads bearing a single route ID, each route segment within the cluster must be broken out. These “new” segments will be given a new route ID.

If a road forks into two private drives, inventorying will stop at the junction of the two drives.

Software

Aspen

Aspen software is loaded on the laptop computer. It is designed for fast, accurate and visual geographic data collection. The Aspen software acts as the *controlling software*, communicating with the GPS receiver to set specific GPS parameters and to record GPS positions.

The Aspen software has a status bar at the bottom of the desktop so you can check the current GPS status. The status bar displays the number of satellites being tracked and the Position Dilution of Precision (PDOP). If the PDOP ever goes above a mask or there are too few satellites, a message appears on the status bar. A warning tone also sounds when these conditions occur.

References to the Data Dictionary are made throughout the document. Do we want to delete the Data Dictionary and the references to it?

Data Dictionary

A data dictionary is a description of the features and attributes relevant to the project. It is used in the field to control the collection of features and attributes.

A data dictionary structures data collection. It does not contain the actual information collected. The following is the data dictionary for this project.

"StatewideInv.DataDic", Dictionary, "Modified 01/29/02"

"Roadway", line

"Type", menu,

"Road", default

"Alley"

"Road -Alley Name", text, 50, required

"MDT ID", text, 6, required

This is the MDT's Base Route ID.

Use 0 (zero) for alleys and a 1 for new roads.

"Cnty-City ID", text, 20

Unique and sequential. Example: The City of Helena has a number system for their City roads. This is the City's or County's identifier and how the City/County will tie their data to our data.

"Cnty-City Name", text, 25, required

Local ID or a sub-area name.

Example: _____

"Area Description", text, 64

Example: The Heights, Downtown, _____

"Collector ID", text, 30, required

The GPS Collector's name.

"Date Collected", date, auto, mdy., required, manual

"MDT Begin Node", point

"MDT ID", text, 6, required

"MDT End Node", point

"MDT ID", text, 6, required

"Cnty-City Begin Node", point
"Cnty-City ID", text, 20

"Cnty-City End Node", point
"Cnty-City ID", text, 20

"Rejected Road", point

Important:

The road must be contiguous with a unique County/City ID if there is no MDT ID.

Example: There is no MDT ID for alleys or new roads.

Check List

- 1. Printed County and City maps
(Use to track progress and to get street names.)
- 2. Printed databases for your County and Cities
(Use to get route number.)
- 3. Laptop Computer
 - Power-to-Go
 - Mouse & Pad
- 4. GPS equipment with cigarette-lighter attachment.
- 5. Connect equipment. Turn GPS receiver on. Start the Aspen software to check that it is communicating with the GPS receiver correctly. If communication is established, the name of the receiver appears in the Receiver Status window. If communication fails, an error message appears.
- 6. Check all settings in the Aspen software. See page _____.
- 7. Turn everything off and pack it into carrying cases and place in your vehicle.

	<u>YES</u>	<u>NO</u>
Is all of the equipment operational?	<input type="checkbox"/>	<input type="checkbox"/>

Is all of the equipment in the vehicle?	<input type="checkbox"/>	<input type="checkbox"/>
---	--------------------------	--------------------------

- An orange vest is required when getting out of the vehicle.
- The headlights should be on at all times. The warning sign should remain on the back of the vehicle at all times.
- The flashing orange light is required when working in high-traffic or unsafe areas.
- You may start work as early as sunrise or stop work as late as sunset.
- You will not work in the dark, even if you do have a flashlight.

Prepare for Inventory Process

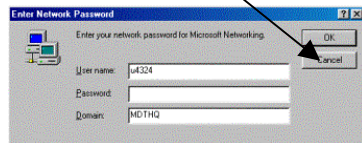
Getting Connected


1. Plug antenna cable found on the floor of the vehicle into the GPS unit.
2. Connect batteries within the GPS unit.
Only two will be connected at one time.
3. Plug the GPS unit into the back of the computer.
(The only cable found exiting the GPS backpack).
4. Plug in the Power-to-Go cord into the back of the laptop and then into the cigarette lighter or power point found in the vehicle.

Starting ASPEN

1. Turn the laptop's power on.
(Upper, left corner, above F1 and F2 key.)
2. Click **Cancel** at "Enter Network Password".

This step may not be necessary.

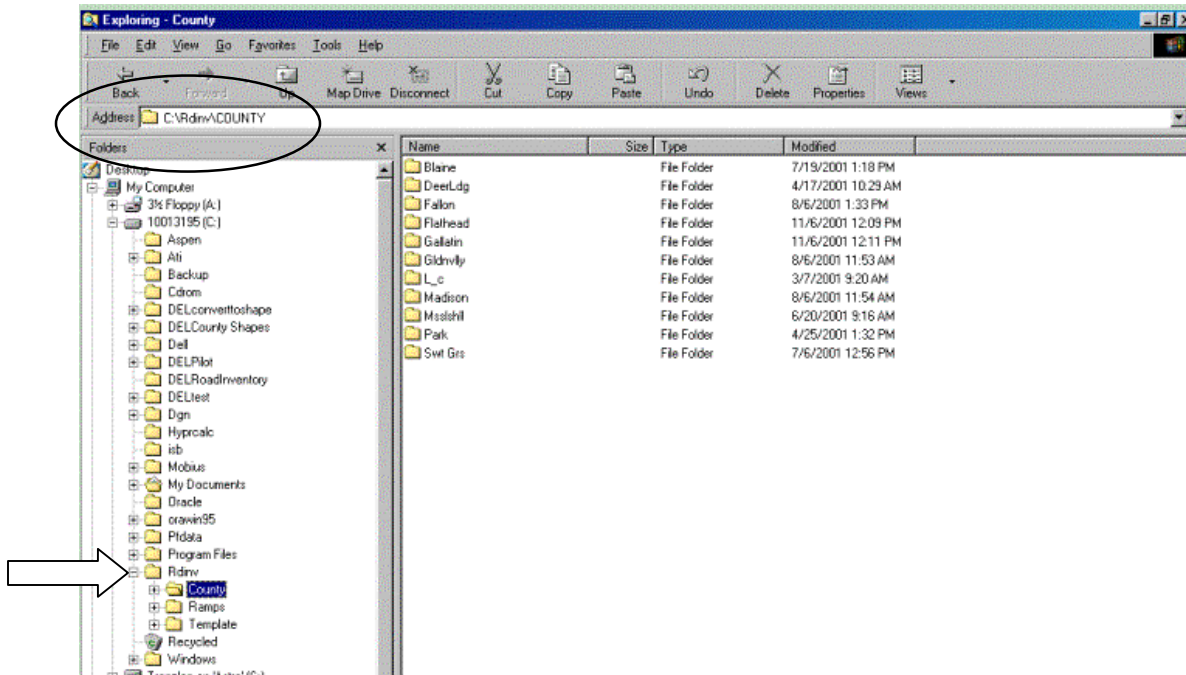
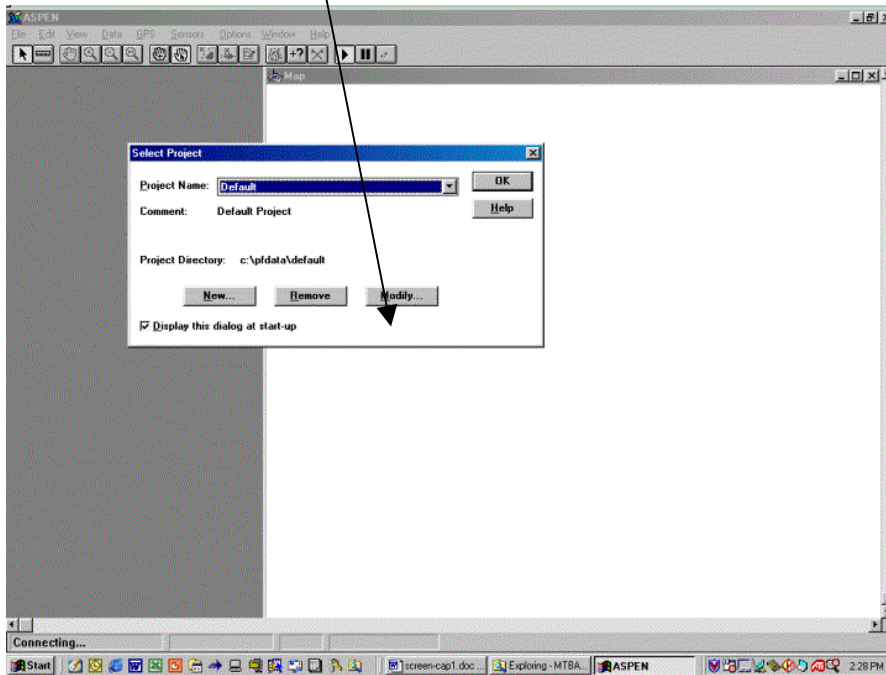


3. Turn the volume up so you can hear the GPS logging positions. (Go to the lower right corner of the screen and click on the yellow speaker picture to ust volume).
4. Double-click on the ASPEN icon.

