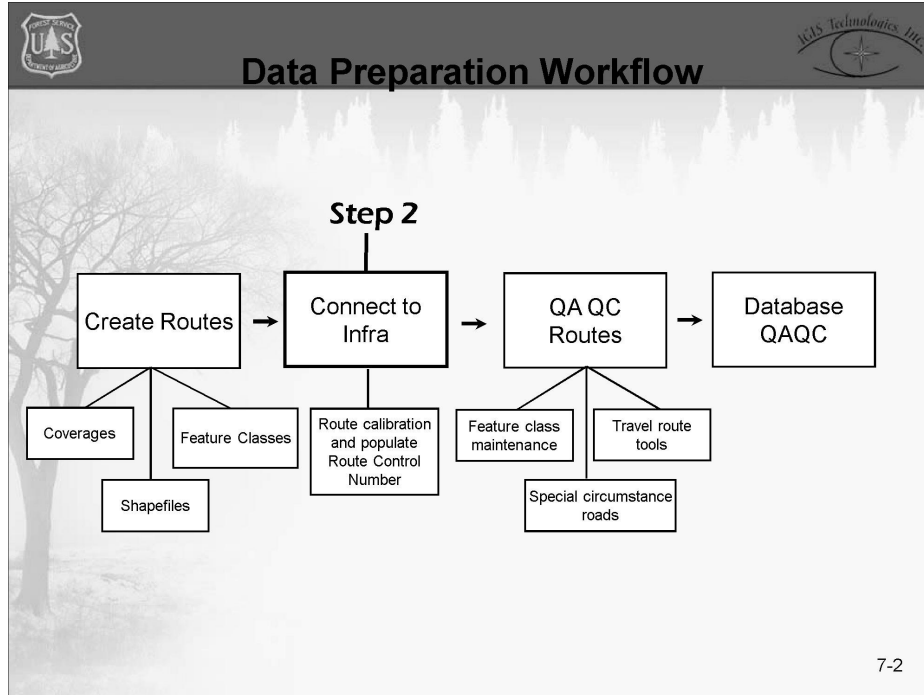




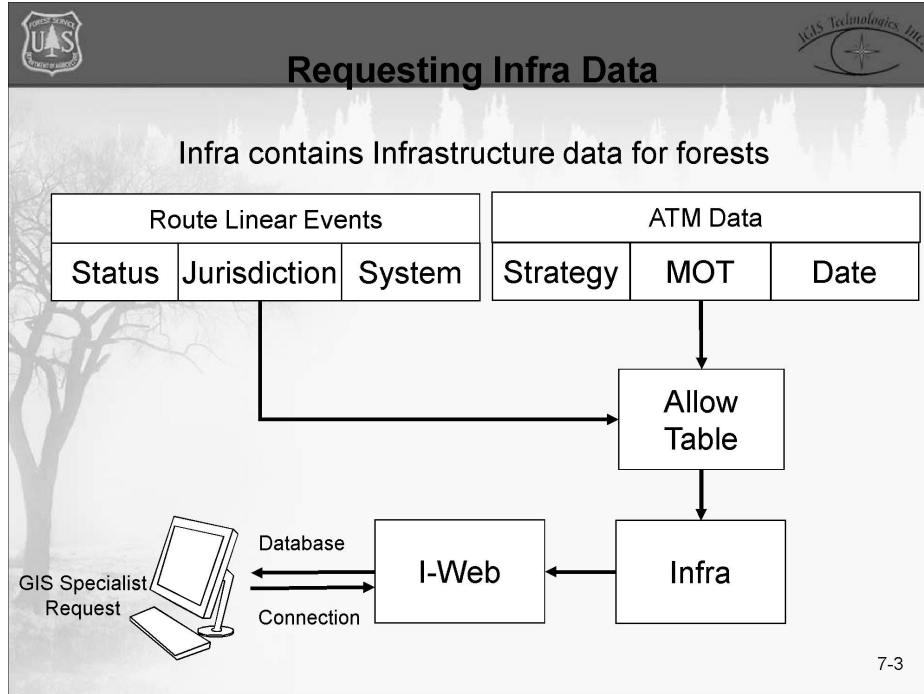
Working with Infra

Objective: Understand how Infra pieces fit into MVUM picture, how to use the QA tools on the Travel Routes toolbar.

7-1



The second step in working through data preparation is to connect to Infra. Infra contains the tables needed to perform route calibration. You will make this connection through the FS internal network via e-Authentication.




To get access to MVUM attributes, a user will log in to the I-Web application. I-Web is a web-enabled application that stores USFS data in a centralized database located at the USDA's National Information Technology Center in Kansas City, MO. I-Web consists of many data management applications including Infra. Infra manages accurate information on the inventory of such features as: buildings, dams, bridges, water systems, roads, trails, developed recreation sites, range improvements, administrative sites, heritage sites, general forest areas, and wilderness areas. The roads and trails data within Infra is required for MVUM production.


