

EMMA – Enterprise MnDOT Mapping Application

EMMA User's Manual
Version: 2/1/2019

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Enterprise MnDOT Mapping Application background

MnDOT implemented the Linear Referencing System (LRS), an Esri Suite of tools, in 2015. LRS replaced the Transportation Information System (TIS) and GIS Basemap. The data in TIS (Roadlog) and BaseMap are no longer being updated and have been frozen/outdated as of January 2014 and complete through Construction season of 2012. Users on the MnDOT network may refer to the iHub LRS webpage for more information.

http://ihub.dot.state.mn.us/gis/lrs_index.html

As new applications are being implemented at MnDOT, there is a need for them to integrate with LRS data. When they do, there is a need to identify whether they need current LRS data, which is updated every weekend, or Highway Performance Monitoring System (HPMS) Snapshot data, which is updated annually. The federal government requires some data to be aligned with this annual HPMS snapshot. If you need to match that data, do not use EMMA but rather use the internal MnDOT Roadway Project Mapping Application (RPMA) which uses the current HPMS snapshot data. For access to RPMA users on the MnDOT network may go to <http://www.dot.state.mn.us/roadway/data/rpma.html>. For more info on HPMS see the Federal Highway Works Administration website: <https://www.fhwa.dot.gov/policyinformation/hpms.cfm>.

The Enterprise MnDOT Mapping Application (EMMA) will provide access to the most recent LRS data. The LRS data used by EMMA is updated every weekend. This data is viewable within EMMA but if you need a copy of the data see the State of MN GeoCommons at: <https://gisdata.mn.gov/>. Copies of all LRS data contained within EMMA are available there with the measure info stripped. If you need the measured data so you can map your own spreadsheets against the MnDOT centerlines send a request to: RACER_Admin@state.mn.us.

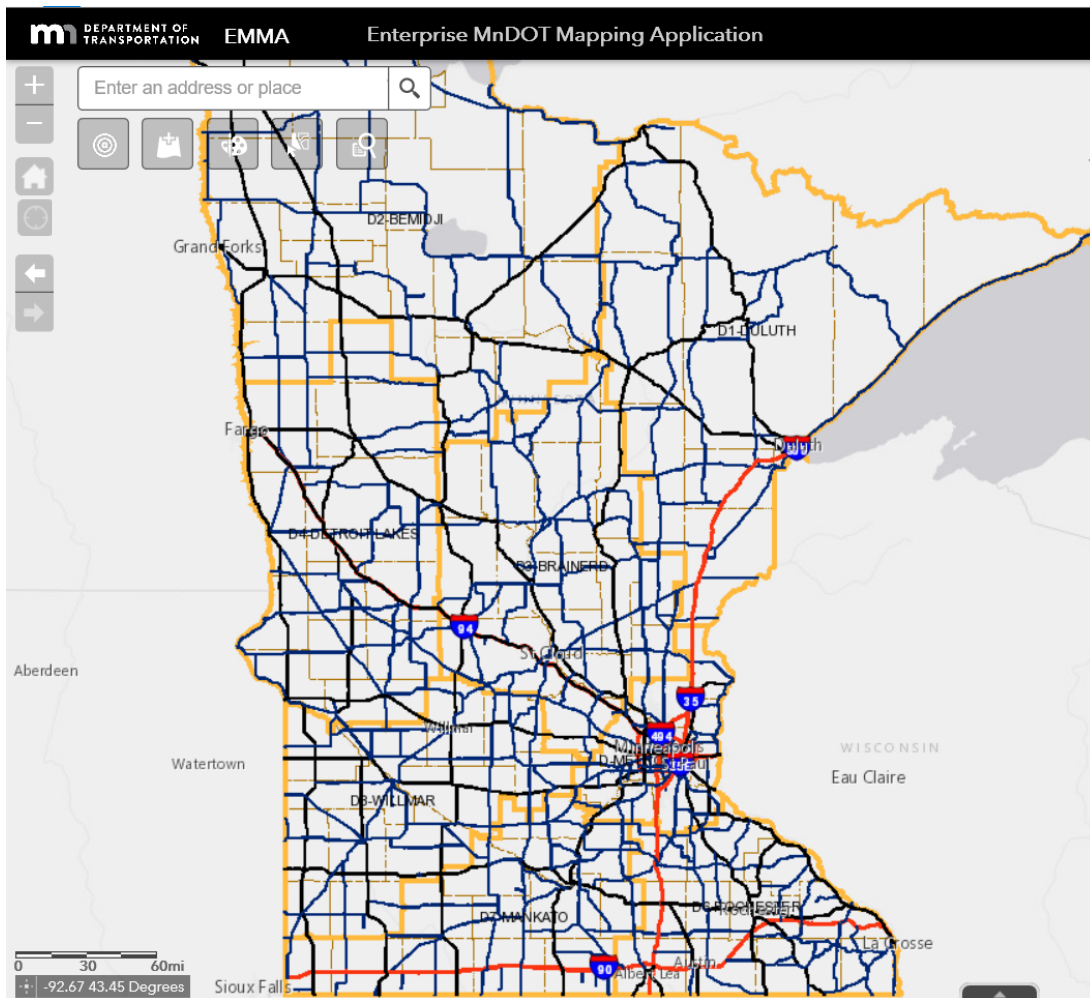
Unlike previous MnDOT map viewers based upon TIS which only included a few of the TIS data items, EMMA includes nearly all the LRS data layers. This includes items as significant as basic pavement type, shoulder width, etc. to fairly minor items such as HOT Lanes or Memorial Routes. Boundary data has also all been updated in EMMA. A series of meetings were conducted updating all Construction District and Tribal Government boundaries and creating new Seasonal Maintenance Sub Area boundaries. Metropolitan Planning Organization Areas and Regional Development Organizations are also now included.