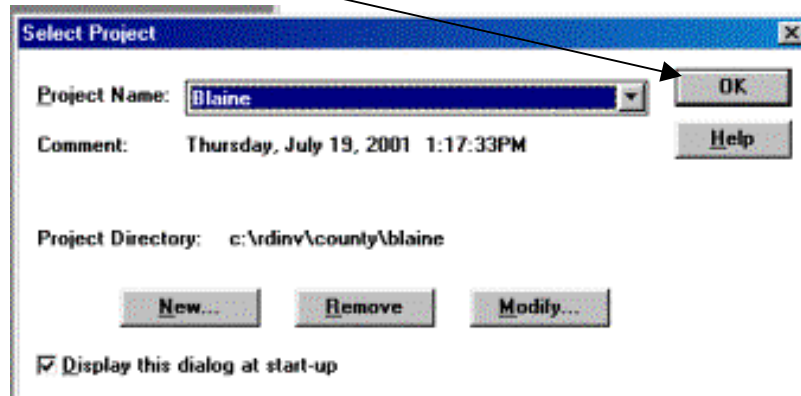


5. Select the project name (county name).
If the program lists **Default** instead of the actual County name:

- Click **Modify** to point to **C:\rdin\county** and the correct County folder

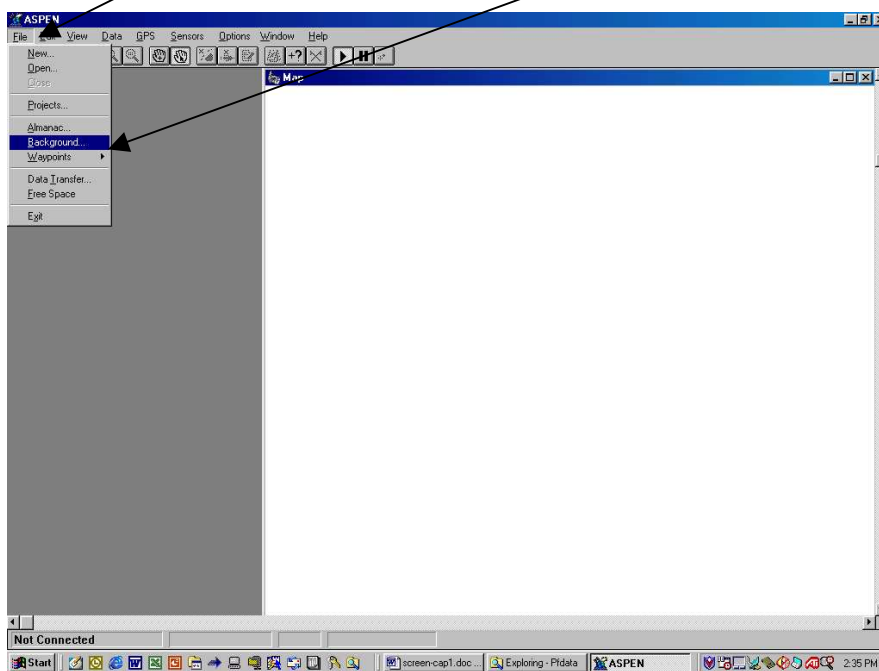


6. Click **OK** after selecting the correct project name and directory.



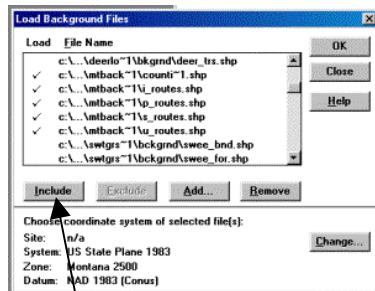
Creating the Background Map

1. Click **File** from the menu bar. Then **Background**.



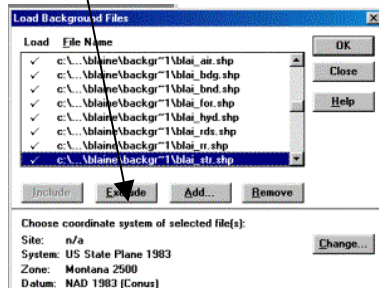
2. A background files window opens. All the background files that you will need should be listed here.

There may be some listed that you don't need.



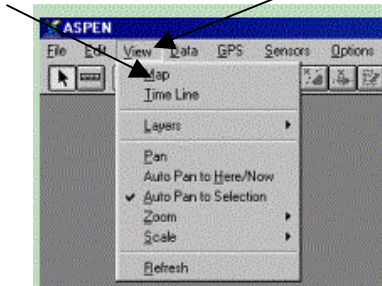
3. The **Include** and **Exclude** buttons place and erase the check marks next to the file. All files that have a check mark next to them will appear on the background map.

If you don't want to see a file on the map then remove the checkmark by clicking on the file to highlight it and click the **Exclude** button or double-click on the file name.



You will not be using either the **Add** or the **Remove** button. These buttons actually add and remove files from the list.

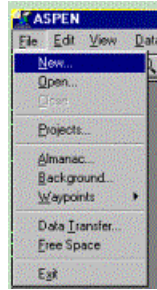
4. Click **OK** when you have all the needed files check marked. If no map appears on the screen, then click **View** from the menu bar and then **Map**.



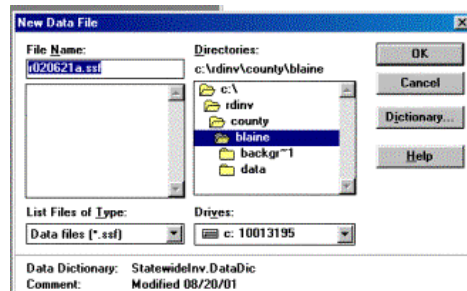
Creating and Opening Files

1. Click **File** from the menu bar then **New** to create a new data file or **Open** to open

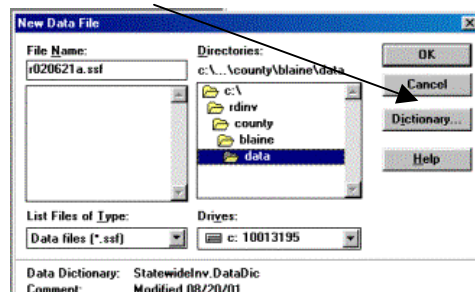
an existing file.



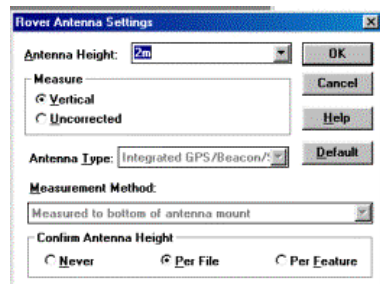
2. When you start a new file, a file name is created automatically (date & time).



Make sure to navigate to your **data** folder in your county folder. Click **OK**.

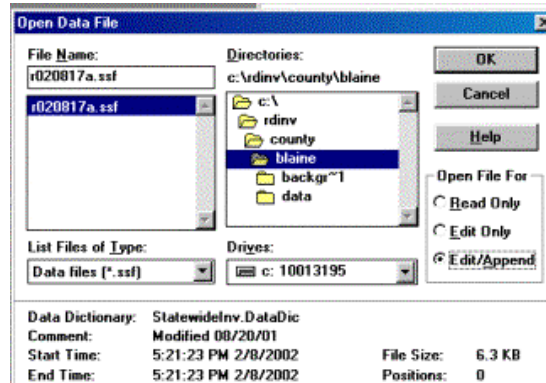


3. A rover antenna settings window opens, click **OK**. It should always have a height setting of 2m.




4. If you open an existing file, you must check the **Edit/Append** option to be able to continue adding GPS information to that file. The Edit/Append option is not

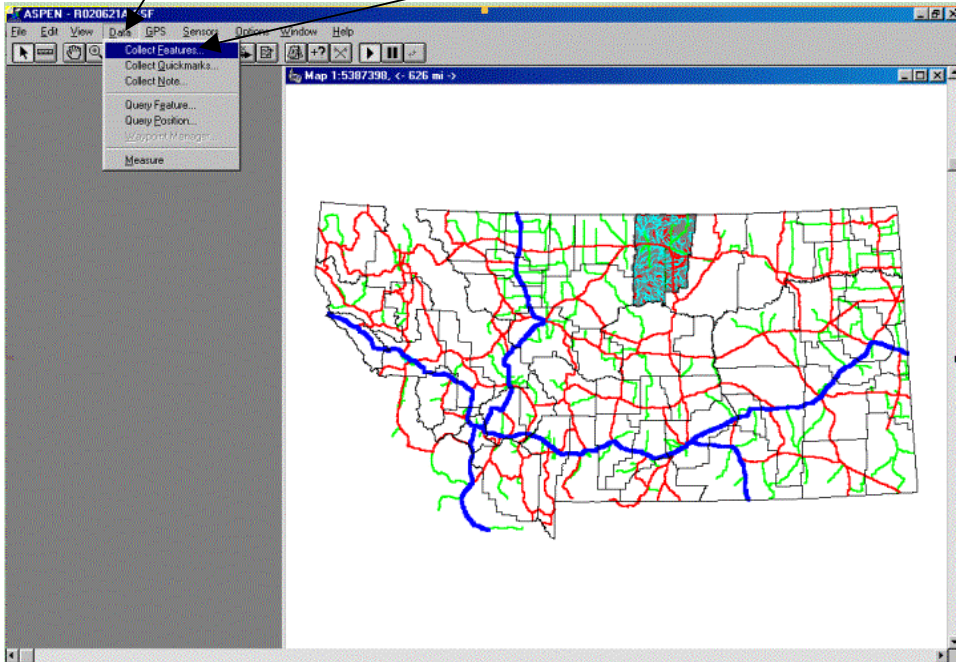
available if the file is more than 7 days old.