The required data tables found in Infra consist of the Access Travel Management plan (ATM), linear event tables, and route allow tables. Along with additional data the ATM and linear event data is combined to make up the allow tables. The allow tables define what access is allowed on each segment of a route. The components of the ATM module are: travel management strategy, mode of travel (MOT), dates, and "applies-to" information. The applies-to field states who the regulations apply to. Any route open to the public will have an applies-to value of all.

Linear event tables contain the locations along a route where an event such as a date designation changes. Locations of events on a route are marked by beginning and ending milepost often referred to as BMPs, and EMPs. Inside Infra the allow table becomes the location where event data pertaining to MVUM road and trail routes are stored and accessed during MVUM production.

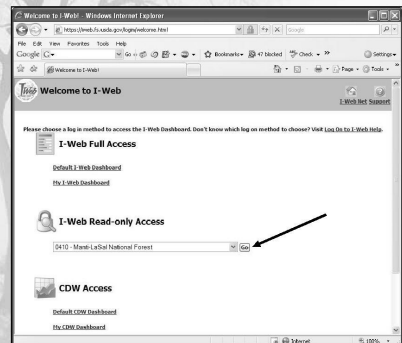
Working with Infra



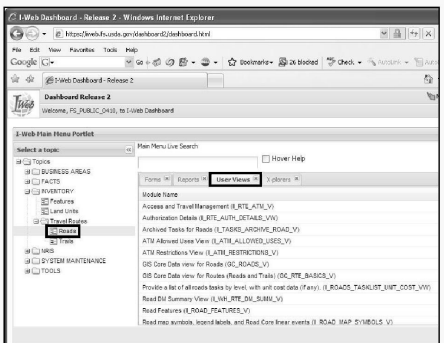
Connecting to Infra




- Must be within FS network
- Access I-Web URL: <https://iweb.fs.usda.gov>
- Login with eAuthentication



7-4



Connecting to Infra is achieved through the USFS I-Web website. This website can only be accessed by USFS employees or those who have been granted the proper permissions. After you log into this website, you will navigate to Infra data. Select the forest from the I-Web Read-only access drop down menu. An eAuthentication permission is required beyond this point. From the main menu portlet on the I-Web site you drill down through the directory structure /Topics/Inventory/Travel Routes/Roads or Trails. Then select the needed data under the Users Views tab. All of the needed MVUM Infra tables can be viewed and downloaded from this location.



Infra MVUM Tables

Key MVUM tables found in Infra

- ATM
- Road Ticmark
- Event tables
- Allow tables
- Route basics

ATM Table List

Forms Reports **User Views** X-plorers

Module Name

The correlated view with all linear event attributes for roads for 1000 (IL_RUAU_LINEAR_EVENTS)

The motor vehicle area map view (IL_TRAVEL_MGT_AREA_V)

The motor vehicle use map road allowed tickmark view (ILMVUM_TICK_ROAD_ALLOW_V)

The motor vehicle use map road restricted tickmark view (ILMVUM_TICK_ROAD_RESTRICT_V)

The motor vehicle use map snapshot for road allowed data (IL_MVUM_ROAD_ALLOW)

The motor vehicle use map snapshot for road restricted data (IL_MVUM_ROAD_RESTRICT)

Gaps and Overlaps Data (IL_RTE_GAPS_OVERLAPS_V)

Random Roads Work Items(IL_RTE_RANDOM_TASKS_V)

Road Allow Table

https://web.fs.usda.gov/infra/docs/temp/FS_PUBLIC...


	A	B	C	D	E	F	G
1	II MVUM ROAD ALLOW						
2	RTE_CN	ID	NAME	BMP	EMP	SYMBOL	ROUTE STATUS
3	1001010397	53098	OBLTERATED 1991	0	0.2	0DE - DECOMMISSIONED	
4	11002010397	53102	UN-NAMED	0	1.431	1EX - EXISTING	
5	1037010397	165014	UN-NAMED	0	0.12	0EX - EXISTING	
6	1007010397	53157	BENNING RIDGE	0	3.145	1EX - EXISTING	
7	1008010397	53159	OBLTERATED 1991	0	0.3	0DE - DECOMMISSIONED	
8	1009010397	53161	OBLTERATED 1991	0	1	0DE - DECOMMISSIONED	
9	1129010397	55345	UN-NAMED	0	0.13	0EX - EXISTING	
10	101010397	55311	BIG BEAR	0	1.71	1EX - EXISTING	
11	1014010397	53176	OBLTERATED 1991	0	0.92	0DE - DECOMMISSIONED	