What does this mean to me?

- RPMA should be used to determine all location data interactions for the life cycle of a construction project and for the different federal fund types on a project, as is required for federal authorization
- EMMA should be used when you need to map data to the latest – most current roadway network.
- Calibrations (route mileage) are different between the old TIS/GIS BaseMap and the new LRS/EMMA. You cannot take a measure from one system and use it in the other. If you do mix measures taken from one system and mix with measures from the other, there is the risk that you will corrupt data.
- Routes and data will look different in EMMA than they did in TIS/GIS BaseMap.

To access EMMA in production, go to: <http://mndotgis/emma>

There will also be a hot key so that if users are connected to MnDOT, they can just type in “emma” in the URL and it will bring users into the application.



Toolsets

There are three toolsets within the EMMA Application. The first toolset is vertically mounted along the upper left corner of the screen and contain tools for map navigation. We refer to them as the ‘Navigation Toolset’. The next set is horizontally mounted just to the right of the Navigation Toolset and contains more advanced tools, we refer to these as the ‘Working Toolset’. The ‘General Toolset’ is located horizontally in the right end of the black bar across the top of the application.

All tools have help text that will appear once you pause your mouse cursor over them. (HINT: If you do not see the help text try clicking in the gray space at the top of the app and then move your cursor over the tool again.) In order to activate a tool, just click on the tool option you want to activate. Navigation tools will then automatically adjust the map extent displayed in the application. General tools will open dialog windows for you to interact with and Working tools may either open dialog windows or change your cursor allowing you to interact with the map itself.



Navigation Toolset

There are six tools in the Navigation Toolset, they are: Zoom In; Zoom Out; Default Extent; Locate Me; Previous Extent; and Next Extent. To activate any of these tools simply click on them and they should cause the map to instantly zoom to the specified extent. These tools are vertically located at the top left corner of the application window. Pan is not a tool per se but to pan the map just click on the map and drag it in the direction you want the map to move.

Zoom In

Zooms the map in closer, keeping the map centered on the current center.

Zoom Out

Zooms the map out farther, keeping the map centered on the current center.

Default Extent

Zooms to the original, (nearly) full state extent of the map.

Locate Me

Only available outside MnDOT (grayed out when within MnDOT) this tool will re-center the map on your current location and zoom in.

Previous Extent

The application keeps a running sequence of map extents in memory. When you zoom to a different extent the new one gets added to the top of the list. This tool returns the map down this list to the last extent used before the current extent. If you have reached the bottom of the list the arrow in the tool will gray out and be unselectable.

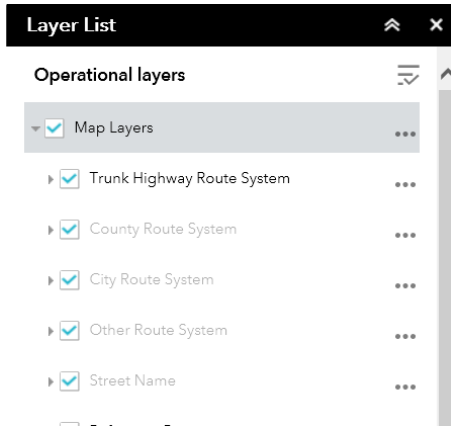
Next Extent

Similar to the Previous Extent tool, this tool returns the map up the list to the next extent used after the current extent. If you are at the top of the list the arrow in the tool will gray out and be unselectable.