Note: If you don't get the rover antenna settings window when you open a file it means you forgot to check the Edit/Append option within the Open Data File window. You will need to close the file and reopen it to select that option.

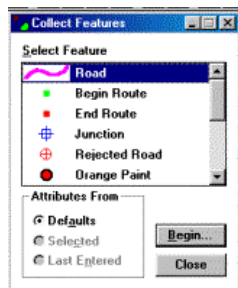
Data Collection

1. Click **Data** from the menu bar, then click **Collect Features** - or click the *Collect Features* button on the tool bar .

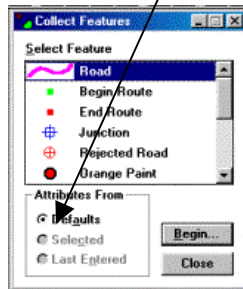


2. This is a list of the features that you will be collecting. Most of the time you will select **Road**. The other features will be mainly collected through the Quickmarks.


We may need a different picture here – only 3 options (?)



3. Select where you want your starting attributes to come from. Start with Defaults.

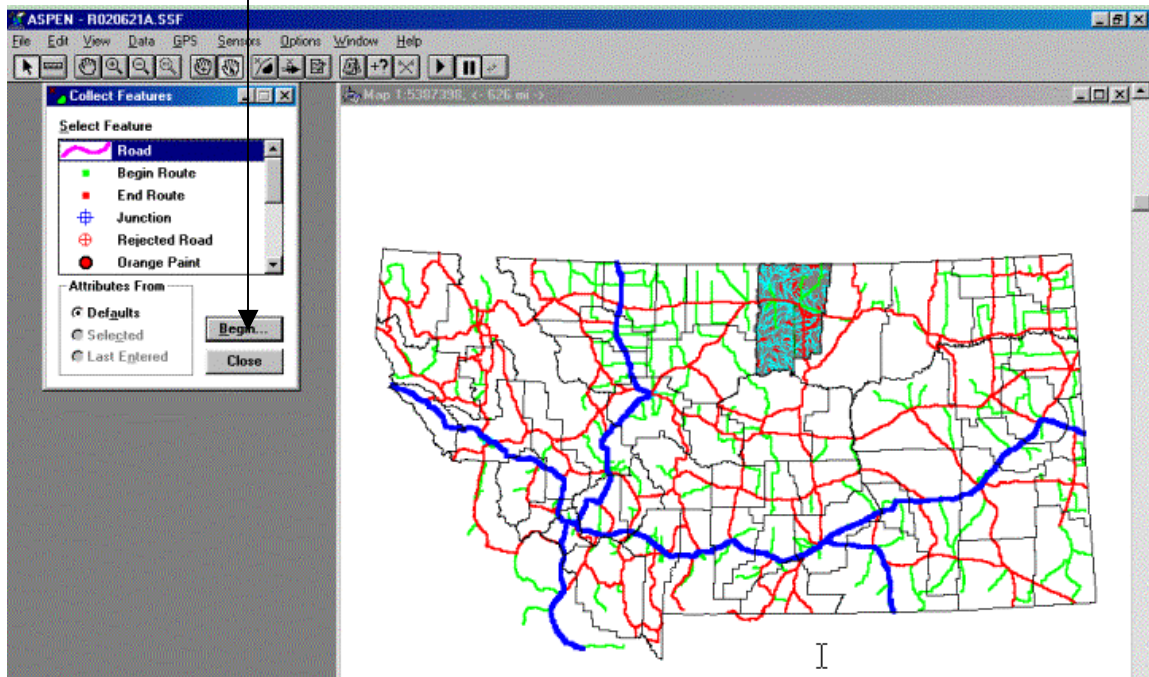


Later you may repeat a feature by choosing either Selected or Last Entered. This will eliminate some of the typing.

4. Make sure you are in the Pause Mode by selecting the pause button  before you click the **Begin** button.

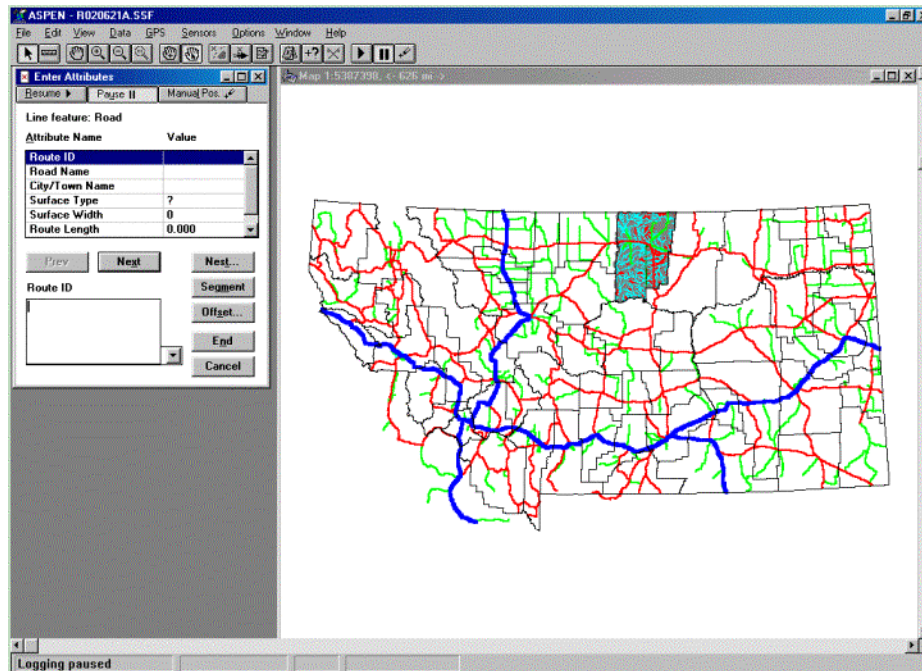


5. Click the **Begin** button on the **Collect Features** window.

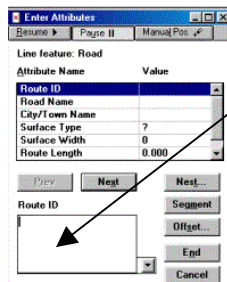


6. The **Enter Attributes** window opens and this is where you enter data pertaining to


the feature you are collecting (Route ID).

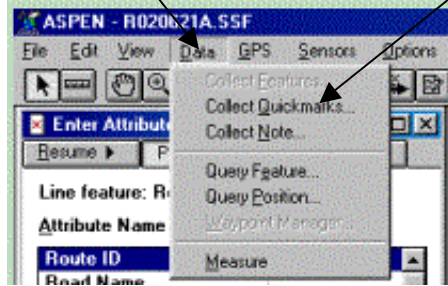


7. Enter the data using all CAPS. The cursor is in the typing area; type the Route ID. Press Enter on the keyboard. The next attribute (Road Name) becomes highlighted. Type the Road Name and press Enter. Continue typing the attributes in.

