

## **Appendix C: GIS for the Design Module.**

UPDATED: 02.26.2015

### **C.1 Preface.**

This GIS Appendix is intended to provide EEBACS users necessary information to input and extract GIS information about projects within EEBACS. This information is a valuable link that will allow Projects data to be mapped spatially. This link not only provides a spatial link to information about FLH projects that is contained within the EEBACS databases, but also provides a link to other project data by using and storing the project number which is also stored in many other FLH databases as a the FLH Project unique identifier. This link will enable ties to many other FLH project databases to be located spatially and tied to a point on a map. While this information is not currently a "required" entry within EEBACS it is very important that the data is entered and is accurate. EEBACS users are highly encouraged to input this information.

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## C.3 Samples of methods for obtaining GIS information that is allowed to be entered into EEBACS.

### C.3.1 Examples of EEBACS screens that allow input of GIS information.

The EEBACS allows users to enter project spatial location information associated with projects and schedules. This spatial location information will allow users and managers to link EEBACS data about projects to actual project locations and allow GIS users to map and analyze EEBACS information spatially. That is why it will be important for users to enter spatial location information into EEBACS whenever possible. The following are EEBACS screens where the spatial information can be entered for each schedule:

A: Select "Add GIS Route" to enter specific information about the route(s) that the estimate schedule applies to.

B: Select "Add Bridge" to enter specific information about the bridge(s) that the estimate schedule applies to.

The screenshot displays the 'Schedules' screen in the EEBACS software. The interface includes a navigation bar at the top with tabs for 'Project Info', 'Design', 'Account', 'Team', and 'Event Log'. Below this, there are sub-tabs for 'Estimate', 'CPL', 'Schedules', 'Column Headers', 'Pay Items', and 'Construction Estimates'. The main content area is titled 'Schedule' and contains several input fields and buttons. Two orange arrows, labeled 'A' and 'B', point to the 'Add GIS Route' and 'Add Bridge' buttons respectively. The 'Add GIS Route' button is located next to the 'GIS Route(s):' field, and the 'Add Bridge' button is located next to the 'Bridge(s):' field. Other fields include 'Copy Existing:', 'Schedule Type\*', 'Schedule Letter\*', 'Construction Type\*', 'Schedule Description\*', 'Schedule Termini\*', 'CPM Days:', 'Line Item Starting Number\*', 'Line Item Increment Number\*', 'Schedule Length:', and 'Lane Miles:'. The 'Add GIS Route' button is highlighted with an orange arrow labeled 'A', and the 'Add Bridge' button is highlighted with an orange arrow labeled 'B'.

Once the “Add GIS Route” button is selected the WEB form adjusts to allow the input of the GIS route information.

A: Enter the GIS Route number (if available-From FLH GIS ex. YELL-0010, or not from FLH GIS use CR 465 or Road name READING AVE – Preferred is FLH GIS )

B: Enter the length of the route in miles

C: Enter the predominant Construction Type for this route for this estimate schedule (Use multiple GIS Routes, even is the same route, if Construction type changes)

D: Enter the GIS milepost for the route where the work begins (if available – see FLH GIS)

E: Enter the GIS milepost for the route where the work ends (if available – See FLH GIS)

F: If a parking lot enter the SQYD area of the work

G: Enter the Latitude value of the route where the work begins (use Decimal Degrees ONLY - If Parking Lot enter center point of the lot)

H: Enter the Longitude value of the route where the work begins (use Decimal Degrees ONLY - If Parking Lot enter center point of the lot)

I: Enter the Latitude value of the route where the work ends (use Decimal Degrees ONLY)

J: Enter the Longitude value of the route where the work ends (use Decimal Degrees ONLY)

K: Enter a verbal description of the termini points (e.g. From State Route 32 to the Jordan Creek Bridge)

L: Enter any User comment for clarification. (State if FLH GIS Used, and RIP Cycle)

M: Select “Remove GIS Route” to remove the GIS route information.

N: Select “Add GIS Route” to add an additional GIS route that this estimate schedule applies to.

The screenshot shows a web form titled "GIS Route(s):" with a dropdown menu. Below the dropdown is a form with the following fields and buttons:

- GIS Route\***: Text input field with callout **A**.
- Length\***: Text input field with "miles" label and callout **B**.
- Construction Type\***: Dropdown menu with callout **C**.
- GIS Milepost Start**: Text input field with callout **D**.
- GIS Milepost End**: Text input field with callout **E**.
- Parking Lot Area**: Text input field with "SQYD" label and callout **F**.
- Lat Begin of Project**: Text input field with callout **G**.
- Long Begin of Project**: Text input field with callout **H**.
- Lat End of Project**: Text input field with callout **I**.
- Long End of Project**: Text input field with callout **J**.
- Termini**: Text area with callout **K**.
- Comment**: Text input field with callout **L**.
- Add GIS Route**: Button with callout **N**.
- Remove GIS Route**: Button with callout **M**.

Once the “Add Bridge” button is selected the WEB form adjusts to allow the input of the Bridge information.

A: Enter the Bridge Identification (e.g. bridge structure number)

B: Enter the GIS Route number that the bridge resides on (if available-From FLH GIS ex. YELL-0010, or not from FLH GIS use CR 465 or Road name READING AVE – Preferred is FLH GIS )

C: Enter the predominant Bridge Construction Type for this bridge for this estimate schedule

D: Enter the Bridge size in SQFT

E: Enter the GIS milepost for the route where the bridge begins (if available – see FLH GIS)

F: Enter the GIS milepost for the route where the bridge ends (if available – see FLH GIS)

G: Enter the Latitude value of the route where the bridge begins (use Decimal Degrees ONLY)

H: Enter the Longitude value of the route where the bridge begins(use Decimal Degrees ONLY)

I: Enter the Latitude value of the route where the bridge ends (use Decimal Degrees ONLY)

J: Enter the Longitude value of the route where the bridge ends (use Decimal Degrees ONLY)

K: Enter the bridge length in feet

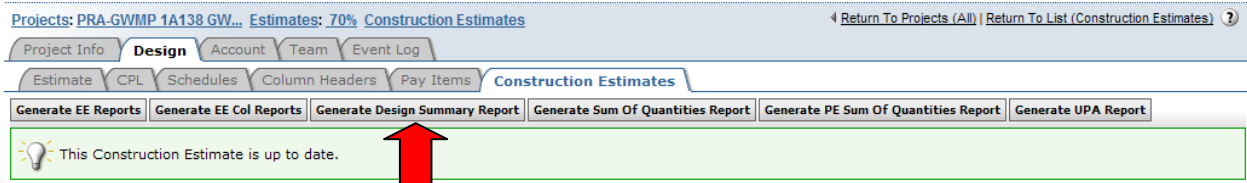
L: Select “Remove Bridge” to remove the GIS route information.

M: Select “Add Bridge” to add an additional bridge that this estimate schedule applies to.

The screenshot shows a web form titled "Bridge(s):" with a dropdown menu set to "Bridge". Below the dropdown are several input fields and buttons, each labeled with a letter from A to M:

- A:** Points to the "Bridge Identification" text input field.
- B:** Points to the "GIS Route" text input field.
- C:** Points to the "Bridge Construction Type" dropdown menu.
- D:** Points to the "Bridge Size (area)" text input field, with "SQFT" written next to it.
- E:** Points to the "GIS Milepost Start" text input field.
- F:** Points to the "GIS Milepost End" text input field.
- G:** Points to the "Bridge Lat Begin" text input field.
- H:** Points to the "Bridge Long Begin" text input field.
- I:** Points to the "Bridge Lat End" text input field.
- J:** Points to the "Bridge Long End" text input field.
- K:** Points to the "Bridge Length" text input field, with "FT" written next to it.
- L:** Points to the "Remove Bridge" button.
- M:** Points to the "Add Bridge" button.

Once the data is entered into EEBACS for each Schedule Reported can be generated in EEBACS to report the data. The GIS report data is generated from Construction Estimates Tab by selecting the Generate Design Summary Report button and the GIS data is reported for the Project.



Below is an example of the type of data that is provided in the Design Summary Report for GIS Routes and Bridges.