General Toolset

There are seven tools in the General Toolset, they are: Layer List; Basemap Gallery; Bookmark; Print; Share; RACER Link; and About this App. To activate any of these tools simply click on them and they should cause the map to instantly zoom to the specified extent.

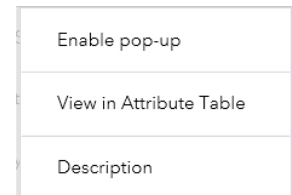


Layers List

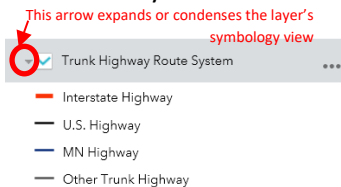
Selecting this button will open the Layers List window which is used to enable or disable Application Map Layers within the application. When a box next to a layer name is checked or enabled you will be able to view that layer. Some layers have scale dependencies so in addition to them being enabled you must also be zoomed in to an acceptable range in order to view them. You will know that you are zoomed out too far if the layer is grayed out in the Layer List.

By Clicking on the three ellipses to the right of the layer you get access to a pop-Menu with three options you can perform against this layer. The first, 'Enable Pop-up' turns your cursor into an 'ID' tool so that when you click against this layer on the map a Pop-up window will appear showing the attributes of that feature.

The second option is 'View in Attribute Table' which opens the attribute table of that layer. When you select a record in the table it will highlight on the screen with a bright cyan color. There are many standard tools for interacting with the table that will not be gone into detail here. Select the down arrow at the center top of the table to close it.



The final option is 'Description', when you select it another tab/window will open with some basic metadata about the layer.

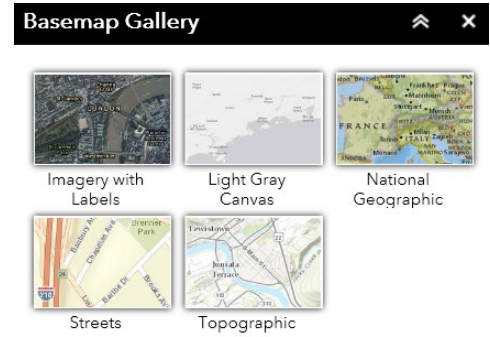


To understand the symbology of the layers, simply click on the black arrow next to the item under Layers. In this example, a user can see that Interstate Highways will show on the map as a red line, US Highways will show as a black line, and MN Highways will show as a blue line. If a user is looking at the map and doesn't understand what the lines, dots, etc. are represented by, he/she can come here and click on arrows for each layer to better understand the representation.

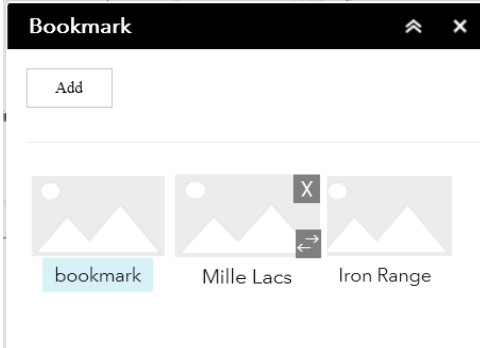
By using the three ellipses next to the layer group names there are additional options under Layer List > Operational Layers. You can select from the various options to Turn all layers on, Turn all layers off, Expand all Layers, or Collapse all layers. Similarly, options are available under Layer List> Map Layers for Zoom to (full extent), Transparency, Move up or Move down (change drawing order), and Description (basic metadata).

Basemap Gallery

Similar to the Layer List, this tool opens a window which will allow you to select a different background to display behind the Application Layers. These backgrounds are for viewing only, you will not be able to interact with or query them. Only one background may be loaded into the app at a time, so selecting one will replace the previous.