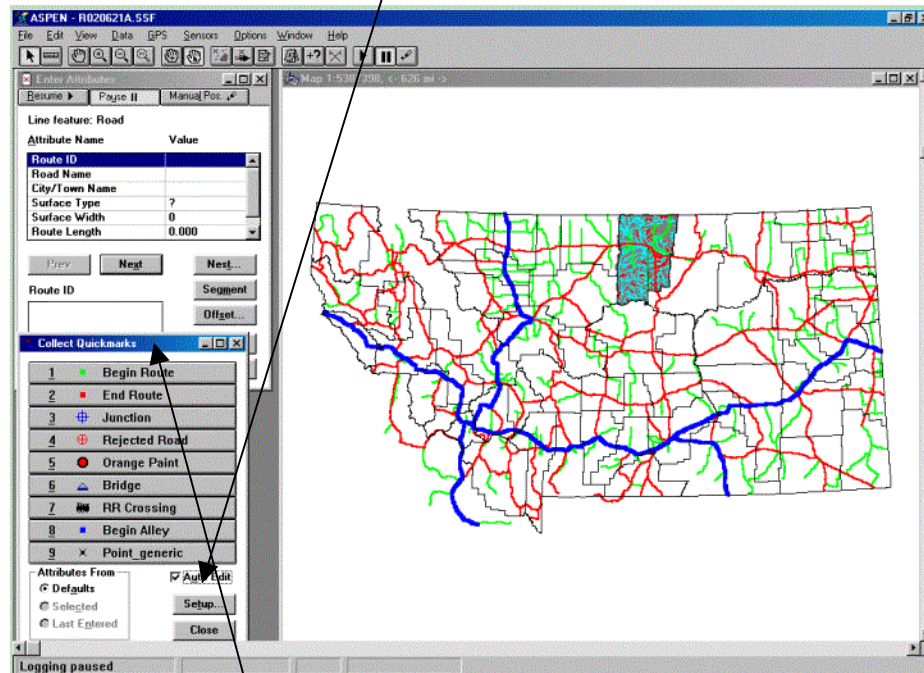


You may enter information (Road Name, ID) in the **Enter Attributes** window while you are driving down the road collecting data or while in the pause mode.

8. Click **Data** from the menu bar, then **Collect Quickmarks** - or click the Quickmarks button from the tool bar .



9. This window displays items that you will pick “on the fly”. **Put a check mark in the “Auto Edit” box.**




You need this box checked to be able to select an attribute ~~or an offset~~. Quickmarks may be collected by clicking on them or by typing the corresponding number on the keyboard, 1-9.

OK to delete the strike-through?

The **Collect Quickmark** window must be the active window in order to use numbers. You can make it the active window, by clicking on the Title Bar.

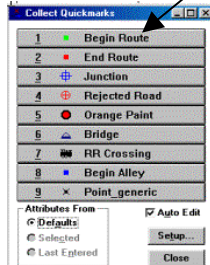
You may *not* collect quickmarks while in the pause mode.

10. When you are at the beginning of the road that you want to GPS, click either of the resume buttons  to begin logging positions.



Then select the “**Begin Route**” quickmark.

need new screen capture?



This quickmark should be selected at the beginning of every road; i.e, where the “B” is on the map.

If you drive the route *starting* at the end, select the “**End Route**” quickmark. When you reach the end (Beg) of the road, select the “**Begin Route**” quickmark. No offset is needed, but you do need to enter the **Route ID** of the road you are collecting in the Enter Attribute window.

11. When you select a quickmark, another window opens (if Auto Edit is checked). Type the Route ID and close the window by clicking X in the right-hand corner.

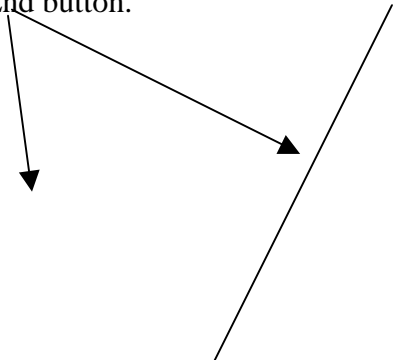
Need screen capture

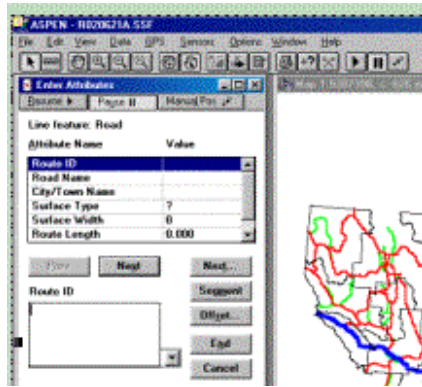
12. The Rejected Road quickmark will be used wherever you see a road that does not meet the criteria ~~and is not currently on our map~~. You may collect this as a quickmark while you are collecting data on a road just by clicking on the quickmark button as you drive by the rejected road.

OK to delete?

13. If the road was questionable in the first place or you end up at a single house, you may at any time during the collection of a road feature, “bail out” simply by clicking Cancel or pushing **Esc** on the keyboard. You are asked if you want to abandon the current feature. Click Yes. The feature is erased from the map.

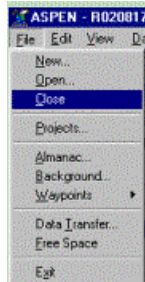
14. When you reach the end of the road, click either of the Pause buttons then click the End button.



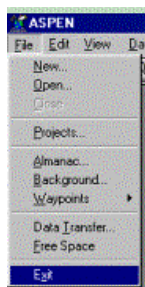


You should be in the pause mode and ready to begin a new road.

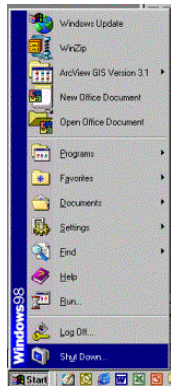
15. At the end of the day, click **File**, **Close**.



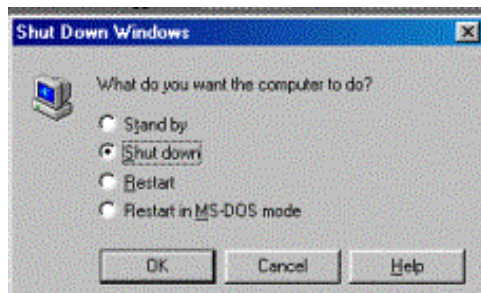
Then click **File**, **Exit**.



Shut down the computer. Click **Start**, **Shutdown**.



Choose Shutdown and click **OK**.



Please take the laptop and the GPS unit into the rooms with you each night.

Alleys

GPS coordinates for alleys will be collected from beginning to end.

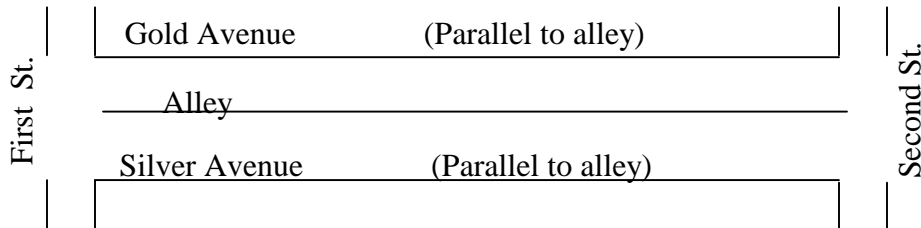
The beginning of the alley will be identified by using the Begin Node identifier. Identify the roadway type as Alley and click the *Begin Node* identifier. We want to identify the alley as a continuous route, so click *Quick Mark* to cross the street; that will designate the street as a link section.

GPS coordinates for alleys will be collected from beginning to end.

Alleys are assigned a 0 (zero) in the MDT ID field.

Alleys will also be identified by naming the two streets (one on each side) that the alley runs parallel with as one data element. This will be entered in the Name Field.


Example: Gold Ave/Silver Ave



Important:

The road must be contiguous with a unique County/City ID if there is no MDT ID.

Notes

- When collecting an independent point feature after the receiver has been changed to a “resume” mode from a “pause” mode, a minimum of 5 XY positions (clicks) will be collected for each feature before moving on.
- At any time during the inventory you can pull over and edit a feature. Remain in the pause position, pick the select button  from the tool bar and double click on the feature, on the map, that you want to edit. The “Query Feature” window opens. You can change any part of it and then close by clicking the in the corner. It asks if you want to save the current feature; click Yes.
- There is no command for saving the data file. The data is stored directly to a temporary file to protect against accidental data loss. It is strongly recommended that you start a new data file at least twice a day, if not more. A large file will slow things down and it is an extra safeguard for protecting your data. If the unspeakable should happen, you would only loose the data from the current file and not all of them.
- You may customize the look of your map by clicking View on the menu bar then Layers. All 6 of the choices can be customized. After you select one, another box opens. Highlight the feature you want to change, click the Line Style box and select a line weight and color. Click OK.
- We can open only one data file at a time, so you will need to track your progress on a printed map... so you can keep track of where you’ve been and where you haven’t. You will need a map and database with you anyway to get the names and numbers of the roads.

- Either the beginning or the end of the road must be identified (use a *Begin Route XY* identifier for this purpose). If the begin route was not identified, the end route must be identified (use an *End Route XY* identifier for this purpose).
- The GPS receiver will be used to measure the route from beginning to end. Lengths obtained from the GPS receivers will be used for quality control.