Schedule: A

Schedule Type: Base

Schedule Estimate: \$1,083,000.00

CON01 \$1,083,000.00 FLHP account

CON02 \$0.00 NPS Funds

Schedule Construction Type: 40204 Overlay 2 - 4-inches

Schedule Length: 3.194 miles

CPM days: 0

Description: Overlay GWMP

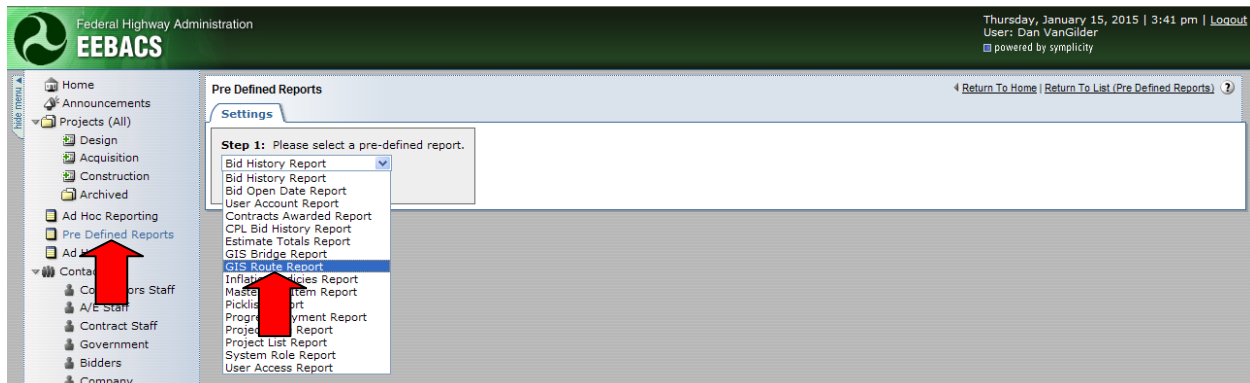
Remarks:

GIS Route	MP_Begin	MP_END	Begin Lat	Begin Long	End Lat	End Long	Length (mile)	Pklot Area (sqyd)	Termini	Construction Type
GWMP-0001	0.394	3.588	38.96417	-77.17355	38.93920	-77.13356	3.19400	0.00000	Dead Run Bridge to Rt 123 Bridge Overpass	40204 Overlay 2 - 4-inches

Bridge ID	GIS Route	MP_Begin	MP_END	Begin Lat	Begin Long	End Lat	End Long	Length (ft)	Size (sqft)	Construction Type
Turkey Run Bridge 3300-002	GWMP-0001	1.247	1.322	38.96354	-77.15805	38.96302	-77.15683	400.00	0.00000	55602 Construct Bridge Rail - Steel

GIS data can also be extracted from EEBACS into Excel Spreadsheets via Pre Defined Reports. This report is accessed from the left-side toolbar by selecting the Pre Defined Reports link. Once selected the user should then select the Add New button to define a new report. Once selected the user can then select the type of GIS data they wish to extract from EEBACS and then select the Continue button



The User can then set various parameters for the output Excel report.

A: Set up the report parameters to contain the desired fields in the report, by clicking check boxes.

B: The user can also use filters to limit the data to meet the GIS requirements.

C: Once the parameters are set to the desired selections the user clicks the Submit Report button to generate the report.

D: An *Excel spreadsheet* is created and can be saved and manipulated within ArcGIS for Desktop to display GIS data pertaining to the routes, bridges, or LAT/LONG point data.

The screenshot displays the EEBACS web application interface. The top navigation bar includes the EEBACS logo, the text 'Federal Highway Administration', and the user information 'Thursday, January 15, 2015 | 3:52 pm | Logout User: Dan VanGilder powered by simplicity'. The left sidebar contains a navigation menu with categories like Home, Announcements, Projects (All), Design, Acquisition, Construction, Archived, Ad Hoc Reporting, Pre Defined Reports, Ad Hoc UPA, Contacts, Tools, and Users Online. The main content area is titled 'Report Results' and shows a 'Settings' section for a 'GIS Route Report'. The settings list includes:
 

- Division [filter](#)
- Project Number [filter](#) (value: 1A138)
- Project Name [filter](#)
- Project Description
- State
- Estimate Milestone
- Schedule
- Schedule Award [filter](#)
- Award Date [filter](#)

 A 'Submit Report' button is located below the settings. A yellow banner at the top of the report results area states 'This report has been completed.' with a link to the report. Orange arrows labeled A, B, C, and D point to the navigation menu, the 'Project Number' field, the 'Submit Report' button, and the completion banner respectively.

### C.3.2 Examples of using GIS-WEB tools to obtain spatial location information for input into EEBACS.

The FLH has existing pilot GIS-WEB application to help provide the spatial location information that EEBACS requires. The information that the GIS-WEB application can provide includes the GIS Route, GIS Milepost Start, GIS Milepost End, and the LAT/LONG information for the Begin and End of Routes or LAT/LONG information for Parking Areas for the Project or GIS information for any Bridge(s).

The link for this GIS-WEB application is as follows:

<http://fhf115gisweb.flhd.fhwa.dot.gov/NpsNavigator/#/Home>

(outside firewall access)

Once the Web page activates click on the “NPS Map” application to get information for NPS Projects, or “All FLH Routes” for other FLTP partner routes, from the menu bar. You may also click on the various map views in the application carousel in the center of the application window and click the application label to access the applications.

U.S. Department of Transportation  
Federal Highway Administration

Related Websites: [CFL](#) [EFL](#) [WFL](#)

FEDERAL LANDS HIGHWAY

Home | [NPS Map](#) | [NPS Navigator](#) | [Compare Cycles](#) | [All FLH Routes](#) | [Finance](#) | [User](#) | [Admin](#) | Welcome : eflhd

**Federal Lands Highway Transportation - GIS for the NPS\* (PILOT TEST WEBSITE)**

The purpose of this PILOT Transportation-related Geographic Information System (GIS) website is to test how WEB technology can bring together the data from the National Park Service management systems (Roadway Inventory Program (RIP) and Pavement Management, Bridge Inspection Program, Traffic Data Collection, and Safety Management), and to put it into a system that is easy to use and can display the features at their spatial location. The Pilot GIS-T website will test how to use the WEB as the “window” into the data Federal Lands and the NPS collect, derive and use to manage National Park Service transportation assets.

**This website contains the following applications:**

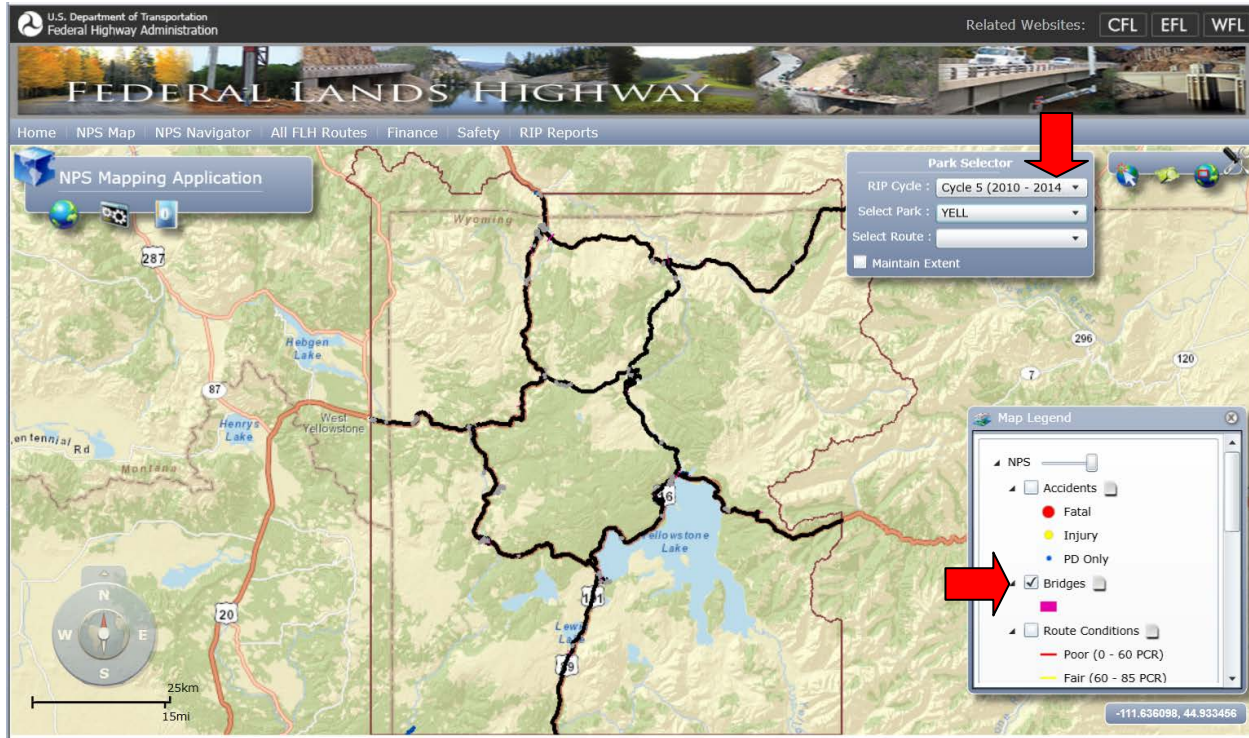
NPS Map | NPS Navigator | Compare Cycles | All FLH Routes | Finance | User | Admin

Showing a GIS map of National Park Service paved routes for RIP CY3, US Fish and Wildlife routes for CY3, and US Forest Service routes.