Bookmark

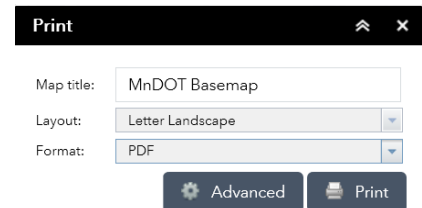


This tool allows you to save the current extent (called a bookmark) of the map or to re-zoom to a previously saved extent. It does not save any other application settings, just the extents. These bookmarks are saved locally on your computer and are not saved in the application server so are not shareable with others off of your computer. To save your current extent as a bookmark, press the add button. This will create a new icon labeled 'bookmark' in the pop-up. Replace the 'bookmark' text with what you would like to name it. To zoom to a saved bookmark just click on it in the Bookmark pop-up. When you

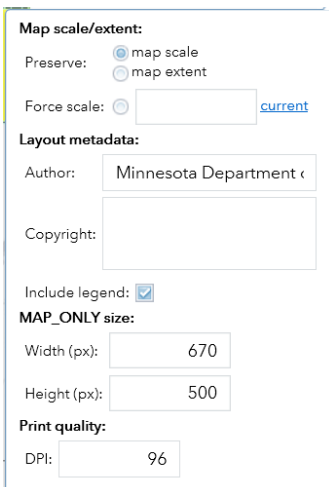
mouse over a bookmark an 'X' will appear in the upper right corner of it. Clicking on this 'X' will delete the bookmark. Also on a mouse-over of the bookmark the lower right corner will display a pair of arrows, selecting these arrows will open a browser window where you can select an image to use for the bookmark, replacing the default one.

Print

The Print tool will allow you to create a map using the current contents of the viewable layers in the application. When you select this tool a window will pop up asking for you to type a Title for your map and to choose a Layout and print Format for the map.



There are some additional configurations you can make to the output by clicking on the 'Advanced' button before pressing 'Print'. Upon pressing advanced, another pop-up window will appear that will let you set the following:



Map scale/extent:

map scale – Fills the output map area while preserving the scale the map in EMMA is currently set to.

map extent – Changes the scale of the output so that the map best matches the area currently displayed in EMMA.

Force scale - Fills the output map area while changing the scale of the map to the value specified.

Layout metadata: Enter an author and copyright to be added to the output.

Include Legend: Uncheck if you do not want a legend on the output.

MAP_ONLY size: Enter a width & height in Pixels to force the output map to be a set size on the page.

Print quality: Set the Dots Per Inch (DPI) to be used in the output file.

You can press either the 'Advanced' button again or the 'Print' button to close the Advanced window. Pressing Print will create the output file with all the parameters chosen.

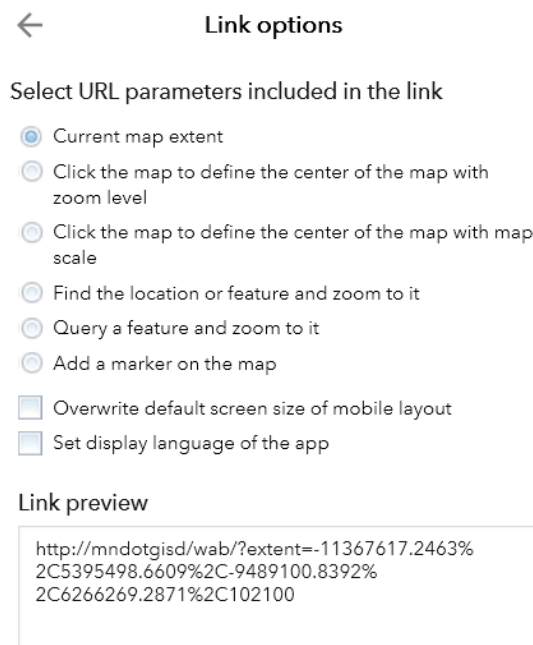
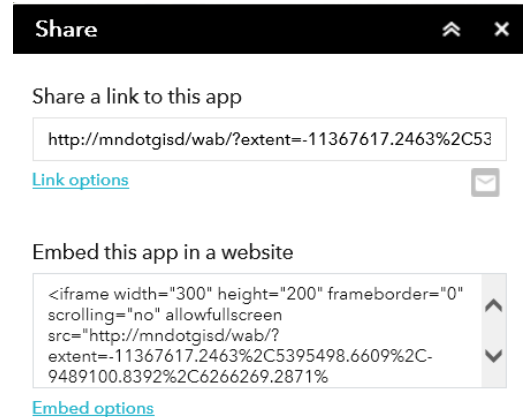
NOTE: if you have too much data in your view the print may not work properly, if this happens remove a few layers of data &/or zoom in to a smaller area and try again.