The GPS receiver will be used to measure the route from beginning to end.

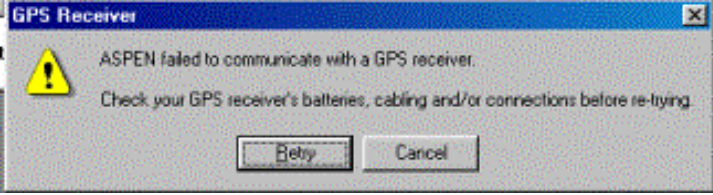
Okay to delete strike-through?

~~For the purposes of quality control, every junction that is driven by with the intent of returning and inventorying must be identified. (MDT will use the *Junction XY* identifier for this purpose). The junction feature will not be used if the road associated with this junction is inventoried at that time.~~ Roads that are inventoried ~~initially marked with a junction identifier~~ then later determined to be primitive, private, field access, logging road or a cattle feeder will be given a rejected road identifier.

Note: ~~The junction feature will not be used for city blocks.~~

All roads that will be shortened in length or removed from the map entirely must be identified. (MDT will use a *Rejected Road XY* identifier for this purpose).

Troubleshooting

<p>Aspen failed to communicate with a GPS receiver.</p> 	<p>Check the connections between the laptop, computer and GPS unit. Make sure they are snug.</p> <p>Check the cable to see if it has a kink. Remove the kink.</p> <p>Batteries are connected and charged.</p> <p>GPS receiver is switched on.</p> <p>Click Retry.</p>
<p>If communication fails again...</p> <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;"> <p>What should the GPS Receiver Port be set at?</p> </div>	<p>Select Communications Settings --> General Settings from the GPS menu and check that the GPS Receiver Port is set correctly and that the <i>Auto-connect at Start-up</i> check box is checked.</p>
<p>The program can't find a receiver or antenna.</p>	
<p>Data dictionary comes up – can't find satellite or can't find signal.....</p>	
<p>Do we need more info on removing one County's background and loading a different County's background?</p>	
<p>Do we need better information on how to get into the Data Dictionary? Why would they need to do that?</p>	
<p>Do they collect every 10 meters or every second?</p>	
<p>Plan day around the satellite availability.</p>	

I need help with all of these.

Definition of Terms

Driving Surface - the area of roadway that is safe and reasonable for vehicle travel.

Dynamic Segmentation – a process by which a section of road is distinctly identified by physical and/or jurisdictional criteria input by the user. The user can specify criteria of interest to him/her and the information displayed reflects the current status of the database.

Field Access - the driving surface serves no purpose other than to provide access to agricultural field(s).

FTP – File Transfer Protocol. A protocol used to transfer files over the Internet.

GIS-T -Geographical Information System for Transportation data. Transportation data has some unique qualities that common GIS systems do not handle. Dynamic segmentation is a methodology that is unique to transportation data.

GPS - Global Positioning System.

GPS Collector – The person selected to do the actual inventory of roads. They ride in the vehicle, set up the equipment and collect the data.

Inventory - The process of physically collecting roadway attributes in a vehicle equipped with a GPS.

IT – Information Technology

ITS – Intelligent Transportation System is a federal program to include technologies to improve the safety of the traveling public.

Junction – the intersection of two or more roads.

MDT – The Montana Department of Transportation

Open to public travel - Road is open for public use except during periods of extreme weather or emergency conditions, when not passable by a two-wheel drive passenger vehicle, and when there are restrictive gates, prohibitive signs or regulations other than restrictions based on size and weight.

PDOP – Position Dilution of Precision

PDOP provides an indication of the expected accuracy of your GPS positions based on the relative positions of the satellites. Lower PDOP values provide more accurate data.

Primitive Trail - a road that has deteriorated to the point where it is not easily passable by a two-

wheel drive passenger vehicle.

Private Drive - a road that serves no other purpose than to provide private access.

QA/QC – Quality Assurance, Quality Control

Quick Plan – A Trimble software product designed to help you plan and schedule GPS field sessions. Quick Plan can help you:

- predict satellite availability
- determine the best observation periods for a given session (considering any constraints on the PDOP and on the hours the field crew can work)
- visualize satellite availability through tables and graphical representations

RIM – The Road Inventory & Mapping Section. Located under the Data & Statistics Bureau within the Transportation Planning Division

Route - synonymous for road or street.

Rural Roads - all roads outside of incorporated city limits.

Note: For fuel tax allocation purposes the Urban Extension (portion of urban area outside city limits) is considered rural.

Surface Types:

Bladed Road -the driving surface has not been built up yet functions as a roadway with no excessive build up of weeds or other obstructions in driving lane and shows clear indications of being used. (Roads under this category that may have some gravel on it are still considered to be a bladed road)

Graded Road - the driving surface has been built up to accommodate adequate drainage.

Gravel Road - the driving surface has been built up to accommodate adequate drainage and gravel has been put on the road.

Paved Road – the driving surface is made of hard material such as asphalt or concrete.

TIS – Transportation Information System

TIS Base Route System – A database used as an anchoring mechanism (the base layer) for additional data to be referenced from.

User – The general public and people working for the City, County, State or Federal government.

Zip Disk – A removable computer storage device capable of holding a large amount of data... approximately ___(how many?)___ double-sided, double-density diskettes, depending upon the

type of zip disk purchased.

Appendix B

MEMORANDUM OF UNDERSTANDING BETWEEN THE MONTANA ASSOCIATION OF COUNTIES AND THE MONTANA DEPARTMENT OF TRANSPORTATION FOR THE GPS COLLECTION OF NON-STATE-MAINTAINED ROADS.

- I. **Purpose** This Memorandum of Understanding is made and entered into by the participating parties for the purpose of collecting, sharing and exchanging digital spatial road information in the State of Montana.
- II. **Objective** This MOU is the means for participating agencies to collect, share and exchange data in the specific project area. In adhering to this MOU, policies and procedures, the data collected will be of a standardized, uniform and validated data framework.
- III. **Benefits** This MOU will decrease the duplicated development of the same information and will generate a standardized information framework. The MOU also promotes the exchange of information and fosters communication between state and local governments.

IV. **Definitions**

Participating parties: The entities that have signed this MOU and those counties who will participate in the data collection efforts.

Spatial Data Information: Data that contains the geographic location and base characteristics of the roads. This information will be collected using global positioning system (GPS) technologies.

V. **Project Management Plan**

1. Administration
Montana Association of Counties (MACo) will be responsible for the administration of this MOU and will administer the invoicing to MDT for services provided by the participating counties (see attachment B).
2. Data Collection
 - a. Montana Department of Transportation (MDT) will provide the training, equipment, data repository, and user support, and is responsible for the quality control of this project.
 - b. The counties that subcontract with MACo will perform the field collection in accordance to the attached policies and procedures (see attachment A).
 - c. Reimbursement to the counties will be on the data accepted by MDT as stated in attachment A, at a set rate per mile as outlined in attachment B.
 - d. The participating counties will provide digital data in a format and frequency outlined in attachment A.

3. The Data Catalog

- a. MDT will provide a master catalog of the collected road data that is generated or produced by the participating agencies. This catalog will fit within the concepts developed as part of the National Spatial Data Clearinghouse (see attachment C for the links to the standards).
- b. The Data Catalog will be available over the Internet and the Statewide Area Network.

4. The Data Repository.

- a. At a minimum, framework data will be consolidated and integrated as part of the distributed Montana GIS-T Framework data will consist of Base Transportation Road information.
- b. The participating agencies will provide electronic data in the agreed-upon format outlined in attachment A.
- c. The Data Repository will be available over the Internet.
- d. MDT will coordinate data collection and standards dealing with attributes, accuracy, currency, and completeness.

VI. **Term of Agreement**

Completion Date. This instrument is executed upon signature of participating agencies and expires on January 31, 2003. The parties will state in writing whether the MOU will be renewed by no later than 30 days before the completion date. If both MDT and MACo agree in writing before that time to renew the MOU, the MOU will automatically be renewed for one (1) year.

Termination. Any party in writing may terminate its involvement in this instrument in whole, or in part, at any time before the completion date.

Participation in Similar Activities. This instrument in no way restricts any cooperating party from participating in similar activities with other public or private agencies, organizations, and individuals.

VII. **Records Shared or Exchanged.** State records that are classified as private, controlled, or protected under Montana or federal law and similarly, federal records exempt from release under the provision of the Freedom of Information Act (FOIA) or other federal law or regulation, or are confidential or proprietary shall not be provided pursuant to this agreement, unless discretionary authority exists for the exemption. Metadata will be included with request records such as data source, scale, reliability, age, accuracy, etc., to identify data integrity.