FS_PUBLIC_0410_186223 II_MVUM_R/Unknown Zone


7-5

Inside Infra all of the data tables needed for MVUM can be found. The MVUM road allow table and the MVUM tic road allow table are both used to create event layers. While these two tables are directly used during production, they are not the only Infra tables used. The allow table is populated by data from a number of tables in the Infra system. The route basics table is another table incorporated from Infra. This table is connected via the I-Web spatial editor toolbar and is used to calibrate routes by providing the beginning and ending milepost data for each route and populating the RTE_CN field. If a RTE_CN match is found, the RTE_CN field is populated from the corresponding record in the route basics Infra table. The RTE_CN field is used to identify unique routes. Throughout the MVUM production process this RTE_CN value will be used for route identification process. This will never change. Infra tables provide all of the attributes assigned to the route feature class geometry. Infra tables are updated nightly so you may need to do repeated downloads to make sure you have the latest data by the time you are ready to produce your final MVUMs.

Working with Infra



Demo Tables




1	A	B	C	D	E	F	G
1	II MVUM ROAD ALLOW						
2	RTE_CN	ID	NAME	BMP	EMP	SYMBOL	ROUTE STATUS
3	480010397	56255	UN-NAMED	0	2.384	1	EX - EXISTING
4	560010397	56496	UN-NAMED	0	1.203	1	EX - EXISTING
5	613010397	50004	TRAIL RIDGE	0	4.6	1	EX - EXISTING
6	1345010397	50191	GIANT ASPEN	0	1.253	1	EX - EXISTING


1	A	B	C	D	E	F	G
1	II MVUM TRAIL ALLOW						
2	RTE_CN	ID	NAME	BMP	EMP	SYMBOL	TRAIL STATUS
3	263749010602	5913	UN-NAMED	0	1.2	7	EX - EXISTING
4	5693.003091	5329	DRY CREEK TRAIL	0	0.989	7	EX - EXISTING
5	5223.003091	5136	DRY WASH	0	5.054	10	EX - EXISTING
6	2092010397	U5321	BLIND CANYON ROAD SPUR	0	0.475	0	EX - EXISTING

1	A	B	C	D	E
1	II TRAVEL MGT AREA V				
2	LU_CN	ID	NAME	LU_SUBTYPE	SECURITY_ID
3	120093010602	UINTA TEST	BURTON BUTTE OHV AREA	DESIGNATED MTR VEHICLE AREA	0419
4	697769010602	STRAWBERRY RESERVOIR	STRAWBERRY RESERVOIR	DESIGNATED MTR VEHICLE AREA	0419
5	697770010602	CURRENT CREEK RESERVOIR	CURRENT CREEK RESERVOIR	DESIGNATED MTR VEHICLE AREA	0419
6	697771010602	VERNON RESERVOIR	VERNON RESERVOIR	DESIGNATED MTR VEHICLE AREA	0419
7					


9-6



Travel Routes Data Dictionary



- Route feature class + allow event table = route event layer
- USFS National GIS Data Dictionary
<http://fsweb.datamgt.fs.fed.us/>



Column Name (Alias)	Description	Domain	Type	L	P	S	N
RTE_NO	The local route number for a route. This item identifies routes within a Forest Service unit.		String	30	0	0	Y
Name	Name of the road. This information is maintained in the Infra Roads application. Beginning measure point of the route. The value is copied from Oracle (RTE_BASIC) and used as an aid in calibration.		String	30	0	0	Y
BMP			Double	8	0	0	Y

Road data dictionary

Field information as reported in ArcCatalog metadata. L = Length, P = Precision, S = Scale, N = Nulls Allowed

7-7

Within a GIS, a route can either be a coverage with a route system or a feature class that has measure (M) values. The M values are stored for each vertex of a line feature. The unit of measure stored in the M value is linear and begins and ends at the first and last vertex placed in that in that feature. Route feature classes are combined with event tables from Infra to produce event feature layers that are used in the final production of MVUMs. The latest data dictionary and data standards can be viewed at <http://fsweb.datamgt.fs.fed.us/>. The Current Standard link at the top of the navigation on the left brings up a page with the current Forest Service national GIS data dictionary standards for the Road and Trail feature classes. Here all of the feature class fields, domains used, and domain coded values are listed and defined. The Road feature class is provided in the IWeb GDB TransportationOnly geodatabase to use during the data preparation process. This website should be referenced for descriptions of the feature classes, their attribute fields and the domains provided in IWeb GDB TransportationOnly geodatabase.