Share

You can use the Share tool to share the details of your current EMMA session with someone else. This tool opens the window displayed here. You can Copy the URL in the 'Share a link to this app' box into an email or press the email icon below that box to automatically create an email with the link in it.

Alternately you could copy the text in the 'Embed this app in a website' box and paste that into an existing webpage source doc to embed your current session into an existing webpage.

Clicking the 'Link Options' opens the window to the left which allows you to modify the map before sending it. These options include changing the map extent, centering the map on certain features, changing the language of the map and more. In most cases you will not see the change in the map but the 'Preview Link' URL will update to show the changes. Most are self-explanatory, here is a brief description of each:



- **Current map extent**—This is used by default and sends the map as you currently see it.
- **Click the map to define the center of the map with zoom level**—A point icon shows under the option when it is checked. Click the icon and click where you want the map to center in the app. A point marker will be added on the map and the URL in the link preview will be updated accordingly based on the map zoom level.
- **Click the map to define the center of the map with map scale**—A point icon shows under the option when it is checked. Click the icon and click where you want the map to center in the app. A point marker will be added on the map and the URL in the link preview will be updated accordingly based on the map scale.
- **Find the location or feature and zoom to it**—A box appears once you select this option. Input a location in the box, such as Redlands, ca, 92373, or a feature in a searchable layer.
- **Query a feature and zoom to it**—Boxes appear from which you can choose a layer, a field and a value from the drop-down menus to query a feature and zoom to it.

- **Add a marker on the map**—Click the point icon and click where you want to add a marker in the map. Fill in the **WKID**, **Pop-up title**, **Symbol**, and **Label** properties in each text box. A list of WKIDs can be found at <http://spatialreference.org/ref/esri/>.
- **Overwrite default screen size of mobile layout**—Input the screen size in pixels. By default, when either the height or width of a screen display is less than 600 pixels, the mobile layout automatically applies.
- **Set display language of the app**—Choose a language from the drop-down menu, some of the text in the app will change to that language. Most codes can be found at <https://www.geonames.org/countries>

Clicking the ‘Embed options’ adds boxes to the bottom of the window allowing you to select a default size for a map window to be Embedded in a webpage.

[Embed options](#)

Small X

Alternately, you may specify the width & height (in pixels) by typing them

directly. Once you click out of the boxes you will notice the change to the ‘Embed this app in a website’ box.

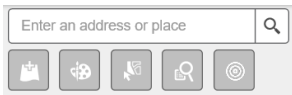
You can then take the text in that box and paste it into a webpage’s code.

RACER Link

The RACER Link tool will open another browser tab to the splash page for the Roadway And Characteristics Editor Request (RACER) web application. RACER allows you to submit data corrections to the team that maintains most of the data within the EMMA application. See the RACER splash page for more information on how to use that app.

About this App

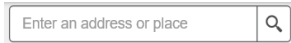
The ‘About this App’ tool opens a window with information about the EMMA version, and any other info the application administrators may want you to know. It will also include links to the most current version of this manual (which is found at the bottom of the application splash page), MnDOT data disclaimers, and to support contacts for the app or the data contained within it.



Working Toolset

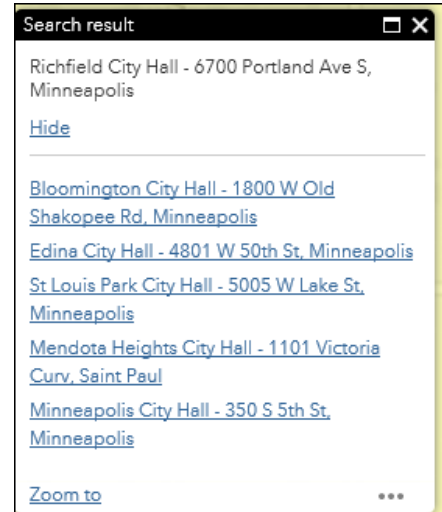
There are six tools in the Working Toolset, they are: Search, Add Data; Draw; Select; Query; and Route Info. To activate any of these tools simply click on them, Add Data, Select and Query will open dialog windows for you to interact with. Draw and Route Info will modify your cursor so that you can interact with the map.

Search



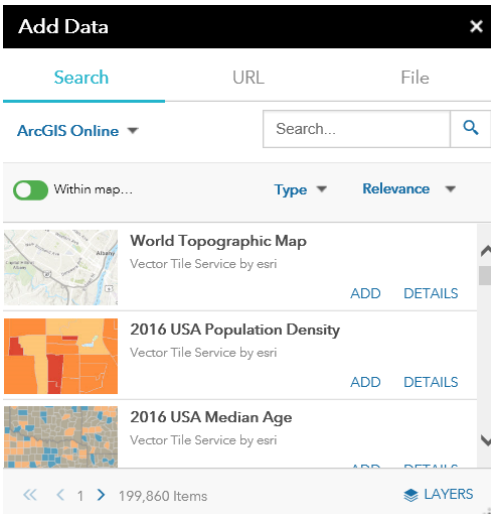
To use the search tool simply type in an address or landmark name in the box and click the 'Enter' key or the magnifying glass icon to the right of the search box. This tool will search the Esri address database for the entered location and zoom to it. You can click on the 'Show more results' to get a list of other similar places/addresses found.

A list of the searches you have done will show under the Search tool which may block your ability to see the other Working Toolset tools. To get access to them simply click the 'X' next to the search to remove the list.



Add Data

Clicking the Add Data tool opens the Add Data dialog window, allowing you to add data to your EMMA session. There are tabs across the top of the window which let you:



Search – search ArcGIS Online for content by typing in a keyword search in the search box. You can refine your search by: sliding the 'Within map' toggle to limit the search to items within the extent of your EMMA session or for any data; clicking on 'Type' and selecting the type of data source you are looking for (Map Service, Feature Service, Image Service, Vector Tile Service, KML, WMS); or clicking 'Relevance' to change what the results are sorted by (Title, Owner, Rating, Views, Date); Clicking the arrow next to the sort item will toggle back and forth between sorting from A-Z or Z-A.

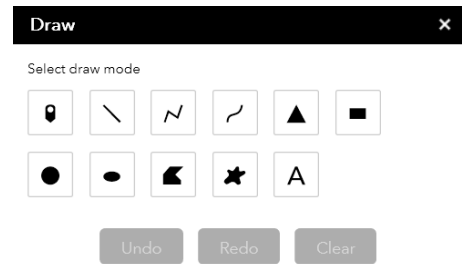
URL- You need to specify the type of data being linked to from the dropdown list of 'ArcGIS Service Web Service', 'WMS OGC web service', 'KML File', 'GeoRSS File', 'CSV File'. Then type in the URL for the specified data and click ADD. You can click the 'SAMPLE URL(S)' for help on how to format your URL.

File- Click the 'BROWSE' button to browse to a file stored on your computer or network. Click the '?' icon in the upper right to get info on what types of files may be loaded. You may also drag a file of the proper type into this window instead of browsing to it.

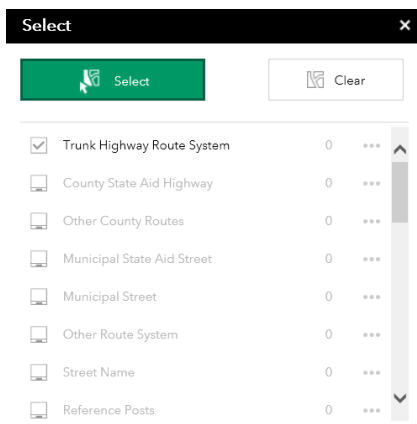
Clicking 'LAYERS' on any of the three tabs will provide a list of external data that you have loaded into this EMMA session.

Draw

The Draw tool both opens a window for you to specify what type drawing you wish to do and it converts your cursor to that drawing tool. You must select whether you wish to draw: point, line, polyline, freestyle polyline, triangle, squares, circles, ellipse, polygon, freehand polygon or text. Once you select the type of drawing mode you wish to use, more options will appear in the box for you to refine the drawing as well as a preview of what will be drawn. You can use the buttons at the bottom to 'Undo' what you've just drawn, 'Redo' the drawing, or 'Clear' all drawings.



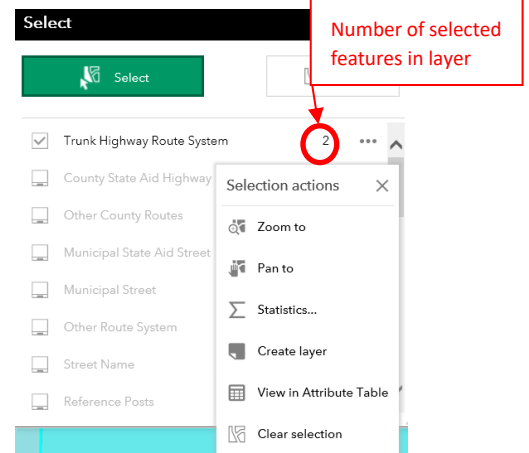
Once you have selected your drawing options just click on the map to place a drawing. Points, Lines & Polygon will draw where your cursor is. Text and shapes (triangle, squares, circles, and ellipse) will draw centered on your cursor.



Select

This tool will open a window, like the one to the left, that gives the user options to specify what layers are selectable in the app. Just make sure the box next to the layer's name is checked for it to be selectable.

Then use the cursor to click on a feature or drag a selection box on the map. Selected features will highlight in the map and the number of features for each layer will appear to the right of the feature name in the Select dialog.



Once some features are selected, the 3 ellipses to the right of the layer name will activate. If you click on them a drop down menu appears from which you can:

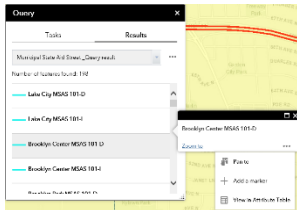
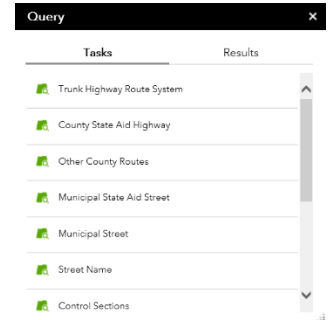
- Zoom to – zooms the map into the selected features
- Pan to – keeps the map at the current zoom scale but re-centers it on the centroid of the selected features.
- Statistics – Opens a window with some standard statistics of the selected features.
- Create layer – Adds a new layer to the map of just the selected features in this layer. This new layer will be available to work with independent of the original layer and will appear in the Layers List.
- View in Attribute Table – Opens an attribute table of the selected features at the bottom of the application screen.
- Clear Selection – unselects features in this layer.

Clicking the 'Clear' button at any time will clear all selections in the current session.

Query



The Query tool opens a dialog window, like the one to the right, with a listing of the layers you can query. Just click on the layer you wish to query and the box will change, giving a box from which you can either select a specific feature to find or type in a string to be searched for, the search is not case sensitive. Once you have the search as desired, click the 'Apply' button and the desired features will be selected and will show in the Results tab on this dialog.



From the Results tab you can select a value and zoom to the feature. Also, you can click the three ellipses to the right and select from the drop down list to 'Pan to' i.e. center the map on the feature, Add a (graphic) Marker to the map for the feature, or 'View (open the feature's record) in the Attribute table' at the bottom of the window.

NOTE: You cannot use the Query tool to search for a specific address as MnDOT does not maintain address ranges in our data. If you want to do that, you can use the search bar at the top of the map to search the Esri database.

Route Info



When the user clicks the Route Info Tool a pop-up box opens with a button to press saying 'Start Tool.' The tool will not be active until this button is pressed. While the tool is active the box will display a button saying 'Stop Tool', you must press this button to deactivate the tool.

The Route Info Tool allows users to click on a point on the map and have data attributes return for that specific location. The information that returns in the pop up box can be copied and pasted into other documents (for Project Charter or Project Scoping documents, you should use the RPMA app not this one). Users must click within 10 meters of a road, and must be zoomed in far enough to retrieve results. If a user clicks on a segment that has multiple routes, the pop up box will display the data attributes for the first route, then the data attributes for the 2 second route, and so on. It does sort by the Route Type (01, 02, 03), then Route ID-Increasing, then Route ID-Decreasing.

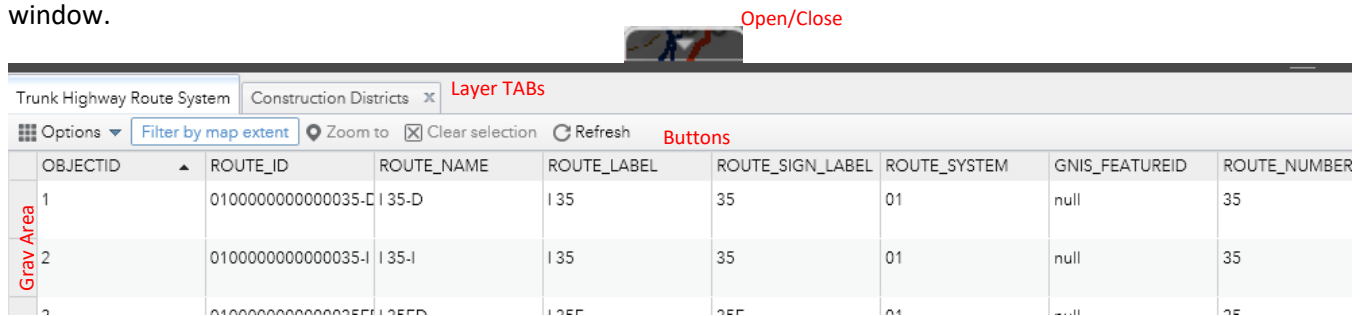
Click this arrow to advance or rewind the different routes found

Roadway Information (1 of 3)	
Route ID:	010000000000094-I
Route Name:	I 94-I
Street Name:	ISTH 94
Ref Post/Offset:	221+00.781
Carto Mile:	222.416
Jurisdiction Type:	City
Jurisdiction Name:	Brooklyn Center
Jurisdiction GNIS:	2393428
County:	Hennepin
County GNIS/FIPS:	99053/659472
Longitude:	-93.347
Latitude:	45.076
UTMx:	472710.733
UTMy:	4991441.070

Other Tools

The Attribute Table:

At the bottom of the application window there is a small black rectangle with a little triangle pointing up (unless the Attribute Table is already open). If you click this box the Attribute Table will open. Any time you interact with a table in EMMA it will show in this window. When the window is open the black rectangle will still be at the top of the window but with a downward pointing triangle within it. Pressing this box again will close the window.



By default the Trunk Highway Route System table is always available within the Attribute Table frame. Through interacting within EMMA you may make choices that open other Layers attribute tables as well. Each table opens in a different TAB within the Attribute Table frame. Any other than the Trunk Highway Route System table may be closed by clicking the 'X' next to its name in the TAB header. Clicking in the gray area to the left of a record in the table will select that feature. When selected, the row in the table will highlight in a light blue color as will the feature on the map. Holding the 'Ctrl' button down and clicking next to a selected record will unselect it, or clicking the 'Clear Selection' button at the top of the window will unselect all selected rows in the currently active table.

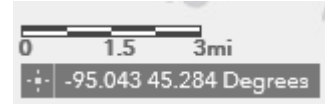
Using the 'Filter by map extent' button will filter the table so only those features currently visible within the map window will be shown in the Attribute Table frame. The number of features in the table and the number of them that are selected will be displayed at the bottom of the frame.

The 'Zoom to' button will zoom into the extent of the selected features in the currently active table. Refresh will redraw the table and go to the first row.

There are additional options available under the Options button. Clicking on it will provide a dropdown list from which you can select: Show only selected or related records; create a filter using a tool to help you build a query; or determine which fields/columns you wish to view or hide within the Attribute Table frame.

Scale bar & Coordinates:

In the bottom left corner of the application is a scale bar which adjusts as you zoom in and out showing you the current scale of the map.



Below the scale bar is a coordinates display. It will display the Latitude and Longitude in decimal degrees at the tip of the cursor. You may click the small crosshairs to the left of the coordinates and then click on the map to get the coordinate display to freeze on a set coordinate. When you do this a green marker will appear on the map indicating the point that was selected. Only one such point can be displayed this way at a time, clicking again will move the marker to the newly clicked point and change the displayed coordinates to match it. Pressing the crosshairs again will return to live streaming of the cursors position.

Mouse shortcuts:

Additionally there are a few things you can use your mouse for within EMMA:

1. You can use the scroll wheel to zoom in or out centered on the tip of the cursor.
2. When no other tool is active, you may click and drag the map to pan to a new area.

Keyboard shortcuts:

There are a few keyboard shortcuts available within EMMA:

1. If you push down on the "Shift" key on your keyboard, and then point and click on the mouse and drag it over a certain area and release, it will automatically zoom you into that area of the map.
2. You can use the 10 key keypad to navigate around the page:
 - a. 1-Move Diagonally SW
 - b. 2-Move South
 - c. 3-Move Diagonally SE
 - d. 4-Move West
 - e. 5-Doesn't do anything
 - f. 6-Move East
 - g. 7-Move Diagonally NW
 - h. 8-Move North
 - i. 9-Move Diagonally NE
 - j. 10-Nothing