VIII. **Confidentiality Statement.** Records provided pursuant to this agreement may only contain information available to the public. State records provided may be subject to non-release restrictions of state or federal laws. The recipient will be informed if release of the information is restricted, and the records will be so labeled. To the extent permissible by federal and state

laws, the recipient agrees to abide by the restrictions, and shall not disclose such information to the public or other parties, or transmit or otherwise divulge this information.

IX. **Cost Recovery.** Whenever possible, digital data shall be shared without cost. Costs would be incurred only if requesting participant wants data on a non-standard digital format or hard copy form. If cost recovery is determined to be necessary when a request for records is submitted, a separate procurement document will be issued and existing cost recovery rules and rate will apply. Records produced will be available, but will not be sold to the public.

X. **Modification.** Modifications of this MOU shall be made only by written modification signed by all parties prior to any changes being performed.

XI. **Administration.** The administration of this agreement will be accomplished by MACo, in coordination with MDT.

XII. **Key Officials.** Key officials are the primary points of contact and are responsible for implementing the provisions of this agreement. It is mutually agreed that the Key Official for each party will be designated by the Signatory Official for that party.

XIII. **Restriction of Delegates.** Pursuant to 41 United State Code §22, no member or delegate to Congress shall be admitted to any share or part of this instrument, or any benefits that may arise therefrom.

XIV. **Non-Fund-Obligating Document.** This instrument is neither a fiscal nor a funds obligation document. Any endeavor involving reimbursement or contribution of funds between the parties to this instrument will be handled in accordance with applicable laws, regulations, and procedures including those for Government procurement and printing. Such endeavors will be outlined in separate agreements that shall be made in writing by representatives of the parties and shall be independently authorized by appropriate statutory authority. This instrument does not provide such authority. Specifically, this MOU does not establish authority for noncompetitive award of any contract or other agreement. Any contract or agreement for training or other services must fully comply with all applicable requirements for completion.

XV. **General Provisions.**

1. All applicable national policy requirements and administrative management standards as set forth in Office Management and Budget, Financial Management Division of Policy Requirements and Administrative Standards for Federal Aid Programs are hereby incorporated by reference.

2. OMB Circular A-87, Cost Principals for State and Local Governments.
<http://www.whitehouse.gov/omb/circulars/a087/a087-all.html>

3. OBM Circular A-102, Uniform Administrative Requirements for Grants-In-Aid to State and Local Governments.
<http://www.whitehouse.gov/omb/circulars/a102/a102.html>

4. OMB Circular A-133 (replaced OMB Circular A-128 on 7/1/97), Audits of State and Local Governments.

<http://www.whitehouse.gov/omb/grants/>

XVI. Signatures.

Signatures are to be signed on Attachment B

Each participant shall receive a copy of the fully-executed Memorandum of Understanding. Each is deemed an original.

Attachment A
GUIDELINES FOR ROAD INVENTORY
(FOR PURPOSES OF ITS DATA COLLECTION)

INVENTORY PARAMETERS

- 1) MACO will be the contract administrator.
- 2) MDT will provide for project management.
- 3) MDT will provide data collection Equipment.
- 4) MDT will provide Training.
- 5) The field collection units will provide the initial quality assurance/control (QA/QC) of the data.
- 6) MDT will provide the final QA/QC on the data collected.
- 7) MDT will provide the data repository for the data collected.
- 8) MDT Planning Division will provide the necessary data to enhance the data collection effort.
- 9) The contractor will inventory all roads with the exception of the following:
 - a) NHS and Primary.
 - b) Forest Service roads (The U. S. Forest Service provides MDT with a database).
 - c) Private drives, primitive trails and field accesses.
- 10) All participating counties should be inventoried by January 31, 2003.
- 11) Jurisdiction and maintenance responsibilities are not considered for purposes of determining inventory item segments.
- 12) GPS Equipment will be able to collect and differentially process data to achieve one-meter accuracy.

INVENTORY ITEMS

GENERAL

There are basically three data items of coordinates that will be collected. They are the road segment, the beginning of the road (Begin Node) and the end of the road (End Node).

Field Collection.Base Segment Coordinates

For data collection purposes this is a line definition that includes the base information to be loaded into validation tables.

MDT Segment ID: The ID that is the MDT base route ID. This ID is unique for each road segment defined. A road segment by definition has a discernable start node, end node and length.

Local Segment ID: The ID that is the local entity base route ID. This ID is unique for each road segment defined. A road segment by definition has a discernable start node, end node and length.(optional)

XYZ fields: These fields are what the GPS unit collected for this epoch. Each epoch is either collected at a one second interval.

Collection Date: For historical references the date that the coordinate was collected is maintained.

Collection By: The person and entity who collected the data is entered here so that if there are future questions then hopefully the person can explain any circumstances that may have arisen during the data collection process.

Description: Optional text field

Name: The road name or some sign that says what the name is.

Area name: This is a text field that tells the general area the road is in. In a city, it is the city's name; in the county, it is the county's name.

Type: road and alley.

Field Collection.Node

The Node Collection entity is for specific events for a road segment. Most notably Begin node and End Node. During field collection begin nodes and end nodes are usually setup as quick marks but experience has indicated that some cleanup will be called for.

Node MDT ID: Unique

Node Local ID: Unique (optional)

MDT Segment ID: Linkage to the segment being collected.

Location GPS XYZ: The distance traveled along the road segment.

Category: The categories are

- 1.) Begin node. The start of a segment that is on some static entity. Entities are intersections, physical start of a road, bridges, interchanges, and Railroad crossings.
- 2.) End node is the end of a segment that is on some static entity.
- 3.) Begin Alley node
- 4.) End Alley Node.

Description: if an intersection, the names of the intersecting streets.

Collection Date: already defined

Collection By: already defined

FIELD COLLECTION PROCEDURES

GENERAL

The road may be inventoried by starting either at the beginning or the end but the direction of travel must remain the same from start to finish.

The beginning of the road is identified with a “B” as found on MDT’s county map sheets or the county maps displayed as a background in the collection software.

The end of the road is identified with an “E” as found on MDT’s county maps sheets or the county maps displayed as a background in the collection software and may end at any given physical location.

The beginning of the road is the center of the junction where the road begins.
(see illustration #1)

When two county roads intersect at a ‘T’ junction that forms a triangle (see illustration #2), only one of the two connectors will be inventoried. Either of the two may be selected, however when one shows more signs of being used, it should be the one inventoried.

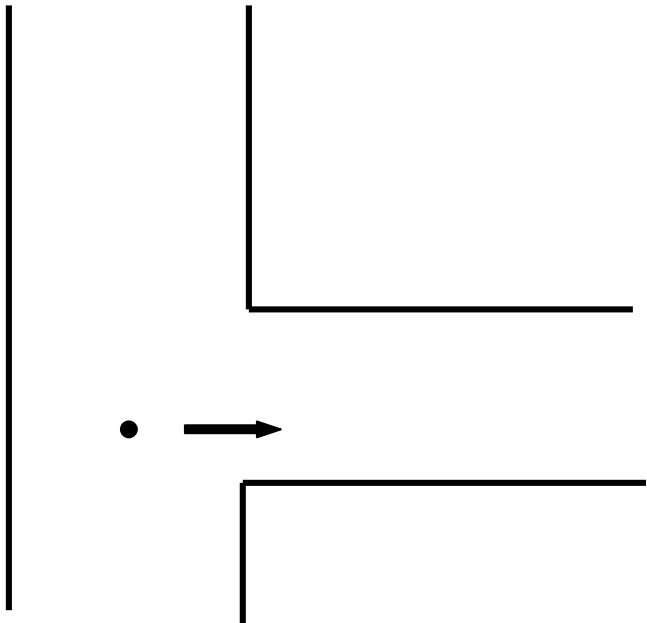


Illustration 1

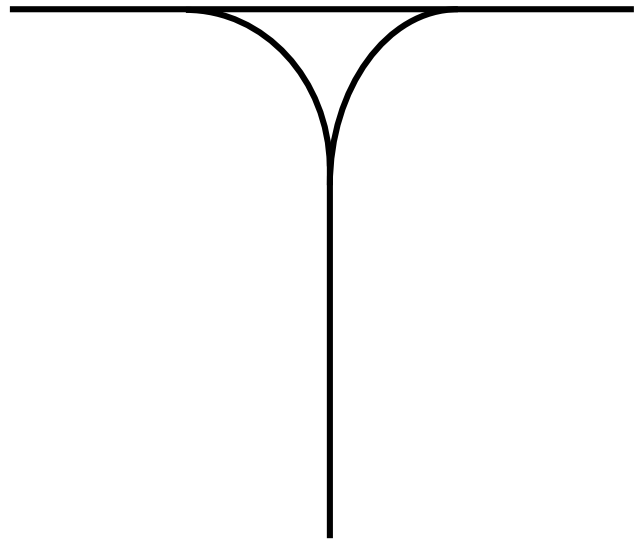


Illustration 2

The end of the road is either the center of the junction where the road ends or it is where the road is no longer considered open to public.