Methods of Route Calibration

- I-Web spatial toolbar
- Calibrate route tool on the Route Editing toolbar
- Calibrate routes with points layer of known measurements
- Use Calc_Routes_Measure.cal script

Evidence of calibration

Part	X	Y	M
0	122 -12524...	381981...	6.146
	123 -12523...	381971...	6.175
	124 -12522...	381968...	6.192
	125 -12521...	381964...	6.219
	126 -12520...	381957...	6.249
	127 -12519...	381951...	6.273
	128 -12518...	381944...	6.300

7-8

A route must be calibrated before it can be used to create an event layer. When a route is calibrated the M value for each vertex is populated representing a linear measure of distance. These values can differ from the units of measure used in the map data frame. A feature can be displayed using Universal Transverse Mercator (UTM) meters coordinates and have M values stored as units other than meters (in the MVUM case the M values are miles). If a route is not calibrated then linear referencing cannot be accomplished. Routes can be calibrated by using the I-Web toolbar, route editing toolbar, a known points layer, or a custom script with a data table of known measurements. One calibration script is available from the National Forest Southwestern Region (Region 3) called Calc_Routes_Measure.cal. If a feature is calibrated, it's M values will be populated in the Edit Sketch Properties window within an edit session. For the most part, standard calibration from the I-Web toolbar is used unless you see reasons to use existing engineering mileage estimates to improve the accuracy of your MVUM symbology.

I-Web Spatial Editor Travel Routes Toolbar

Installation Requirements

- Crystal Reports for .NET 2.0
- I-Web client
- USDA eAuthentication

eAuthentication Login



User ID: [Forgot your User ID?](#)

Password: [Forgot your Password?](#) [Change My Password](#)

Without all of these, the toolbar may install, but it will not function properly.

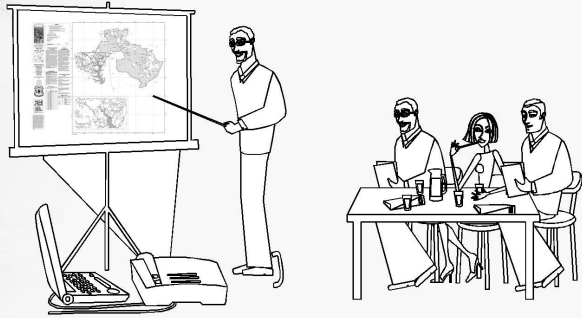
7-8

The I-Web Spatial Editor Travel Routes toolbar requires a few software applications to be installed before it can work properly. Along with Oracle 9i client, the I-Web toolbar needs Crystal Reports for .NET 2.0 and I-Web Client installed. The user must be within the Forest Service system or login through VPN with eAuthentication privileges. Without the other applications installed the I-Web Spatial Editor Travel Routes toolbar may install successfully but will not function properly.





Demo

- Turn on the IWEB QA toolbar
- Join the route basics table to Roads layer
- View M values in sketch properties




7-10



Exercise:



Connect to Infra and calibrate routes

- Goal: Use the I-Web Spatial Editor Travel Route toolbar to connect to Infra, calibrate the routes and verify calibration



1. Connect to Infra and calibrate routes
2. Check to make sure the routes were calibrated by looking at sketch properties and using the Turn On/Off Route hatches tool

7-11



Summary

- ☐ Connect to Infra through I-Web
<https://iweb.fs.usda.gov>.
- ☐ Infra contains several required MVUM tables
such as Allow tables and Ticmark table.
- ☐ The I-Web Spatial Editor toolbar contains most
of the QA tools needed for an MVUM.

7-12

Exercise 7: Connect to Infra and Calibrate Routes



Exercise goal: In this exercise you will use the I-Web Spatial Editor toolbar to connect to Infra and calibrate the routes. You will also learn how to verify that the calibration was successful.

Why is this important? It is necessary for all routes to be calibrated correctly to ensure an accurate portrayal of the MVUM symbology. This exercise demonstrates how to use a custom tool in the I-Web spatial editor toolbar to calibrate MVUM routes.

Upon completion of the exercise, you will be able to ...

- ✓ Activate the I-Web toolbar and create MVUM metadata
- ✓ Use the Find Duplicate and Turn On/Off Route Hatches tools
- ✓ Connect to Infra and calibrate routes through the I-Web toolbar
- ✓ Verify route calibration by comparing End Mile Post data and Shape_Length data, and reviewing M values

STEP	DESCRIPTION	PAGE
1	Activate I-Web toolbar and create MVUM metadata	7 – 14
2	Connect routes to Infra and calibrate routes using the I-Web Spatial Editor Travel Routes toolbar	7 – 17
3	Check M values to make sure calibration was successful	7 – 19
4	Using the route hatches tool, compare the Shape_Length and End Mile Post fields	7 – 20

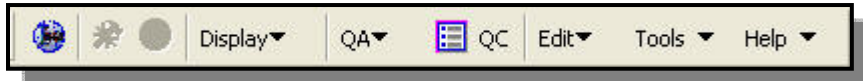
Step 1: Activate I-Web toolbar and create MVUM metadata

The IWeb Spatial Editor Travel Routes toolbar must be downloaded and installed for this exercise. You will use the toolbar to connect to Infra and calibrate the travel routes.