\* GIS - Geographical Information System  
\* NPS - National Park Service



For NPS Projects use the NPS Map application. Once the "NPS Map" menu item is selected the page updates to the NPS Map web application where the user can see NPS routes for the National Park Service for various RIP collection cycles. The user should use the latest RIP Cycle (Cycle 5) for the latest and best location information for the NPS routes. Map navigation can most easily be achieved by using the mouse to pan (left-click-press and hold) and using the mouse wheel to adjust the zoom level of the map. The map legend can be used to turn off/on map layers as desired by clicking the check boxes within the legend.



Once the user has navigated to a termini point (beginning or end) of the project by using mouse navigation(mouse wheel for zooming, and point click-hold for panning), other tools are available to query the map to determine the GIS route information for EEBAACS.

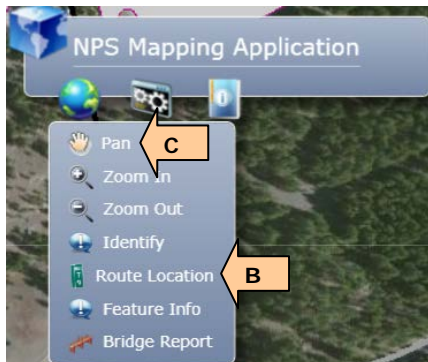
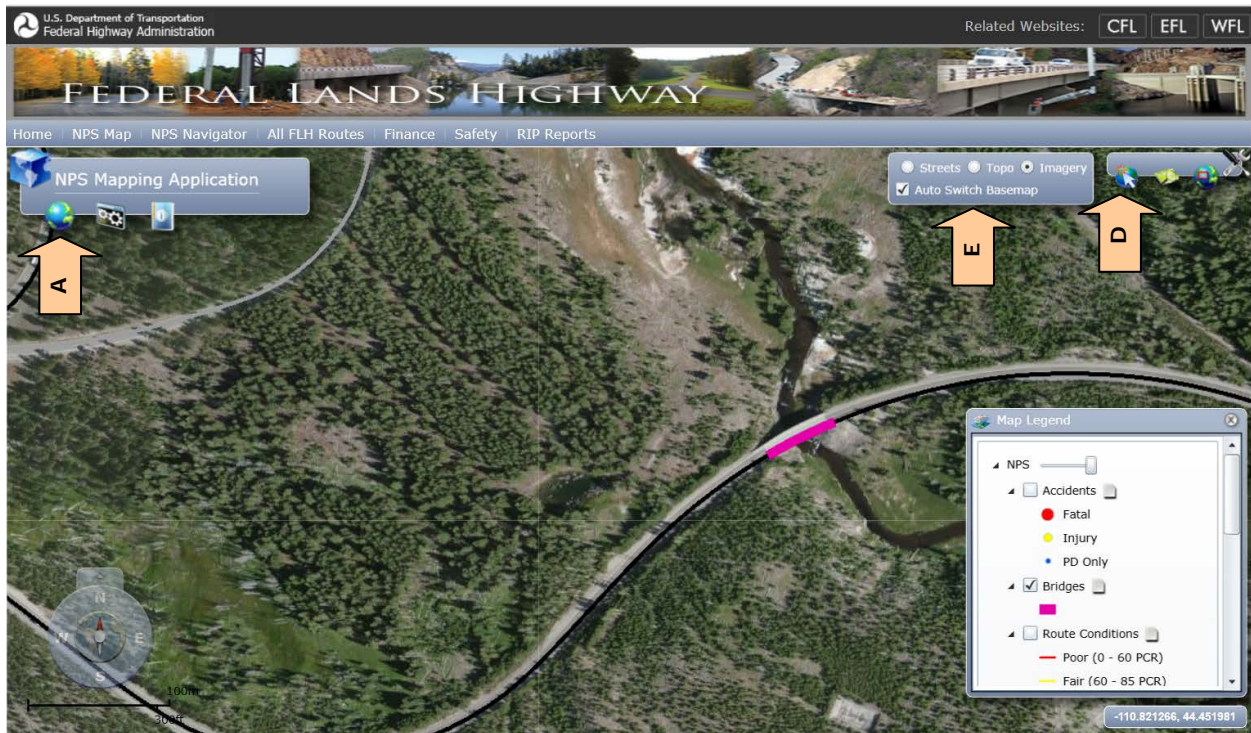
A: Run the mouse cursor over the GLOBE icon to view WEB toolbar for zoom and pan controls and the Identify and Route Location tool – you will use the Route Location tool.

B: Click the Route Location tool to activate the tool (use Feature Info tool for Parking Areas),

C: If you need to adjust the map click the Pan tool to re-enable the mouse for panning and zooming

D: Click the GLOBE ARROW icon to display the background menu

E: Click the radio buttons to change the background of the map from streets to USGS Topo or Imagery.



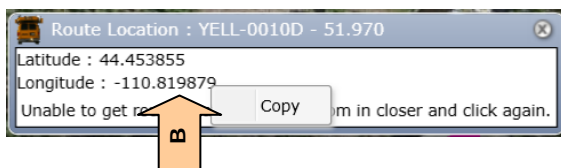
With the Route Location Tool activated, click the point on the map, on the route (in this case on the west end of the bridge – the black line), where the project beginning or ending is located (if a message Unable to get route location, try the point again. You may need to zoom-in further to accurately pick a point on the route), an output window will appear with the Route ID, milepost, and LAT/LONG coordinates of the location clicked. Use these values as the EEBACS information. The bottom right corner of the map also tracks the coordinate location of the mouse. These coordinates do not lock and change if the mouse is moved, even slightly. The values in the Route Location read-out window can be copy/pasted by right-clicking the values in the window.

A: Right-click values from the window to copy to EEBACS application open in separate Internet window. Copy/Paste the Route Id, Milepost, Longitude, and Latitude values

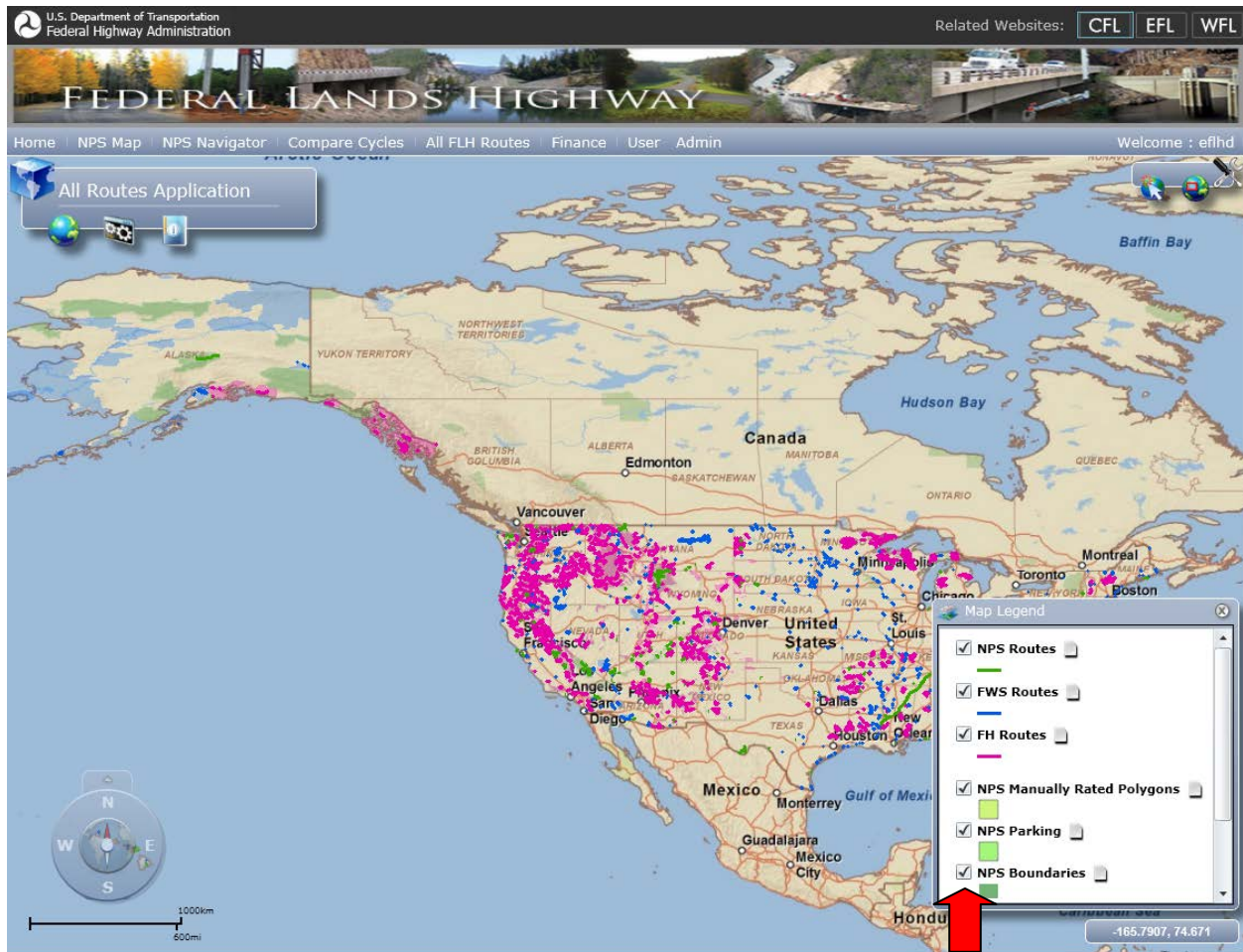


The tool can also be used to get LAT/LONG coordinates even if the route is Unable to be found (for non-NPS Routes – anywhere on the map) LAT/LONG coordinates are displayed for any point clicked by the mouse and these coordinates can also be Copy/Pasted.

B: Right-click values from the window to copy to EEBACS application open in separate Internet window. Copy/Paste the Longitude, and Latitude values



For Non-NPS Projects use the "All FLH Routes." Once the "All FLH Routes" menu item is selected the page updates to the All FLH Routes web application where the user can see FLH Partner routes for the National Park Service, the U.S. Fish and Wildlife Service, and the U.S. Forest Service. Map navigation can most easily be achieved by using the mouse to pan (left-click-press and hold) and using the mouse wheel to adjust the zoom level of the map. The map legend can be used to turn off/on map layers as desired by clicking the check boxes within the legend.



Once the user has navigated to a termini point (beginning or end) of the project by using mouse navigation other tools are available to query the map to determine the GIS route information for EEBACS.

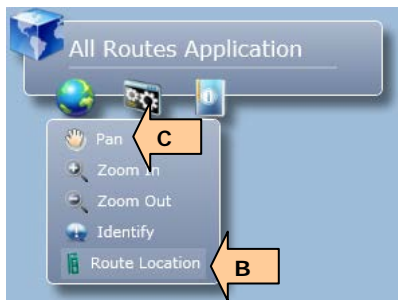
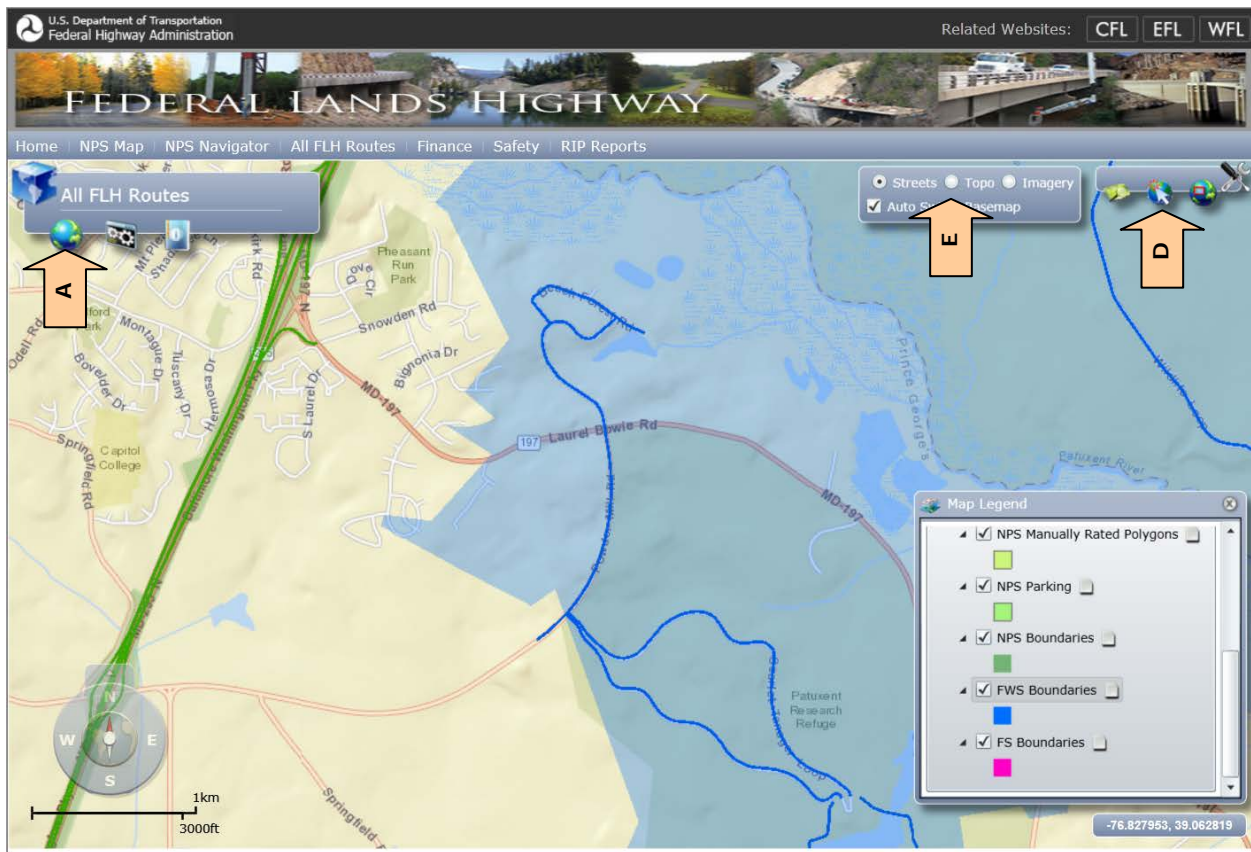
A: Run the mouse cursor over the GLOBE icon to view WEB toolbar for zoom and pan controls and the Identify and Route Location tool – you will use the Route Location tool.

B: Click the Route Location tool to activate the tool

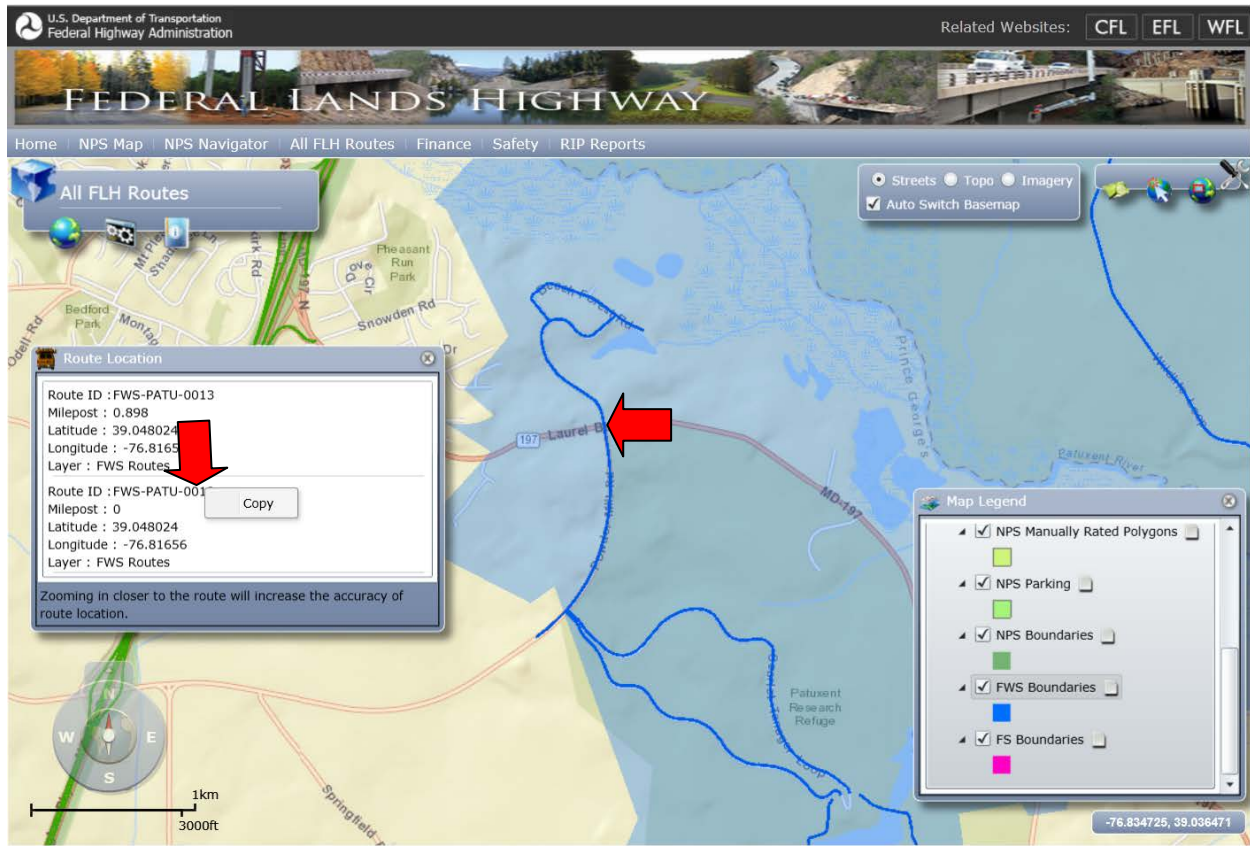
C: If you need to adjust the map click the Pan tool to re-enable the mouse for panning and zooming

D: Click the GLOBE ARROW icon to display the background menu

E: Click the radio buttons to change the background of the map from streets to USGS Topo or Imagery or Imagery.

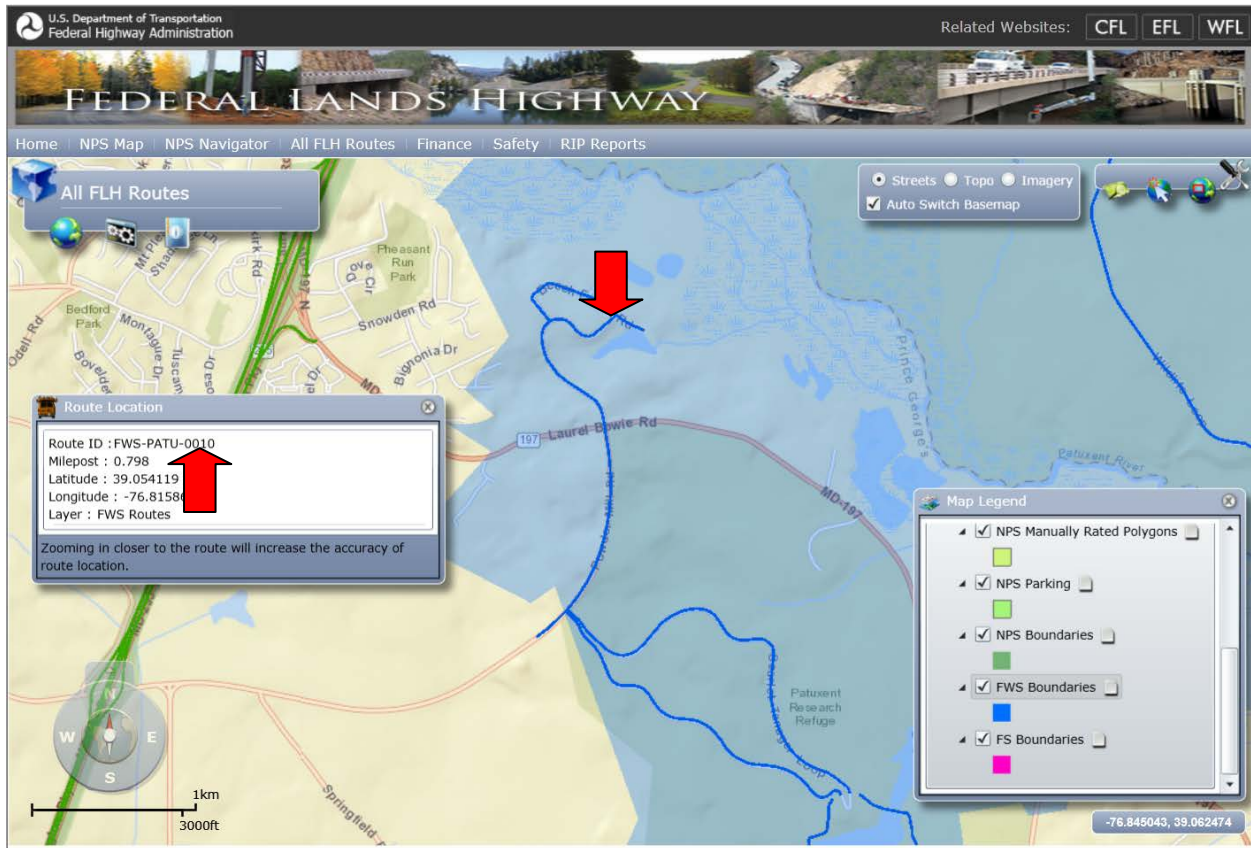


With the Route Location Tool activated click the point on the map, on the route, where the project beginning or ending is located (if a message location not found appears, try the point again), an output window will appear with the Route ID and milepost of the location clicked. Use these values as the EEBACS information. The bottom right corner of the map also tracks the coordinate location of the mouse.



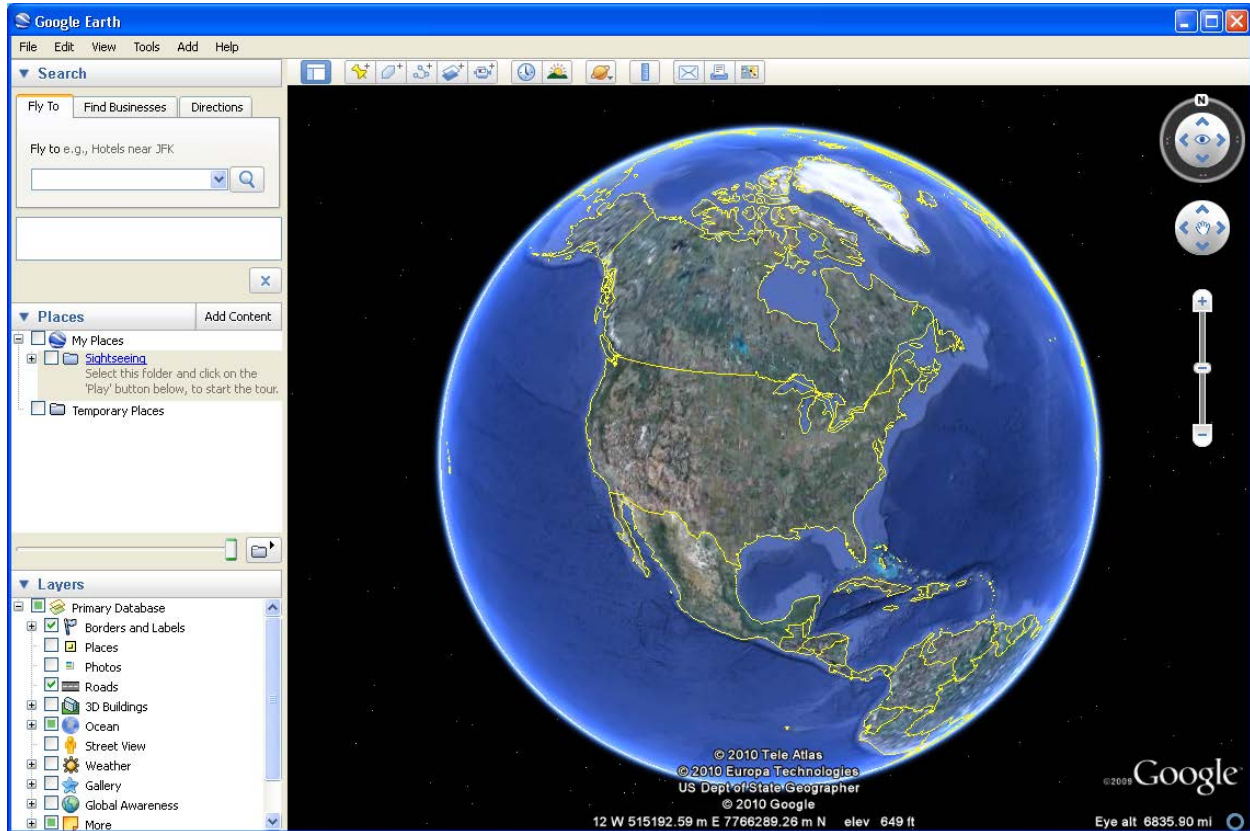
Right-click the Route ID, Milepost and LAT/LONG coordinates in the Route Location window and then click the COPY button and you will be able to COPY/PASTE these values into the EEBACS application screens into the appropriate fields.

Navigate and click the terminus point location and enter those values into EEBACS as well.



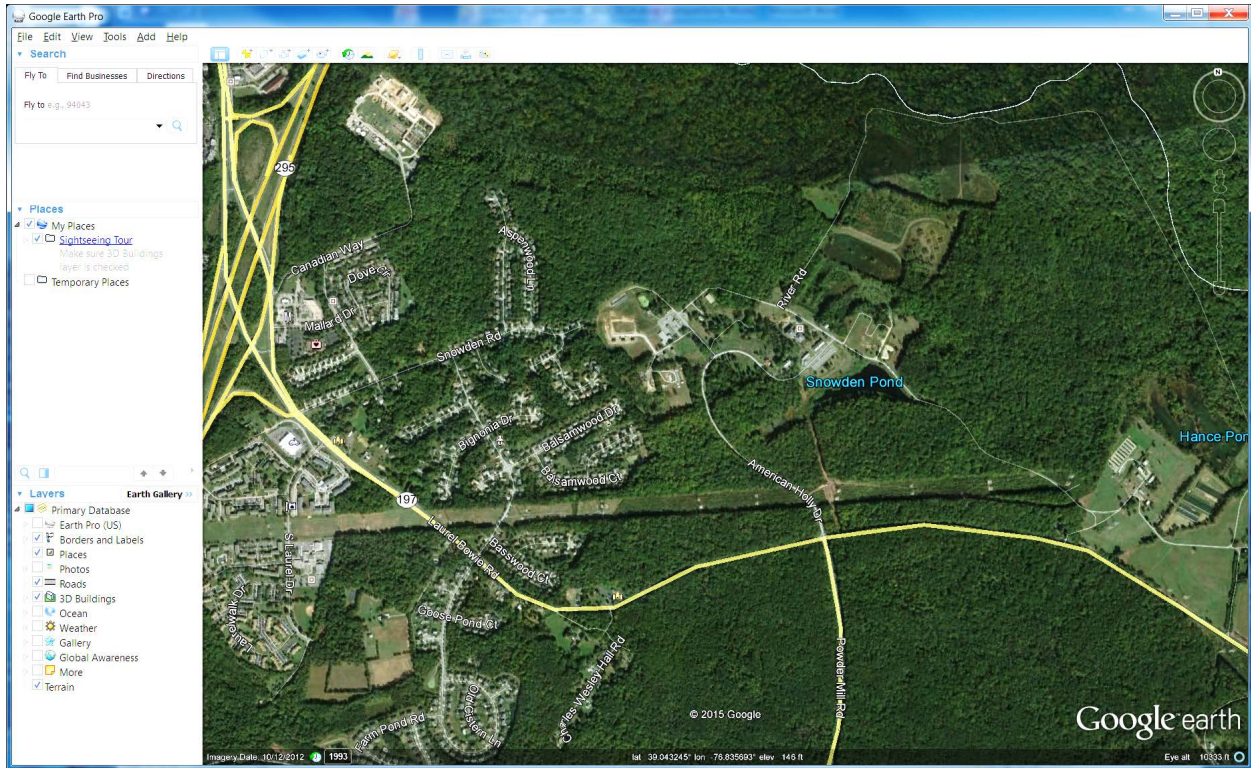
### C.3.3 Examples of using *Google Earth* tools to obtain spatial location information for input into EEBACS.

*Google Earth* is another application that can be used to help provide some of the spatial location information that EEBACS requires. The information that *Google Earth* can provide is limited to LAT/LONG information for the Begin and End of the Projects. *Google Earth* is a good tool to use when the FLH GIS-WEB application data is not sufficient. (typically for projects that are not located on roads that are not currently displayed in the *NPS Navigator* GIS application). *Google Earth* will display coordinates in the required decimal degree format as does the FLH GIS Web application.

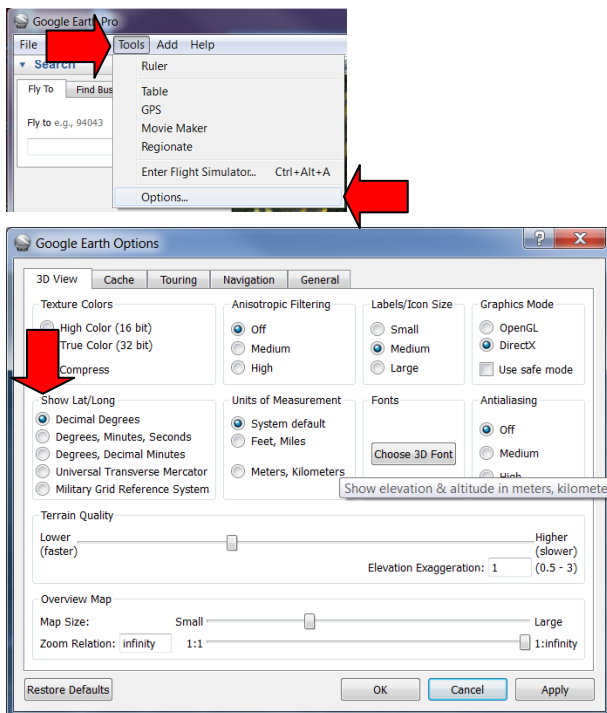




Navigate in Google Earth to the termini location of the project/schedule for the route. Map navigation can most easily be achieved by using the mouse to pan (left-click-press and hold) and using the mouse wheel to adjust the zoom level of the map.



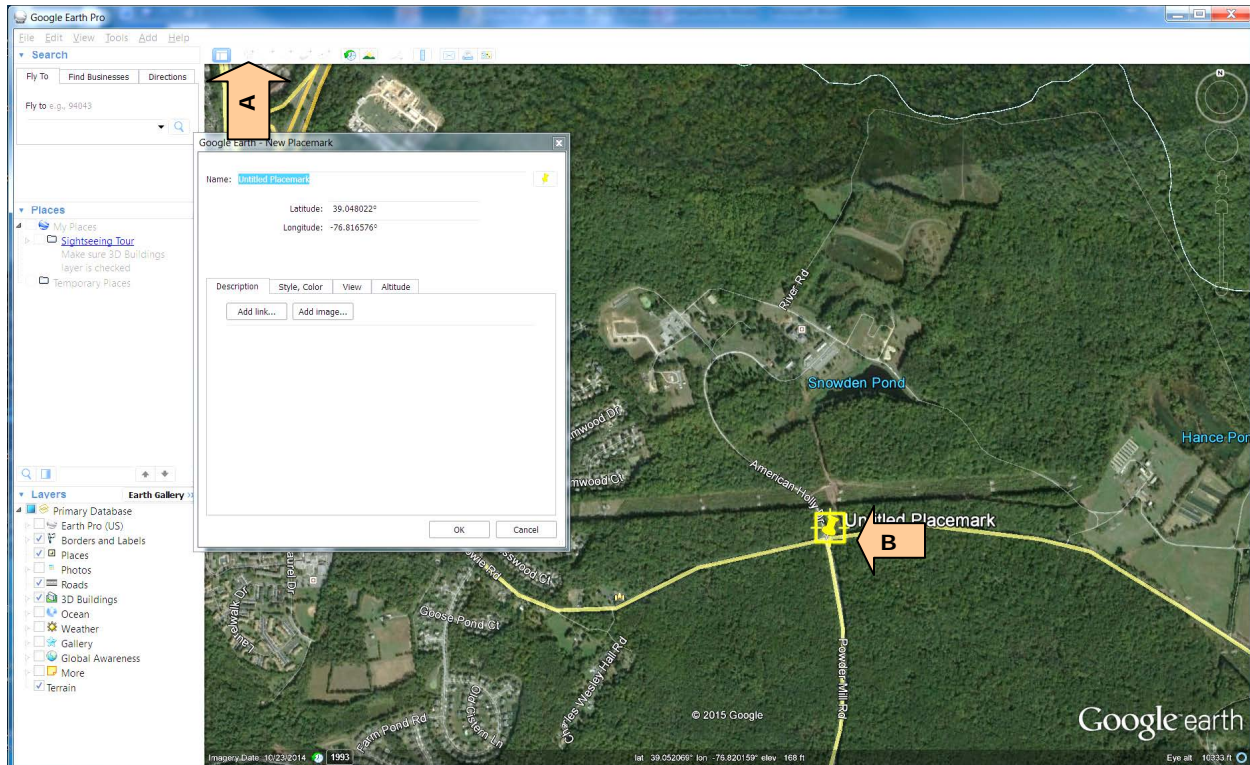
Be sure to set Google Earth to read-out LAT/LONG in Decimal Degrees. This is accomplished by selecting the Tools>Options pull-down menu. Then select the Decimal Degrees in the Show Lat/Long menu of the *Google Earth Options* window.



Once the map is positioned showing the termini point desired select the Placemark tool and position the cross-hairs of the tool over the desired point to capture the point coordinate values. You may enter the name of the desired point if you desire to save the placemark for later re-viewing. The milepost or route name cannot be determined using this method.

A: Click the Placemark Tool.

B: Position the placement point



You can then highlight (do not highlight the degree symbol) and COPY/PASTE from the coordinate values in the *Google Earth New Placemark* window and PASTE the values into EEBACS.

### C.3.4 Examples of using *Microstation* and *GEOPAK* tools to obtain spatial location information for input into EEBACS.

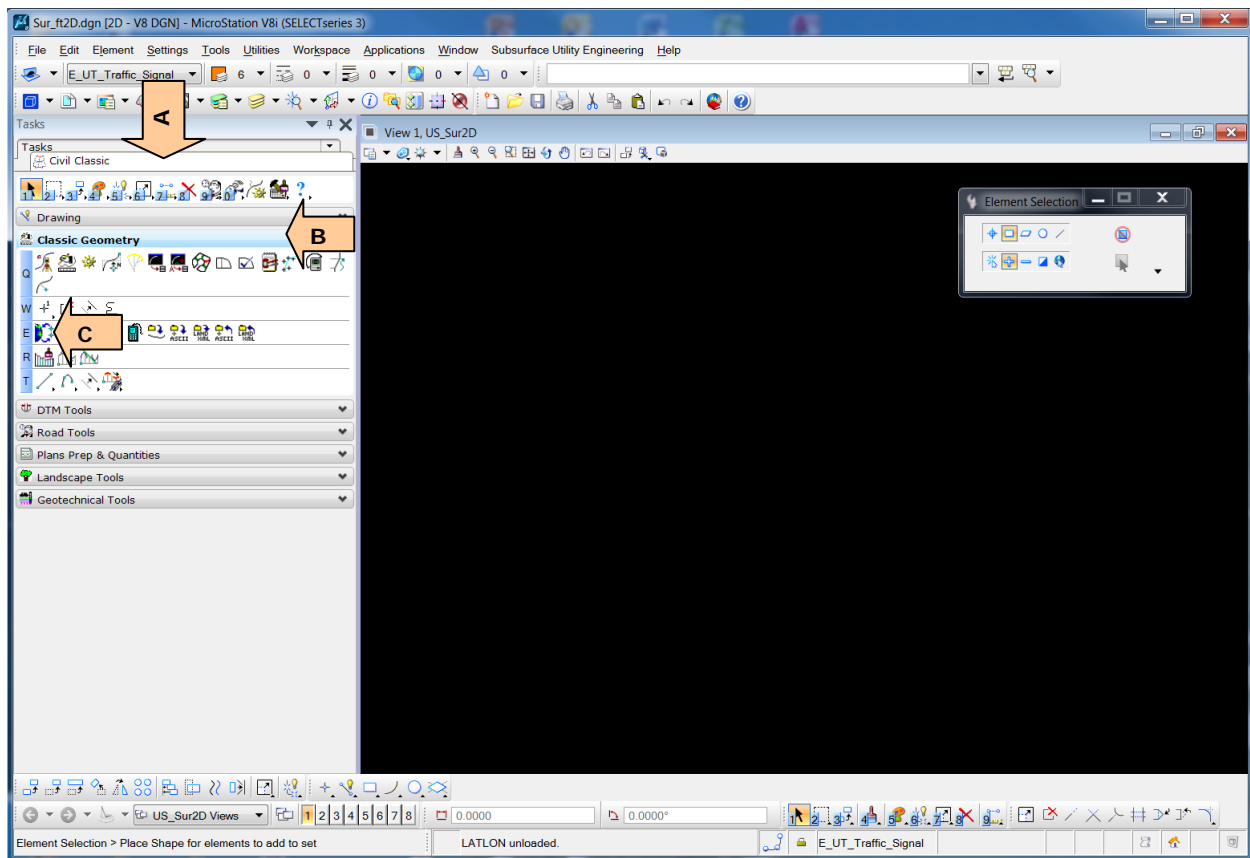
Using *Microstation* and *GEOPAK* is another set of applications that can be used to help provide the spatial location information that EEBACS uses. The information that *Microstation* and *GEOPAK* can provide includes the LAT/LONG information for the Begin and End of the Project. *Microstation* and *GEOPAK* are good tools to use when the *NPS Navigator* FLH GIS-WEB application data is not sufficient (typically for projects that are not located on roads that are not currently displayed in the *NPS Navigator* GIS application) and the information is available through CAD.

Use the *GEOPAK* Survey utility *Geodetic Conversions* to convert State Plane coordinates to LAT/LONG coordinates (WGS1984). There are several ways to locate the utility as follows:

A: Click the *Civil Classic* - Task.

B: Once *Civil Classic* is activated, click the *Classic Geometry* sub-menu

C: Select the *Geodetic Conversions* tool to activate.



The other methods use the *Geopak Survey* toolbar.

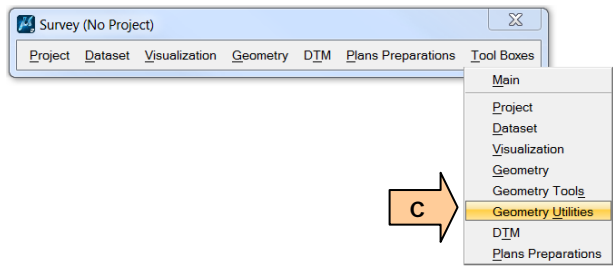
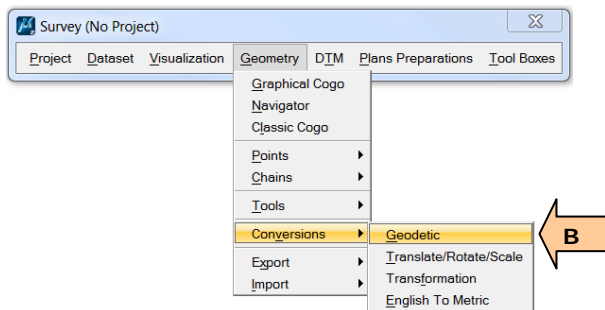
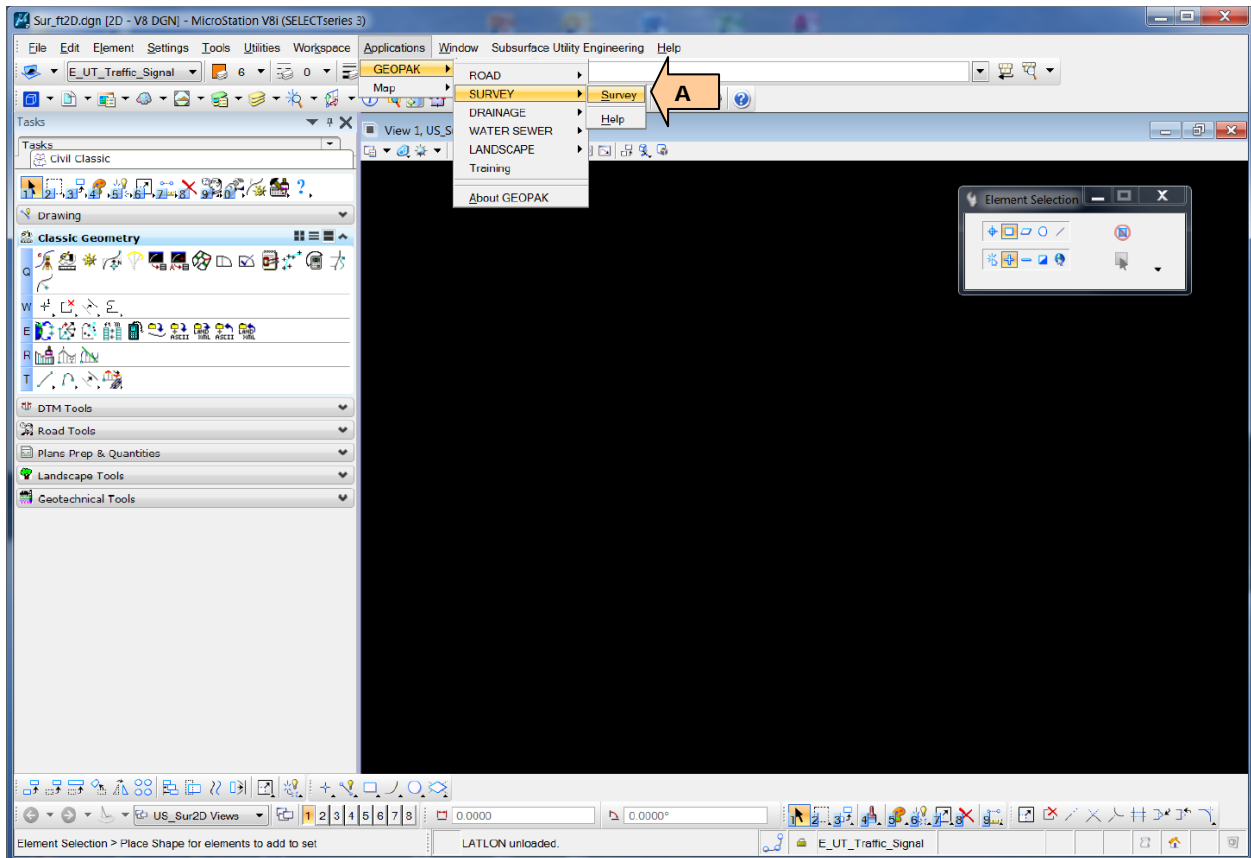
A: Click *Applications* from the menubar, picking *GEOPAK > Survey > Survey* submenus to activate the *Geopak Survey* toolbar

B: From the *Geopak Survey* toolbar, click *Geometry > Conversions > Geodetic* submenus to activate the *Geodetic Conversions* tool.

Or...

C: From the *Geopak Survey* toolbar, click *ToolBoxes > Geometry Utilities* submenus to activate the *Geometry Utilities* toolbar

D: From the *Geometry Utilities* tool bar click the *Geodetic Conversions* tool



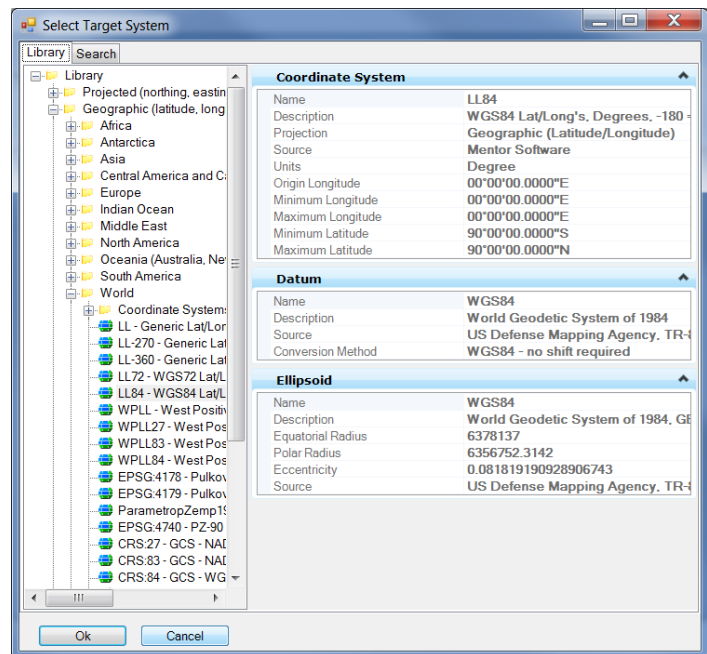
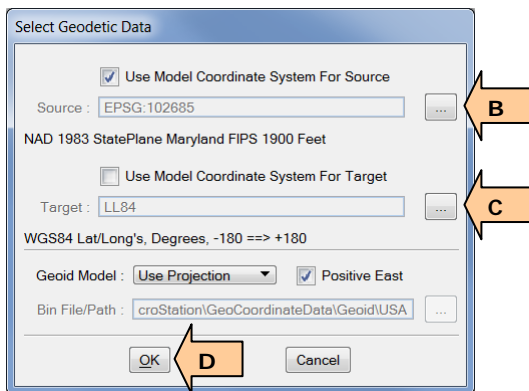
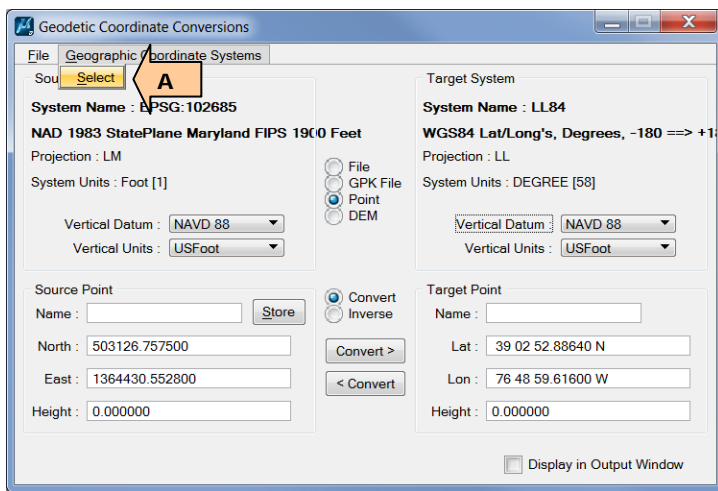
Once the Geodetic Coordinate Conversions tool is activated the user should set the source and target coordinate systems to be able to convert State Plane coordinate values to LAT/LONG.

A: Click the *Geographic Coordinate Systems* menu and then click the *Select* submenu

B: Click the icon to pick the coordinate system for the source coordinate system (pick the proper State Plane system for the project from the Projected category (North America/United states of America) in the *Select Source System* tool)

C: Click the icon to pick the coordinate system for the target coordinate system (pick WGS84 Lat/Long (LL84), Degrees from the Geographic category in the *Select Source System* tool)

D: Click OK.

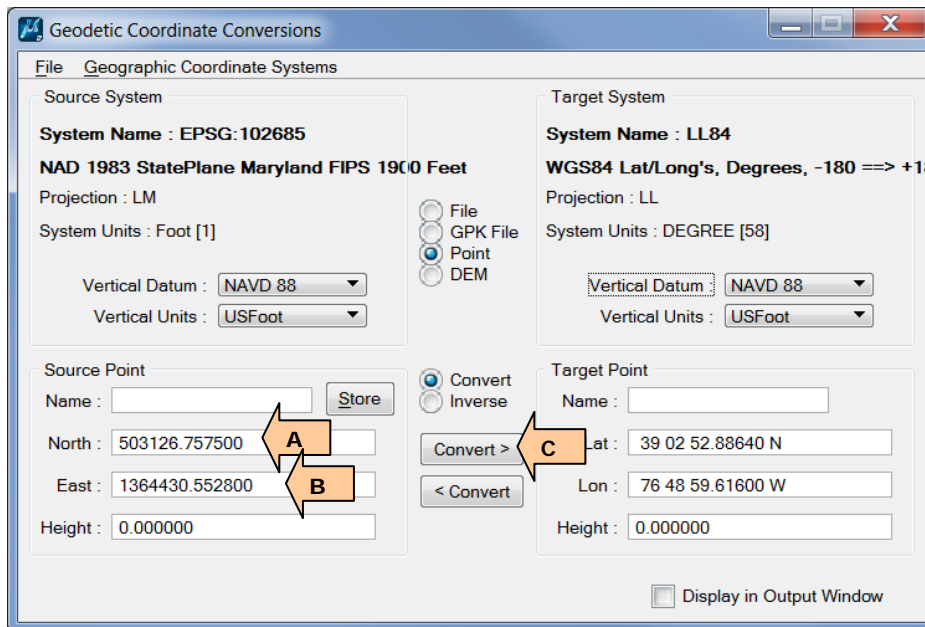


Once the correct Source and Target coordinate systems are set, the user can enter the state plane coordinate values into the tool to calculate the LAT/LONG value for EEBACS. The LAT/LONG value in the tool is shown in Degrees, minutes, and seconds. **This value will need to be converted to decimal degrees.**

A: Enter the Northing coordinate value

B: Enter the Easting coordinate value

C: Click the Convert button



The Coordinates in the Target LAT/LONG are in Degrees/Minutes/Seconds and must be converted to Decimal Degrees. This can be done by using the following link:

<http://www.fcc.gov/encyclopedia/degrees-minutes-seconds-tofrom-decimal-degrees>

The values once converted can be COPY/PASTED from the results in the conversion application into EEBACS.

### Degrees, Minutes, Seconds to/from Decimal Degrees

This tool permits the user to convert latitude and longitude between decimal degrees and degrees, minutes, and seconds. For convenience, a link is included to the National Geodetic Survey's NADCON program, which allows conversions between the NAD83 / WGS84 coordinate system and the older NAD27 coordinate system. NAD27 coordinates are presently used for broadcast authorizations and applications.

This tool requires that Javascript be enabled to perform the calculations.

#### Degrees Minutes Seconds to Decimal Degrees

Enter Degrees Minutes Seconds latitude:	39	2	52.886
Enter Degrees Minutes Seconds longitude:	-76	48	59.616
<input type="button" value="Convert to Decimal"/> <input type="button" value="Clear Values"/>			
Results: Latitude:	39.048024		Longitude: -76.81656