If a road crosses a city/urban boundary and the boundary is not easily identifiable, it must be inventoried as a single route. Where there are two route ID’s existing on either side of the boundary as shown on the MDT maps, they will be given a single route ID.

Where MDT maps show a single route ID as dead-ending at one location and then continuing at a different location (as seen with city streets), each route segment will be given a new route ID.

The PDOP mask will be set at 6 at all times. If heavy canopy precludes inventory from progressing, the PDOP mask will be set at a level that allows the receiver to function. However, PDOP setting and route number will be documented. During the collection process the PDOP can change dramatically, depending on the position of the satellites and terrain one is in. The parties realize that field conditions are not always conducive to one-meter accuracy. Field notes become the most valuable tool during these poor collection times. During QA/QC process the field notes will be taken into consideration for the acceptance of the data collected.

New routes will begin at a logical junction with another route and will always be anchored on at least one end by another route. When the new route serves as a connector between two routes, the new route may begin at either end.

Primitive trails and field accesses, not previously inventoried, will not be inventoried nor identified at this time.

If what appears to be a field access is actually a connector between two roads it will be inventoried if it meets the criteria of a bladed road.

The existing MDT road number is determined either through the MDT county map sheets or the county maps displayed as a background in the collection software. These route numbers are per MDT's TIS base route system. New route numbers are assigned programmatically based on the next available number.

The GPS receiver will be used to measure the route from beginning to end. Lengths obtained from the GPS receivers will be used for quality control.

Do not drive beyond signs posted on the road that say, Keep Out, No Trespassing, Do Not Enter, or any other restrictive postings. M.C.A. 45-6-201 (Criminal Trespass) explicitly restricts access on these roads.

Note: If these roads are actually public or county roads, the county will need to remove the signs prior to inventory.

Roads with restrictive gates, or fluorescent orange paint, will not be inventoried. (Wire gates used to restrict livestock are not considered to be a restrictive gate unless accompanied by orange paint or a restrictive sign.)

Signs that are posted along the roadway, no closer than 30' from the centerline of the roadway, are considered to restrict access to the land adjoining the road.

A signed name for the road will be collected if physically posted, otherwise the Collector will make every effort to obtain road/street names from cities and counties at a later time.

COLLECTION

Either the beginning or the end of the road must be identified (use a *Begin Route XY* identifier for this purpose). If the begin route was not identified, the end route must be identified (use an *End Route XY* identifier for this purpose).

When collecting an independent point feature after the receiver has been changed to a “resume” mode from a “pause” mode, a minimum of 5 XY positions (clicks) will be collected for each feature before moving on.

Roads that are well maintained and clearly serve as major connectors within a county but that may have orange paint on posts adjacent to cattle guards will not be considered closed to public travel. The orange paint is considered to be a restriction to the adjoining land and not the road itself.

The following roads will be inventoried:

- 1) General traveled roads considered public. This project should not worry about gas tax allocation collection.
- 2) Alley ways
- 3) Main roads through oil fields (connectors)– not roads that dead end at oil rigs or storage tanks.
- 4) Canal roads
- 5) Roads that provide access to picnic, camping or fishing areas
- 6) Trailer court roads
- 7) Roads with cattle guards

The following roads may be inventoried:

- 1) Cemetery roads (the inventoried road will end at the main gate or entrance)
- 2) College campus roads

GPS coordinates for alleys will be collected from beginning to end.

The beginning of the alley will be identified. (use a *Begin Alley Node* identifier for this purpose)

The existing alley number is determined through the MDT’s TIS database and will be available in a form on the collectors machine. New numbers are assigned based on the next available number.

Alleys will also be identified by naming the two streets (one on each side) that the alley runs parallel with as one data element and the two streets the alley starts and ends on as another data element. This will be entered in the Name Field.

Data Backups

Before the data is submitted it will be backed up on a Zip disk and cataloged. The disk and catalog will be retained by the county. The disk will be used as the master in case of loss or errors in the submittal process.

Data Submittal

Data will be collected on a one-day, one-file basis. Once every week the data will be submitted to MDT. After initial check to make sure that all the fields are populated, the data can be submitted to MDT by either copying the file via the internet on MDT's ftp site, or the data may be copied to a zip disk and mailed to MDT. The ftp site will be provided during the pre-inventory training.

Data Acceptance

Data collected is considered accepted after QA/QC has been performed by MDT staff. If the data is in error from not following policy and procedures then the collection will be redone at the expense of the contractor, for other issues MDT may request the collection to be redone at MDT's expense.

TERM DEFINITIONS

Inventory - The process of physically collecting roadway attributes in a vehicle equipped with a DMI and GPS.

ITS – Intelligent Transportation System is a federal program to include technologies to improve the safety of the traveling public.

GIS-T -Is the Geographical Information System for transportation data. Transportation data has some unique qualities that common GIS systems do not handle. Dynamic segmentation is a methodology that is unique to transportation data.

Open to public travel - Road is open for public use except during periods of extreme weather or emergency conditions, when not passable by a two-wheel drive passenger vehicle, and when there are restrictive gates, prohibitive signs or regulations other than restrictions based on size and weight.

Rural Roads - all roads outside of incorporated city limits.

Note: For fuel tax allocation purposes the Urban Extension (portion of urban area outside city limits) is considered rural.

Route - synonymous for road or street.

Driving Surface - the area of roadway that is safe and reasonable for vehicle travel.

Paved Road – the driving surface is made of hard material such as asphalt or concrete.

Gravel Road - the driving surface has been built up to accommodate adequate drainage and gravel has been put on the road.

Graded Road - the driving surface has been built up to accommodate adequate drainage.

Bladed Road -the driving surface has not been built up yet functions as a roadway with no excessive build up of weeds or other obstructions in driving lane and shows clear indications of being used. (Roads under this category that may have some gravel on it are still considered to be a bladed road)

Field Access - the driving surface serves no purpose other than to provide access to agricultural field(s).

Primitive Trail - a road that has deteriorated to the point where it is not easily passable by a two-wheel drive passenger vehicle.

Private Drive - a road that serves no other purpose than to provide private access.

Junction – the intersection of two or more roads.

GPS - Global Positioning System.

DMI - Distance Measuring Instrument. Used to measure the length of roads, with accuracy to the thousandth of a mile (5 ft).

TIS – Transportation Information System

RIM – The Road Inventory & Mapping Section. Located under the Data & Statistics Bureau within the Transportation Planning Division

P.D.O.P – Position Dilution of Precision

Attachment B
AGREEMENT #

This AGREEMENT is entered by and between the MONTANA DEPARTMENT OF TRANSPORTATION, hereinafter called the DEPARTMENT, and the Montana Association of Counties (MACo), hereinafter called the CONTRACTOR.

The point of contact for the DEPARTMENT is Skip Nyberg at Information Services Bureau in Helena. The point of contact for MACo is Gordon Morris at MACo's office in Helena.

I. HIRING OF ADDITIONAL LABOR

There will be no subcontracting of any of the work under this MOU to any workers other than County employees.

II. UNSATISFACTORY WORK/CONTRACT TERMINATION

This Agreement may be terminated for failure to provide the services or accomplish work enumerated herein. Upon receiving written notice from the DEPARTMENT, the CONTRACTOR has one week to cure the failure; the CONTRACTOR'S failure to cure the failure within the time allowed will be grounds for the immediate termination of this Agreement.

This Agreement may be terminated without cause upon 30 days written notice.

III. INSURANCE REQUIREMENTS

The data collection county shall maintain property and liability insurance pursuant to this subcontract. The liability coverage shall be provided with a combined single limit of \$1 million per occurrence/\$2 million aggregate per year or when provided by statutory tort limits of \$750,000 / claim, \$1,500,000 / occurrence as provided by the MACo/JPIA property and liability self-insurance pool coverage. This insurance must be from an insured licensed to do business in Montana or by a domiciliary state and with a Best's rating of no less than A- or by a public entity self-insured program either individually or on a pool basis as provided in Title 2, MCA. A Certificate of Insurance will be provided from the data collection county's insurance provider.

The data collection county shall maintain workers compensation insurance, pursuant to this subcontract, for all employees that are providing services under this subcontract.