- a. If not already downloaded and installed, follow the directions on the website below to download and install the I-Web Spatial Editor Travel Routes toolbar.

<https://iweb.fs.usda.gov/gisutils/iseTravelRoutes/iseTravelRoutes.html>

- b. Open ArcMap. From the main menu bar right-click and add the I-Web Spatial Editor : Travel Routes toolbar.




- c. Navigate to the C:/Training/Ex7 folder and add the **Road** feature class from the IWeb GDB TransportationOnly geodatabase to the ArcMap session.

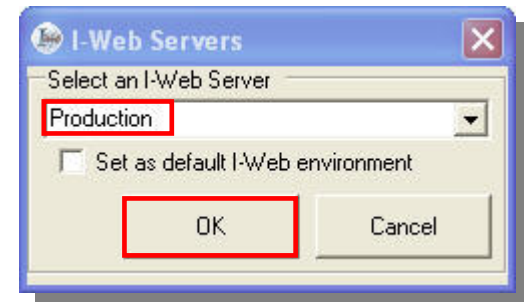


- d. On the I-Web Spatial Editor toolbar click on the **Connect to I-Web** button. On the first web screen click **continue**.

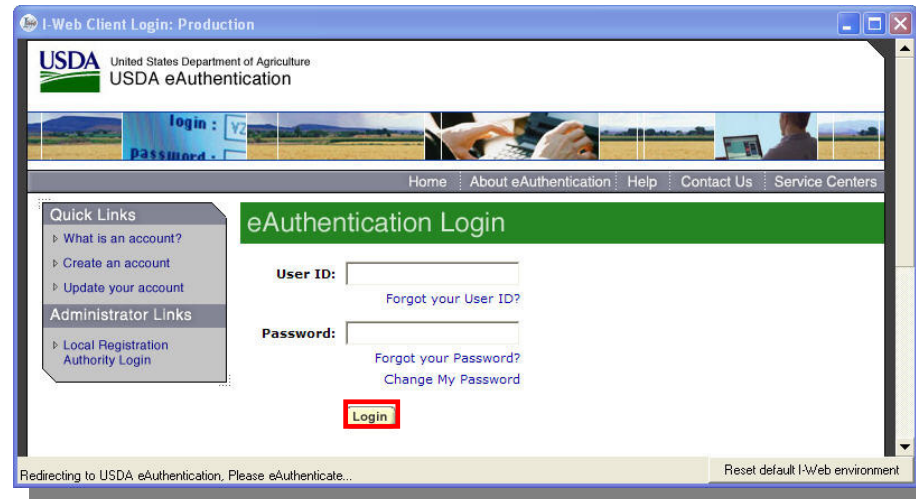


- e. In the I-Web Servers window select **Production** from the drop-down menu and click **OK**.

 Note: Sometimes this screen is bypassed if your system remembers where you last logged on.



- f. In the I-Web client Login window click on the **Continue** button and enter your eAuthentication login information and click **Login**.

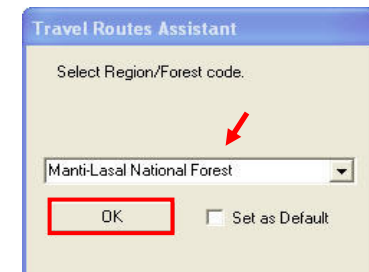


- g. Click the **Update Metadata for this editing session** button on the I-Web Spatial Editor Travel Routes toolbar. Creating metadata is necessary step to activate the toolbar. This metadata records the date edits were made, who made them, and the location, organization, and contact information of those who performed edits.



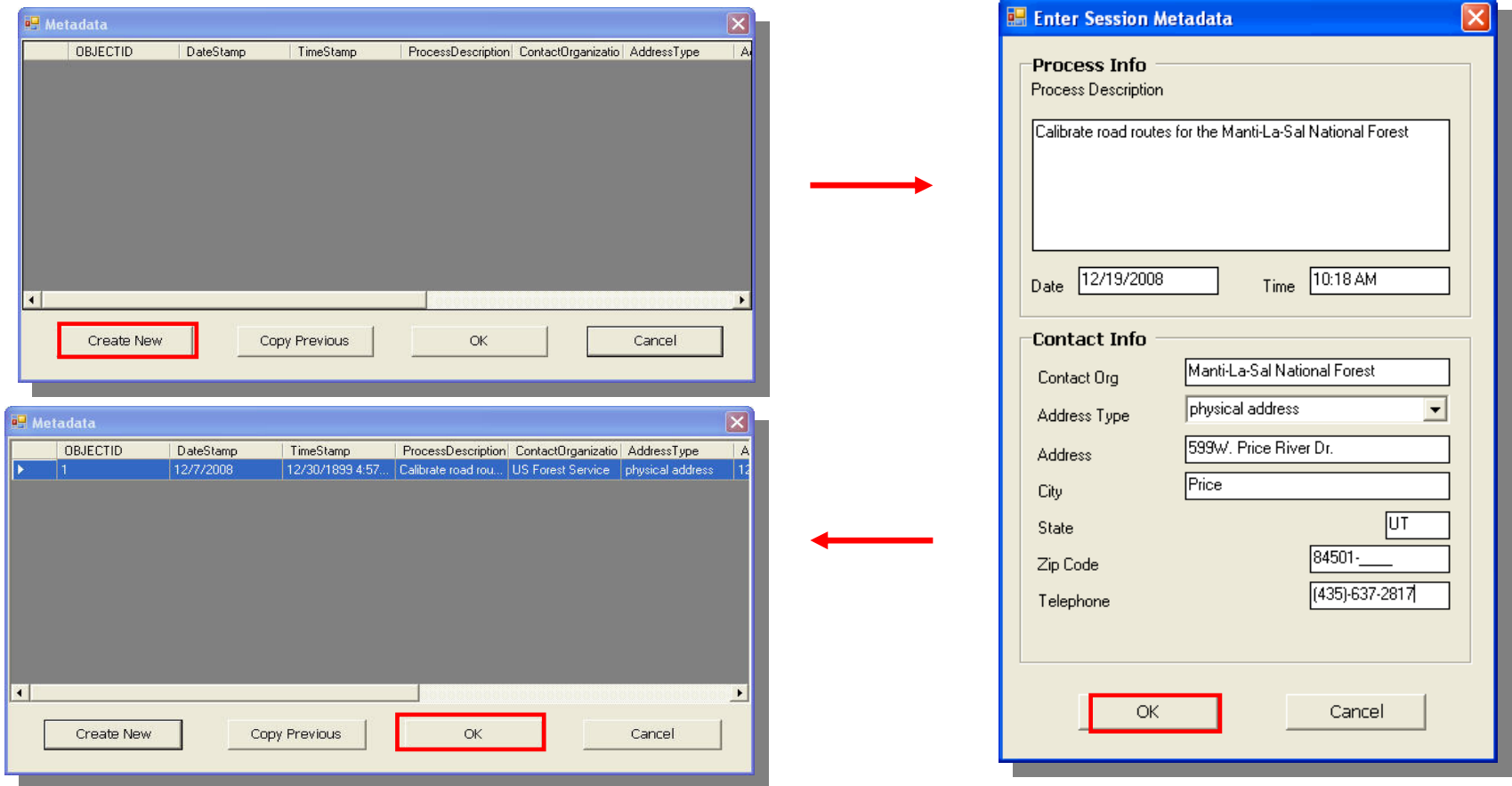
In the next step you will specify what Infra records you are going to be checking against. You will select “Road” features of the Manti-Lasal National Forest.

- h. Select Region/Forest code drop-down menu and click **OK**.

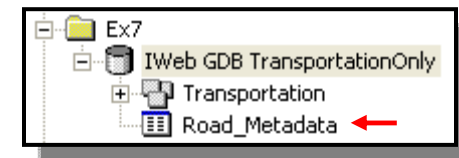


Working with Infra

- i. In the Metadata window click **Create New**. Next you will fill out the form as completely as possible. You can mimic the info in the screenshot and click **OK** twice.



At this point the I-Web Spatial Editor Travel Routes toolbar is connected to I-Web and a metadata document has been created to log information about the edit session. Metadata is stored in a unique table within the geodatabase you are working in.




Step 2: Connect routes to Infra and calibrate routes using the I-Web Spatial Editor Travel Routes toolbar

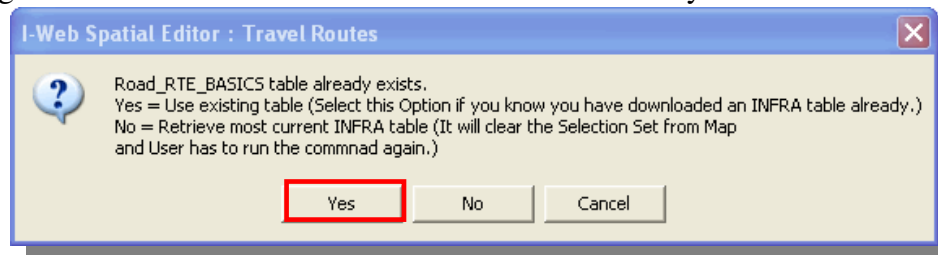
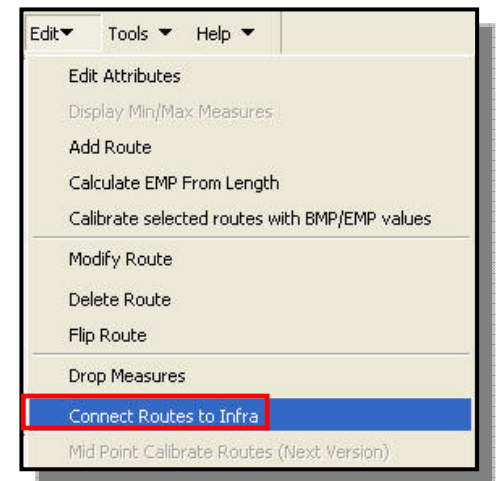
In this step you will use the I-Web Spatial Editor Travel Routes toolbar to calibrate the routes. The routes are calibrated by referencing the beginning and ending milepost data for each route provided in the Infra Route basics table.

- a. Right-click on the **Road** feature class in the table of contents and select **Open Attribute Table**. In the attribute table, press **Ctrl+A** to select all records. At the bottom of the attribute table you should see 3268 out of 3268 selected. Minimize the attributes table window.
- b. Under the Edit drop-down menu in the I-Web Spatial Editor Travel Routes toolbar select the **Connect Routes to Infra** tool. In the next three I-Web Spatial Editor Travel Routes windows select **OK**.

This step just downloaded the ROAD_RTE_BASICS table into the IWeb GDB TransportationOnly geodatabase and populates the BMP, EMP, RTE_CN, RT_ACTION, and ACTIONSTAMP fields of the road feature class.

- c. Click **OK** on the next three windows.

 **NOTE:** You may not have permissions to the Manti-La-Sal forest. In this case, open the attribute table for the road feature class. If the CN# field is not populated, select all features and run the Connect Routes to Infra tool again. Click **Yes** in the second window when asked if you want to use the existing RTE_BASICS table already downloaded.



Working with Infra

By using the Connect Routes to Infra tool you downloaded the Road_RTE_Basics table and you populated some fields in your Road feature class. Only those records allowed by ATM will be updated. View the geodatabase you are working in to see the Road_RTE_BASICs table.

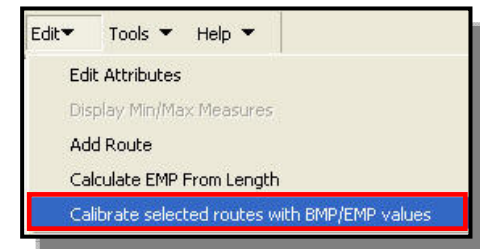


Question:

1. What field is being used to connect GIS features with the correct Infra record?

Currently you should see a limited number of features selected that were designated with the 'allowed' status. You will run the calibration on this selection. In case you lost your selection, create this SQL query: `Rte_CN <> '0'`.

- d. Next from the Edit drop down menu in the I-Web Spatial Editor Travel Route toolbar select **Calibrate Selected Routes with BMP/EMP values**.



- e. In the I-Web Spatial Editor Travel Routes window select **OK**.

- f. Click the Clear Selected Features button on the main toolbar.



Question:

2. In the attribute table, what populates the RTE_ACTION field after using the Calibrate selected routes with BMP/EMP tool?

Step 3: Check M values to make sure calibration was successful


After a route is calibrated it is a good practice to check the M values. M values are the assigned to each vertex of a calibrated arc. Looking at these values can quickly show an error in the calibration process.

- a. Use the select tool and select a feature in the data frame.

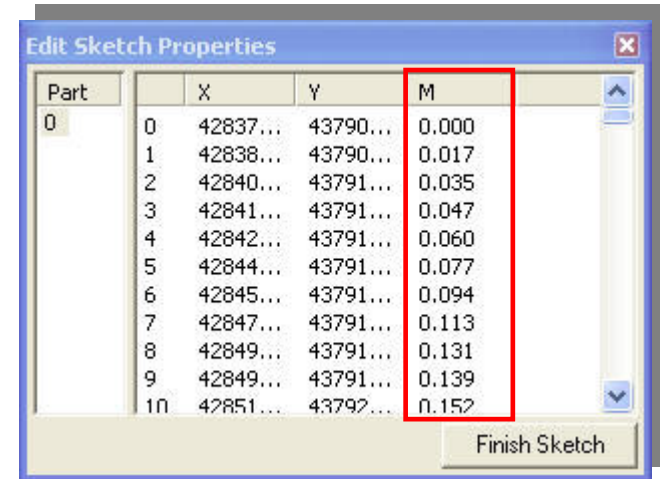


- b. In the editor toolbar make the task **Modify Feature** a click on the **Sketch Properties** tool to open the Sketch Properties window.



 **NOTE:** Each row in the Edit Sketch Properties window represents a vertex in the selected feature. Note the values given for the M field. The M values should start at 0.0 and continually increase as you scroll down the window. These values are populated as a result of the calibration process and represents the linear distance (in miles) a particular vertex is from the first vertex in that route.

- c. Review the M values and close the window.



NOTE: Another way to check individual vertex M values is by using the Identify Route Location tool. This tool can be added by following the path below off the main menu bar:

Tools → Customize → Commands Tab

Categories = Linear Referencing → Identify Route Locations

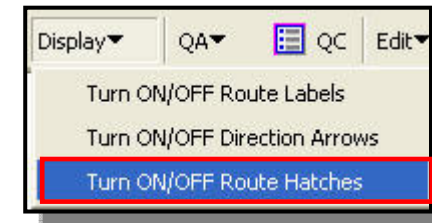


Your Edit Sketch Properties will have different values.

Step 4: Using the route hatches tool and compare the Shape_Length and End Mile Post fields

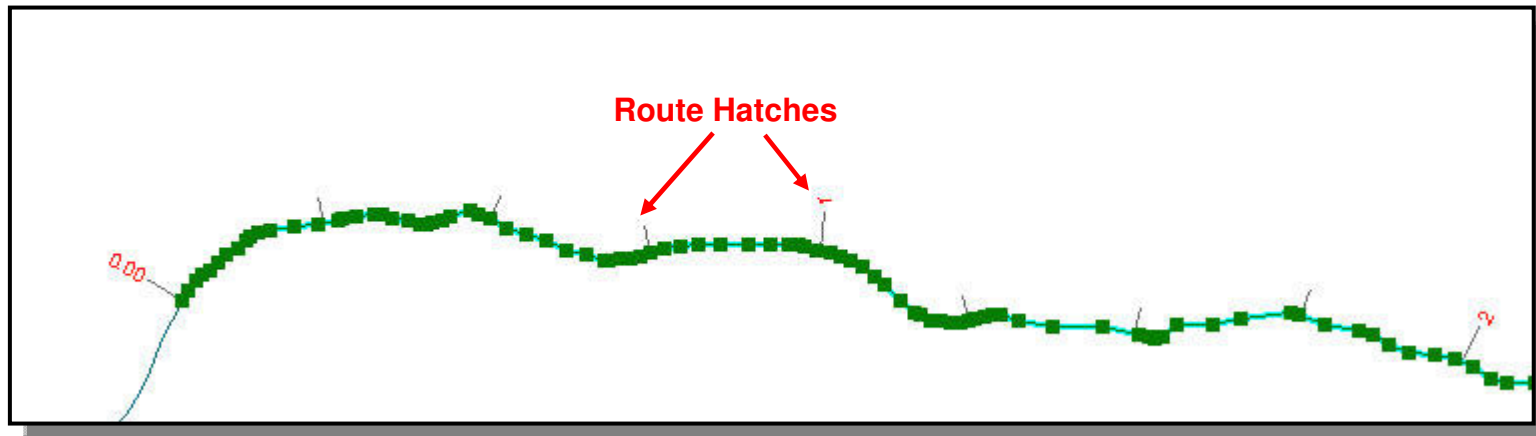
Route hatches gives you the ability to label BMP and EMP route data. By comparing the difference between EMP values and the Shape_Length values, routes large enough discrepancies that need to be addressed can be identified.

- a. With a feature still selected click the Display drop-down menu from the I-Web Spatial Editor Travel Routes toolbar and select the **Turn On/Off Route Hatches** tool.



This tool turns on and off hatches along a route. These hatches are placed in quarter mile increments along each route. This display is helpful because it labels EMP and BMP data and illustrates whether the route is displaying in the correct direction or not.

- b. Zoom into the beginning of the route you have selected. Notice the hatch marks labeled in red. The first one should be labeled 0.00, the next three blank, and the fourth one labeled 1.



If there was an error in the calibration the hatching may display numbers too large such as an EMP of 200.

- c. Clear the selected features so nothing is selected.



- d. Open the attribute table for the **Road** feature class.
- e. Select any row in the attribute table. Look at the value for the Road.EMP field. Multiply that value by the miles to meters conversion value of **1609.344**. The product of the multiplication equation should be very close the Shape_Length field for that row.

If the values are not close, then you just found your first route feature to start a wonderfully long list of data problems to solve.

NOTE: When comparing the EMP and Shape_Length values the difference between the two should be no more than 10%. The Shape_Length is a value ArcMap automatically calculates based on a perfectly flat topography. The EMP value was actually measured in the field and will typically be longer due to topography changes.

Question:

3. In the Road attribute table select the record with RTE_CN of 1010397. Using the equation in step e, would you consider the difference in EMP and Shape_Length excessive? Remember 10% difference is a general guideline to use.

- f. Save changes and close the ArcMap session.



In this exercise you used the I-Web Spatial Editor Travel Routes toolbar to connect to Infra and download the Route Basics table. Using this table with the I-Web toolbar you were able to calibrate the routes. Then you examined the routes to make sure they were successfully calibrated and looked at the EMP vs. the Shape_Length values of the features. The Route Hatches tool was used to display the BMP and EMP values of the routes for further verification that the route direction was correct.

End Exercise.