IV. HOLD HARMLESS/INDEMNIFICATION

CONTRACTOR agrees to defend, protect, indemnify and save harmless the State of Montana and DEPARTMENT against and from all claims, liabilities, demands, causes of action, judgments (including costs and reasonable attorneys fees), and losses to them from any cause whatever (including patent, trademark and copyright infringements) from the Agreement and its execution. This includes any suits, claims, actions, losses, costs or damages of any kind, including the State's and DEPARTMENT's legal expenses, arising out of, in connection with, or incidental to the Agreement, but does not include any such suits, claims, actions, losses, costs or damages which are solely the result of the negligent acts, omissions or misconduct of DEPARTMENT's employees if they do not arise out of, depend upon or relate to a negligent act, omission or misconduct of CONTRACTOR's employees. The CONTRACTOR assumes all responsibility for ensuring and enforcing safe working conditions and compliance with all safety-related rules and regulations for the benefit of its own employees, the employees of any subcontractor, and the public. That responsibility includes all duties relating to safety, regardless of whether any such duties are, or are alleged to be, "nondelegable" (e.g., the Montana Safe Place to Work Statute, etc.). This indemnification is expressly intended by the parties to include any claims, liabilities, demands, causes of action, judgments (including costs and reasonable attorneys fees), and losses that are, or are alleged or held to be, based upon a breach by the DEPARTMENT of a nondelegable duty relating to workplace safety for the CONTRACTOR's employees, the employees of any subcontractor, and the public.

V. LABOR REQUIREMENTS

Any report of infraction of the laws of the State of Montana covering labor, Title 18, MCA will be forwarded to the State of Montana, Department of Labor and Industry.

It is expressly agreed that the CONTRACTOR in fulfilling the terms of this Agreement is not an employee of the DEPARTMENT, but is solely an INDEPENDENT CONTRACTOR and anyone employed to provide any of the services called for herein is an employee of the CONTRACTOR or a subcontractor and not an employee of the DEPARTMENT.

It is further understood by the parties that no deductions from payments provided for by this Agreement will be withheld by the DEPARTMENT for federal or state income tax, FICA (Social Security), retirement, health benefits, pension benefits, or any other reason.

Payment will occur within 30 days of receipt of a valid claim or invoice. The DEPARTMENT may withhold payment if the CONTRACTOR has not performed in accordance with the terms of this Agreement.

VI. CODE AND PERMIT REQUIREMENTS

The contractor must, in performance of work on this contract, fully comply with all applicable federal, state and local laws, rules and regulations. Any subletting or subcontracting by the contractor subjects subcontractors to the same provisions of the appropriate federal, state and local laws, rules and regulations.

VII. CIVIL RIGHTS COMPLIANCE

During the performance of this contract, the Contractor, for itself, its assignees and successors in interest, and the participating counties, agree as follows:

A) COMPLIANCE WITH TITLE VI OF THE CIVIL RIGHTS ACT OF 1964 FOR FEDERAL-AID CONTRACTS

(1) Compliance with Regulations: The Contractor shall comply with all Regulations relative to nondiscrimination in Federally-assisted programs of the Department of Transportation, 49 Code of Federal Regulations, Part 21, as they may be amended (hereafter referred to as the Regulations), which are incorporated by reference and made part of this Agreement, even though only State funding is here involved.

(2) Nondiscrimination: The Contractor, with regard to the work performed by it during the Agreement, shall not discriminate on the grounds of sex, race, color or national origin in the selection and retention of subcontractors, including procurement of materials and leases of equipment. The Contractor shall not participate either directly or indirectly in the discrimination prohibited by 49 CFR §21.5.

(3) Solicitations for Subcontracts, Including Procurements of Materials and Equipment:

In all solicitations, whether by competitive bidding or negotiation by the Contractor for work to be performed under a subcontract, including procurements of materials or leases of equipment, any potential subcontractor or supplier shall be notified by the Contractor of the Contractor's obligations under this Agreement and the Regulations relative to nondiscrimination.

(4) Information and Reports: The Contractor will provide all reports and information required by the Regulations, or directives issued pursuant thereto, and permit access to its books, records, accounts, other sources of information and its facilities as may be determined by the Department or the Federal Highway Administration (FHWA) to be pertinent to ascertain compliance with Regulations or directives. Where any information required of the Contractor is in the exclusive possession of another who fails or refuses to furnish this information, the Contractor shall so certify to the Department of the FHWA as requested, setting forth what efforts it has made to obtain the information.

(5) Sanctions for Noncompliance: In the event of the Contractor's noncompliance with the nondiscrimination provisions of this Agreement, the Department may impose sanctions as it or the FHWA determines appropriate, including, but not limited to;

(a) withholding payments to the Contractor under the Agreement until the Contractor complies, and/or

(b) cancellation, termination or suspension of the Agreement, in whole or in part.

(6) Incorporation of Provisions: The Contractor will include the provisions of paragraphs (1) through (6) in every subcontract, including procurement of materials and leases of equipment, unless exempt by the Regulations or directives issued pursuant thereto. The Contractor will take such action with respect to any subcontract or procurement as the Department or the FHWA may direct to enforce such provisions including sanctions for noncompliance: Provided; however, that

in the event the Contractor is sued or is threatened with litigation by a subcontractor or supplier as a result of such direction, the Contractor may request the Department to enter into the litigation to protect the interests of the State, and, in addition, the Contractor or the State may request the United States to enter into such litigation to protect the interests of the United States.

B) COMPLIANCE WITH THE MONTANA GOVERNMENTAL CODE OF FAIR PRACTICES, 49-2-207, MCA

In accordance with 49-3-207, MCA, the Contractor agrees that for this Agreement all hiring will be made on the basis of merit and qualifications and that there will be no discrimination on the basis of race, color, religion, creed, political ideas, sex, age, marital status, physical or mental disability, or national origin by the persons performing the Agreement.

C) COMPLIANCE WITH THE AMERICANS WITH DISABILITIES ACT (ADA)

(1) The Contractor will comply with all regulations relative to implementation of the AMERICANS WITH DISABILITIES ACT (ADA).

(2) The Contractor will incorporate or communicate the intent of the following statement in all publications, announcements, video recordings, course offerings or other program outputs:

“The Contractor will provide reasonable accommodations for any known disability that may interfere with a person participating in any service, program or activity offered by the Contractor. In the case of documents, recordings, or verbal presentations, alternative accessible formats will be provided. For further information call the Contractor.”

(3) All video recordings produced and/or created under this Agreement will be closed captioned.

D) COMPLIANCE WITH PARTICIPATION BY DISADVANTAGED BUSINESS ENTERPRISES IN DEPARTMENT OF TRANSPORTATION FINANCIAL

ASSISTANCE PROGRAMS, 49 CFR §26

Each Agreement the Department signs with a Contractor must include the following assurance: **“The Contractor, sub recipient or subcontractor shall not discriminate on the basis of race, color, national origin, or sex in the performance of this contract. The Contractor shall carry out applicable requirements of 49 CFR part 26 in the award and administration of DOT-assisted contracts. Failure by the Contractor to carry out these requirements is a material breach of this contract, which may result in the termination of this contract or such other remedy, as the recipient deems appropriate.**

VIII. BASIS OF PAYMENT

The scope of services and/or labor to be provided by the CONTRACTOR will be determined by the DEPARTMENT, based on the MOU and Attachment "A". Upon satisfactory work done for the DEPARTMENT, payment will be made based on \$11.655 per mile of data collected and accepted by the DEPARTMENT. Of the \$11.655 payment, \$11.10 will go to the county collecting the data, and MACO will receive \$0.555 per mile of data accepted for their administration of this contract.

IX. RECORDS

CONTRACTOR agrees to provide the DEPARTMENT, the Legislative Auditor or their authorized agents access to any records concerning this Agreement.

CONTRACTOR agrees to create and maintain all records supporting the services rendered for a period of 3 years after either the completion date of the Agreement or the conclusion of any claim, litigation, or exception relating to this Agreement taken by the DEPARTMENT or the third party.

X. LIMITS OF AGREEMENT

This Agreement contains the entire agreement between the parties. Except by written amendment to this agreement, signed by both parties, no statement, promises, or inducements made by either party shall be binding or valid.

XI. VENUE

In the event of litigation over the terms or conditions of this Agreement, venue shall be in the First Judicial District in and for the County of Lewis & Clark, Montana, and the Agreement shall be interpreted according to the laws of Montana.

The CONTRACTOR is notified that pursuant to 2-17-514, MCA, the Department of Administration retains the right to cancel or modify any contract, project or activity that is not in compliance with the Agency's Plan for Information Technology, the State Strategic Plan for Information Technology, or any statewide IT policy or standard.

Reviewed and Approved by:
Information Technology Services Division
Montana Department of Administration,
per MCA 2-17-512:

Date: _____, 2002

Chief Information Officer (CIO)

MONTANA ASSOCIATION OF COUNTIES

MONTANA DEPARTMENT OF TRANSPORTATION

Reviewed and Approved:

Signature of Contractor

Date

Date

For Legal Content by:

Address

Attorney, Legal Services

City, State, Zip Code

Telephone Number

Federal Tax ID Number

"Alternative accessible formats of this document will be provided upon request."

RR:G:PU: