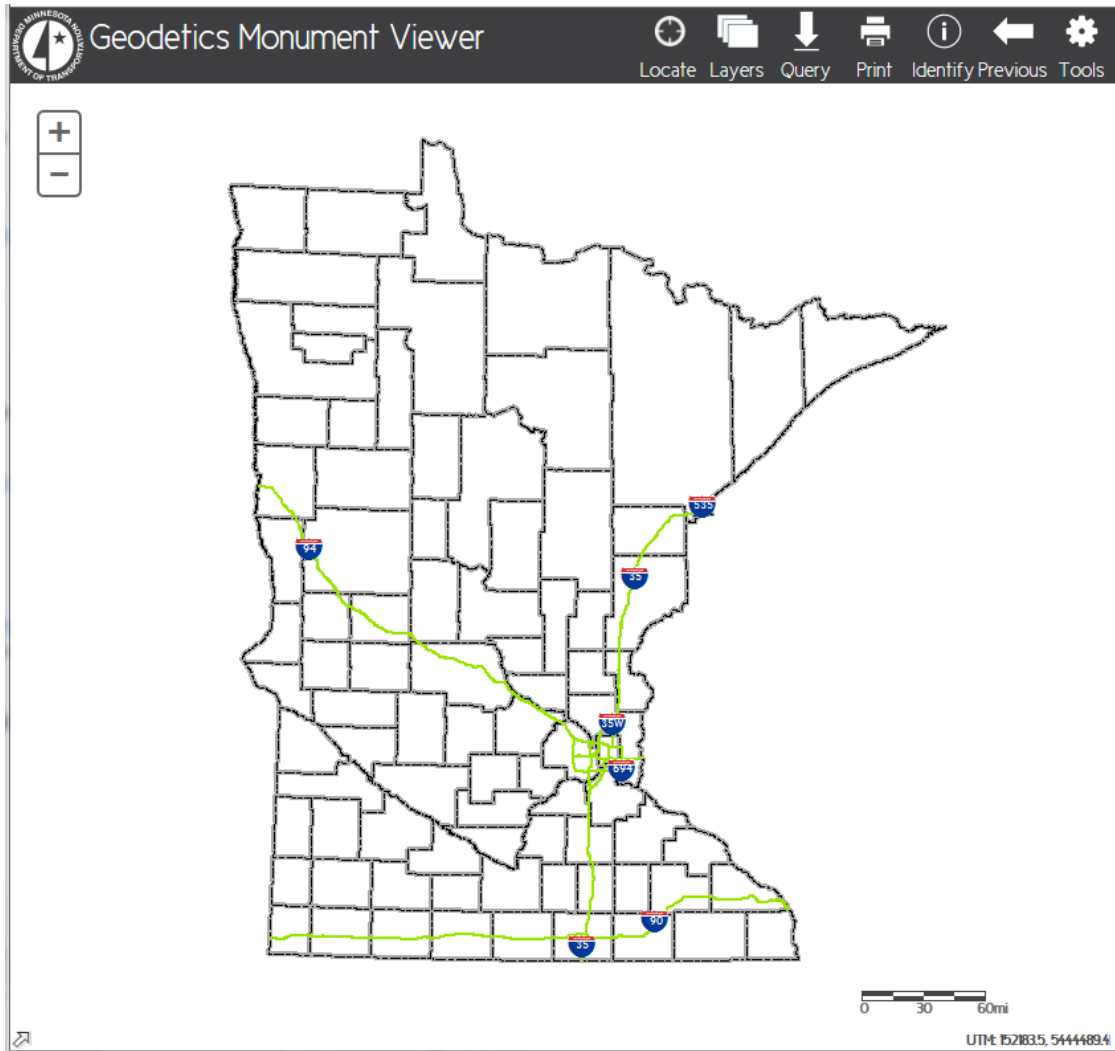


Geodetic Monument Viewer

A guide for general functionality and layer definitions



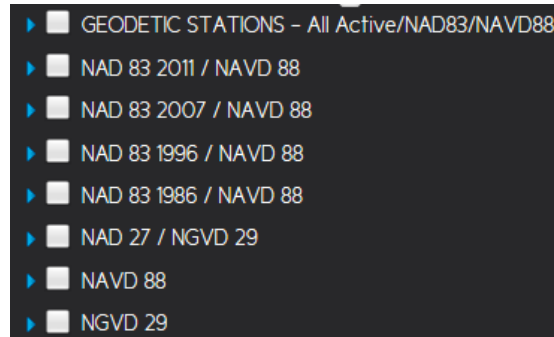
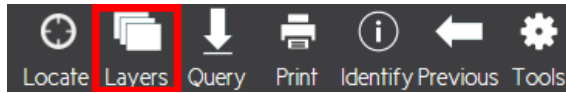
1/21/2016
Minnesota Department of Transportation
Geodetic Unit

Table of Contents

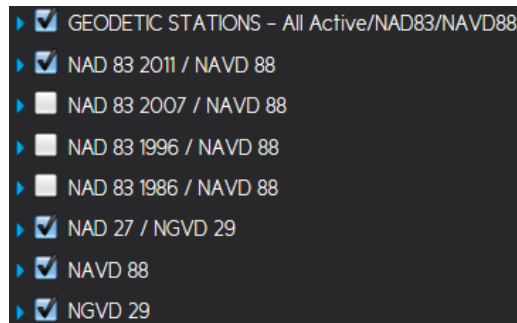
Geodetic Station Layer Functionality	2
Geodetic Station Layer Definitions	
Geodetic Stations – All Active	3
Current Horizontal Datum/Adjustments	4
Current Vertical Datum	5
Historic Datums	5
Common Tasks	
View Data Sheet	7
Query Station – By Name	9
Zoom to Region	11
Zoom to PLS	13

Geodetic Station Layer Functionality

The new geodetic layers are designed, within the limitations of the application, to give the user the ability to quickly identify all stations relative to the most current horizontal and vertical datums (NAD 83 and NAVD 88), or to look more specifically at current or historical datum and adjustment combinations.

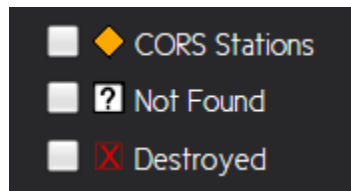


There is overlap between the Datum/Adjustment layers which can cause duplication of individual station symbols and labels when more than one layer at a time is visualized. The station symbols will display in the order of the layers.

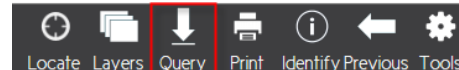


HOOF MNDT
HOOF MNDT
HOOF MNDT

The following layers are mutually exclusive and do not overlap with each other or the Datum/Adjustment layers



The GEODETTIC STATIONS ALL – Queries layer is included for use with the Query tool and allows the user to search for stations by specific attributes such as STATION NAME.

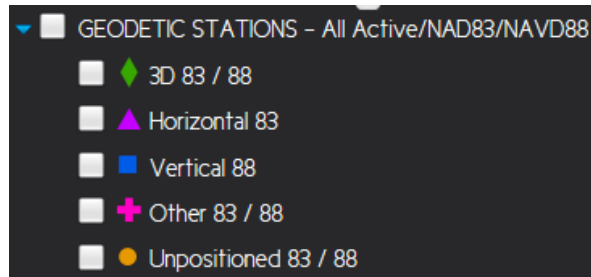


Geodetic Station Layer Definitions

Geodetic Stations – All Active

This layer includes all active stations, each grouped by the method used to position the station relative to the current horizontal and vertical datums (NAD 83 and NAVD 88).

- The **Other** category may include horizontal and/or vertical positions as defined in the table below.
- The **Unpositioned** category includes stations positioned through less rigorous means, such as scaled or autonomous GNSS, and used for mapping purposes only.



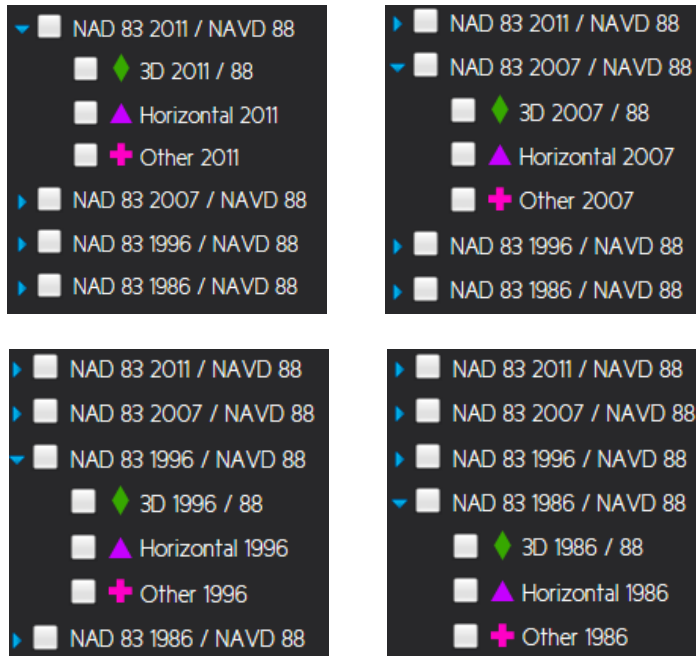
Stations are symbolized by quality of position and categorized according to the following table:

Geodetic Stations - All Active - NAD 83 / NAVD 88						
HORIZONTAL ORDER	VERTICAL ORDER					
	1	2	3	4	Unclassified	No Position
A	3D	3D	Horizontal	Horizontal	Horizontal	Horizontal
B	3D	3D	Horizontal	Horizontal	Horizontal	Horizontal
C (GPS)	3D	3D	Horizontal	Horizontal	Horizontal	Horizontal
1 (Classical)	3D	3D	Horizontal	Horizontal	Horizontal	Horizontal
2	Vertical	Vertical	Other	Other	Other	Other
3	Vertical	Vertical	Other	Other	Other	Other
4	Vertical	Vertical	Other	Other	Other	Other
Unclassified	Vertical	Vertical	Other	Other	Other	Other
No Position	Vertical	Vertical	Other	Other	Other	Unpositioned

Current Horizontal Datum/Adjustments

These layers are designed to isolate positions relative to the four main adjustments of the current horizontal datum.

- NAVD 88 positions are included in these layers to distinguish 3D stations.



NOTE:

The NAD83 1996 layer no longer contains a HARN group. All stations with an order of “C” or higher are classified as Horizontal or 3D.

Contact the Geodetic Office for information on stations that were part of the original HARN survey.

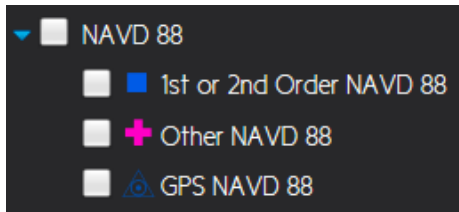
Stations are symbolized by quality of position and categorized according to the following table: (Only the 2011 table is shown, but they are the same for all of the NAD 83 adjustments)

NAD 83 2011 - NAVD 88						
HORIZONTAL ORDER	VERTICAL ORDER					
	1	2	3	4	Unclassified	No Position
A	3D	3D	Horizontal	Horizontal	Horizontal	Horizontal
B	3D	3D	Horizontal	Horizontal	Horizontal	Horizontal
C (GPS)	3D	3D	Horizontal	Horizontal	Horizontal	Horizontal
1 (Classical)	3D	3D	Horizontal	Horizontal	Horizontal	Horizontal
2	Other 2011	Other 2011	Other 2011	Other 2011	Other 2011	Other 2011
3	Other 2011	Other 2011	Other 2011	Other 2011	Other 2011	Other 2011
4	Other 2011	Other 2011	Other 2011	Other 2011	Other 2011	Other 2011
Unclassified	Other 2011	Other 2011	Other 2011	Other 2011	Other 2011	Other 2011
No Position	Not Displayed	Not Displayed	Not Displayed	Not Displayed	Not Displayed	Not Displayed

Current Vertical Datum

This layer identifies all stations with vertical positions based on the NAVD 88 datum.

- The **1st or 2nd Order NAVD 88** category is comprised of leveling derived elevations.
- The **Other NAVD 88** category includes GNSS-RTRN derived orthometric heights.
- The **GPS NAVD 88** category is comprised of orthometric heights derived from GNSS-Static network surveys.



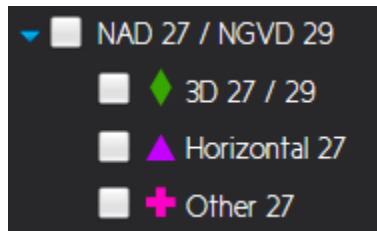
Stations are symbolized by quality of position and categorized according to the following table:

NAVD 88						
VERTICAL ORDER						
1	2	3	4	Unclassified	GPS Derived	No Position
Vertical	Vertical	Other	Other	Other	GPS	Not Displayed

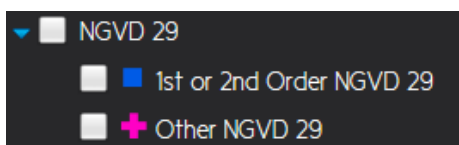
Historic Datums

This layer identifies all stations with horizontal positions based on the NAD 27 datum.

- 1st and 2nd order NGVD 29 positions are included in this layer to distinguish 3D stations.



This layer identifies all stations with vertical positions based on the NGVD 29 datum.



Stations in these layers are symbolized by quality of position and categorized according to the following tables:

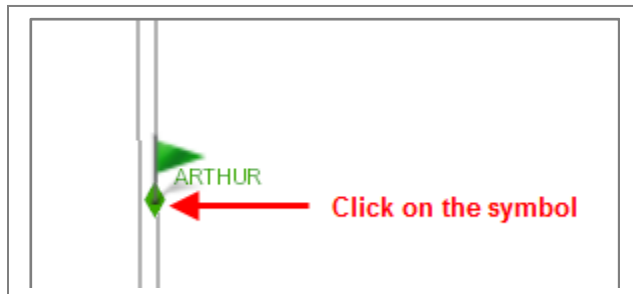
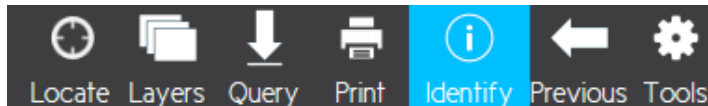
NAD 27 - NGVD 29						
HORIZONTAL ORDER	VERTICAL ORDER					
	1	2	3	4	Unclassified	No Position
A	3D	3D	Horizontal	Horizontal	Horizontal	Horizontal
B	3D	3D	Horizontal	Horizontal	Horizontal	Horizontal
C (GPS)	3D	3D	Horizontal	Horizontal	Horizontal	Horizontal
1 (Classical)	3D	3D	Horizontal	Horizontal	Horizontal	Horizontal
2	Other 27	Other 27	Other 27	Other 27	Other 27	Other 27
3	Other 27	Other 27	Other 27	Other 27	Other 27	Other 27
4	Other 27	Other 27	Other 27	Other 27	Other 27	Other 27
Unclassified	Other 27	Other 27	Other 27	Other 27	Other 27	Other 27
No Position	Not Displayed	Not Displayed	Not Displayed	Not Displayed	Not Displayed	Not Displayed

NGVD 29					
VERTICAL ORDER					
1	2	3	4	Unclassified	No Position
Vertical	Vertical	Other	Other	Other	Not Displayed

Common Tasks

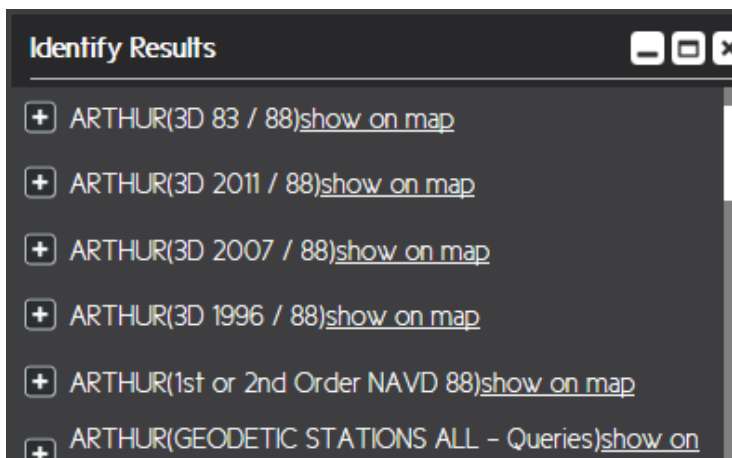
View Data Sheet

Data sheet retrieval begins by first selecting the Identify Tool on the menu bar, and then clicking on a the station symbol of choice

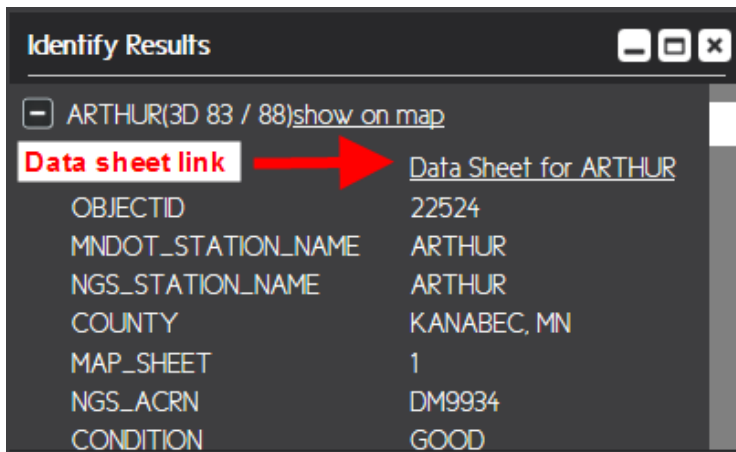
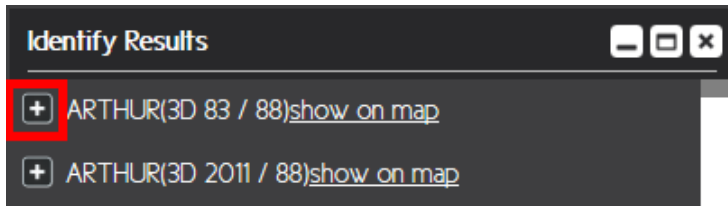


This will invoke the Identify Results window which will show all layer features for the geographic location that you selected.

- Layers will be listed in the order that they appear in the Layer window
- The Geodetic Datum/Adjustment layers will be at the top



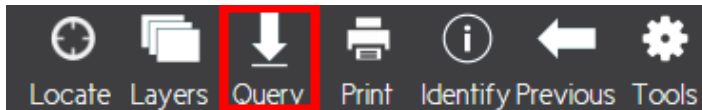
Each Geodetic Datum/Adjustment layer will have a link to the data sheet. All links are to the same data sheet, so it is only necessary to expand the first layer by clicking on the + symbol and then selecting the data sheet link.



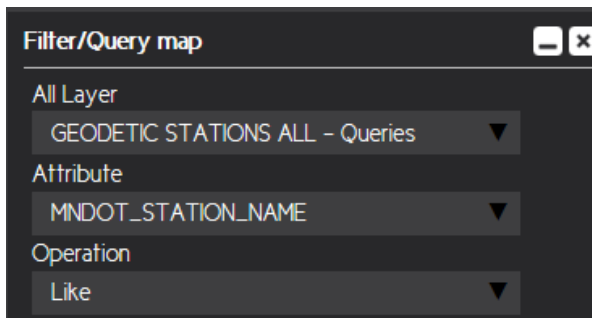
Geodetic Data Sheet (Feet)										ARTHUR		01/09/2016		
GSID Station # 89709												Sheet Help		
MnDOT Name: ARTHUR					NGS Name: ARTHUR									
County: KANABEC, MN (Sheet 1)										NGS ACRN: DM9934 Get Map NGS Quad / Sta Num : 45093142/ USGS Quad: MORA SOUTH				
<u>1/4</u>	<u>Sec</u>	<u>Twp</u>	<u>Rng</u>	<u>Reference</u>	<u>Reference</u>	<u>Vert</u>	<u>Horz</u>							
SE	22	39 N	24 W	Latitude	Longitude	Order	Order							
				455055.67	931902.27	2	C							
<u>Year Set</u>	<u>Last Recovery</u>	<u>Condition</u>	<u>Geodetic Usability</u>	<u>Photos</u>	<u>Bridge Num</u>	<u>F/P/R</u>	<u>Magnetic Properties</u>							
2010	2010	GOOD	Horz=YES Vert=YES	YES		RECESSED 2 IN.	BAR MAG IN DRILL HOLE							
<u>Monument Type</u>				<u>Disk Type</u>				<u>Mon. Agency</u>						
ALUMINUM ALLOY ROD (NO SLEEVE) (DEPTH 20 FT)				METAL ROD (WITH REMOVABLE ID DISK)				MNDT						
<u>Description:</u> (2010)					<u>Stamping:</u> ARTHUR 2010									
1.5 MILES SOUTHWEST OF MORA, 1.0 MILE WEST ALONG TRUNK HIGHWAY 23 FROM THE SOUTH JUNCTION OF TRUNK HIGHWAY 23 AND TRUNK HIGHWAY 65 IN MORA TO TRUNK HIGHWAY 23 MILEPOINT 253.6, THENCE 0.3 MILE SOUTH ON COUNTY ROAD 14, 21.6 FEET EAST OF COUNTY ROAD 14, 12.1 FEET SOUTH OF FIELD ENTRANCE, 31.0 FEET WEST OF FENCE LINE, 3.7 FEET NORTHWEST OF WITNESS POST.														
<u>Leveling-Derived Orthometric Heights (Feet)</u>														
<u>NAVD88</u>				<u>Ellipsoid (NAD83)</u>				<u>Project Info</u>						
<u>Height</u>	<u>Acc</u>	<u>Order ((Class)</u>	<u>Height</u>	<u>Acc</u>	<u>Adj</u>	<u>Determination Method</u>	<u>Year</u>	<u>Reference</u>						
995.113	.016	2/1				VERTICAL ADJUSTMENT	2012	00000745						
995.113	.016	2/1				VERTICAL CONTROL SURVEY	2011	VMORA						
<u>Non Leveling-Derived Orthometric and Ellipsoid Heights (Feet)</u>														
<u>NAVD88</u>				<u>Ellipsoid (NAD83)</u>				<u>Project Info</u>						
<u>Height</u>	<u>Acc</u>	<u>Order ((Class)</u>	<u>Height</u>	<u>Acc</u>	<u>Adj</u>	<u>Determination Method</u>	<u>Year</u>	<u>Reference</u>						
995.110	.131		903.758	.007	2011	HORIZONTAL ADJUSTMENT	2012	GPS2800						
995.110	.131		903.860	.066	2007	HORIZONTAL ADJUSTMENT	2011	GPS2812						
995.110	.131		903.981	.066	1996	GPS - STATIC	2010	HMORA						
995.110	.131		903.860	.066	2007	GPS - STATIC	2010	HMORA						
Geoid Separations(ft): GEOID12A\12B = -91.381 GEOID09 = -91.283 GEOID03 = -91.132 More														

Query Station - By Name

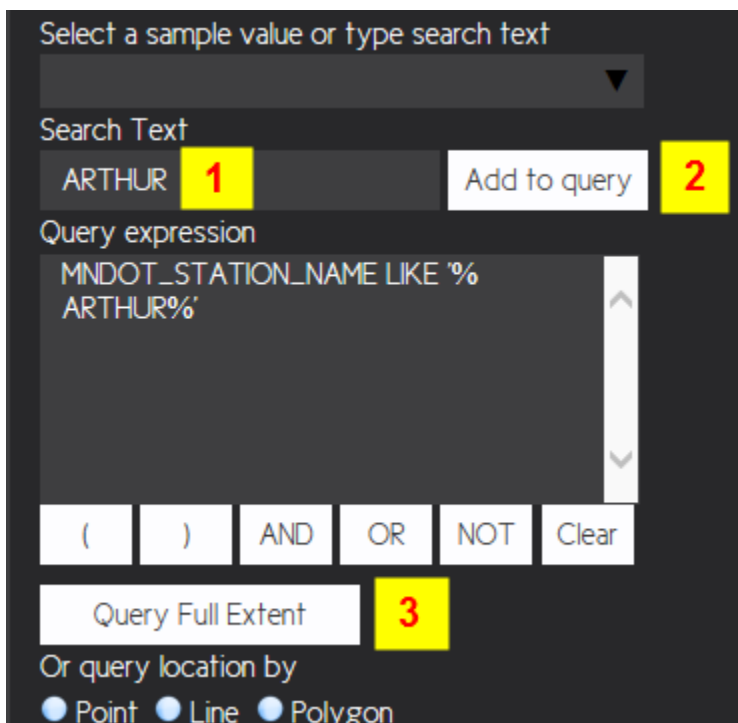
Select the Query Tool from the menu bar



Select the following filter options in the Filter/Query map window



1. Enter the name of the station – **MUST BE ALL CAPS**
2. Click on Add to query button
3. Click on Query Full Extent button



This will bring up the Results window showing all stations matching the search criteria. Clicking on the Show button will zoom the map to each specific station location

Results		
	OBJECTID	MNDOT_STATION
Show	63965	ARTHUR
Show	22524	ARTHUR
Show	74876	ARTHUR FARMERS NT
Show	77559	ARTHUR MICROWA
Show	30110	ARTHUR MNDT RE

Use the scroll bar or Export to CSV button to view all station attributes

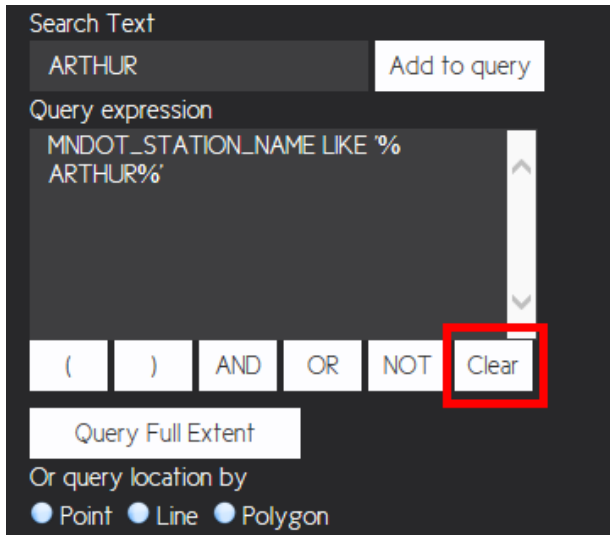
Results		
NAME	COUNTY	MAP_SHEET
	THUNDER BAY DISTRICT, ON	1
	KANABEC, MN	1
RS ELEV MID VE	CASS, ND	1
WAVE MAST	CASS, ND	1
	POLK, MN	1

1-5 of 5 items

Export to CSV

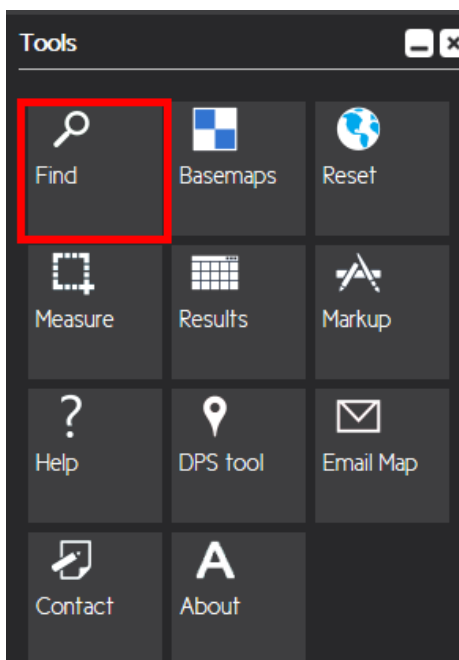
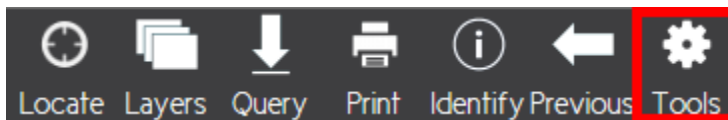
	A	B	C	D	E	F	G	H	I	J
1	MNDOT_STATION_NAME	COUNTY	MAP_SHEET	NGS_ACRN	CONDITION	STATION_AGENCY	TOWNSHIP	RANGE	FIRST_DIVISION	SECOND_DIVISION
2	ARTHUR MICROWAVE MAST	CASS, ND	1	SL1312	GOOD	CGS	141 N	52 W	SECTION 2	SE QUARTER
3	ARTHUR	KANABEC, MN	1	DM9934	GOOD	MNDT	39 N	24 W	SECTION 22	SE QUARTER
4	ARTHUR MNDT RESET	POLK, MN	1	AJ4401	GOOD	MNDT	147 N	44 W	SECTION 11	NE QUARTER
5	ARTHUR	THUNDER BAY DISTRICT, ON	1		GOOD	IBWC	65 N	1 W	SECTION 22	NW QUARTER
6	ARTHUR FARMERS ELEV MID VENT	CASS, ND	1	SL1310	GOOD	CGS	142 N	54 W	SECTION 21	NE QUARTER
7										
8										

Use the Clear button to remove the current Query expression and start a new search



Zoom to Region

Use the Find Tool to quickly zoom to an area using a predefined list of attributes



1. Select a region or road type from the drop-down list
2. Wait for the Sample Value list to populate and then select from the list
3. Wait for the results to appear and then click anywhere on the correct result line to zoom

Find

Find

Counties **1**

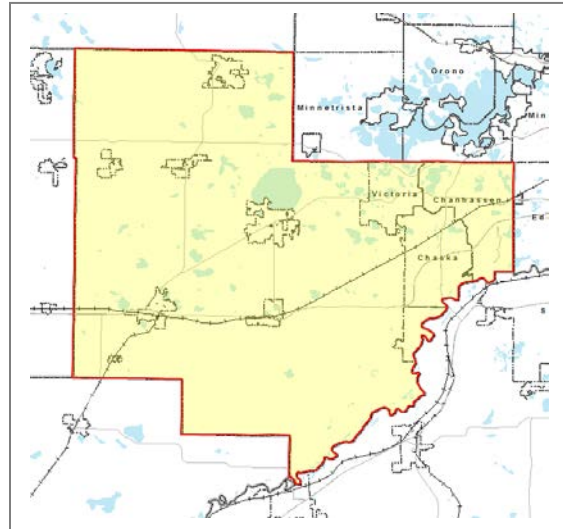
Select a sample value or type search text

Carver **2**

Search Text

Search

County Code	County Name	FIPS Code
10	Carver	019



Find

Find

US Highways **1**

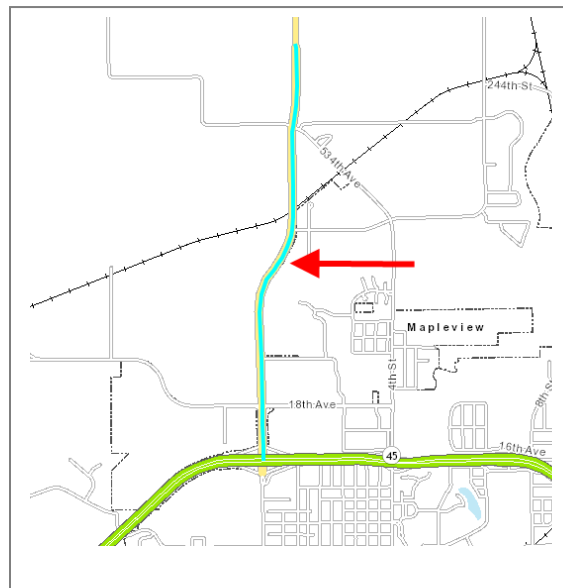
Select a sample value or type search text

US218 **2**

Search Text

Search

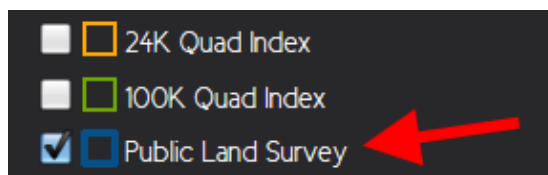
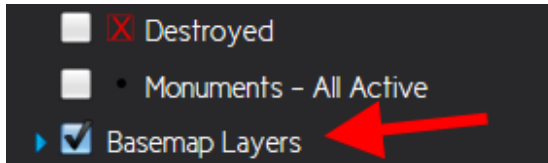
ID	Route Name	Route Number	TIS Code
72	US218	218	0200000218
73	US218	218	0200000218
74	US218	218	0200000218



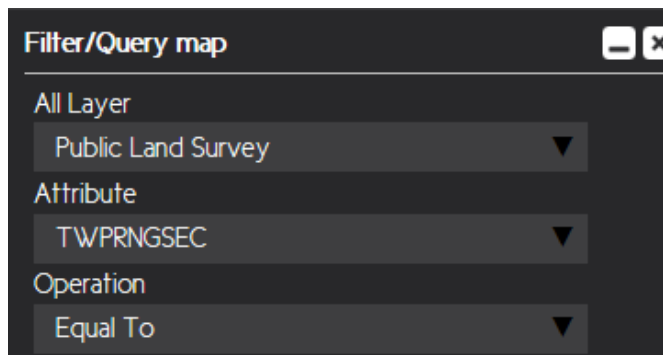
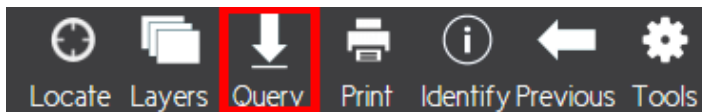
Zoom to PLS

Turn on the Public Land Survey layer, which is found under the Basemap Layers grouping

- Layer visibility is scale dependent so you may have to zoom the map in order to activate the layer



Choose the Query Tool from the tool bar and then make the following selections in the Filter/Query map window



1. Enter the Township (XX or XXX), Range (XXX), Section (XX) in a single string, using leading 0's where necessary for Range and Section
2. Select the Add to Query button
3. Select the Query Full Extent button
4. Select the Show button in the Results window

Select a sample value or type search text

Search Text
4301928 **1** Add to query **2**

Query expression
TWPRNGSEC = 4301928

() AND OR NOT Clear

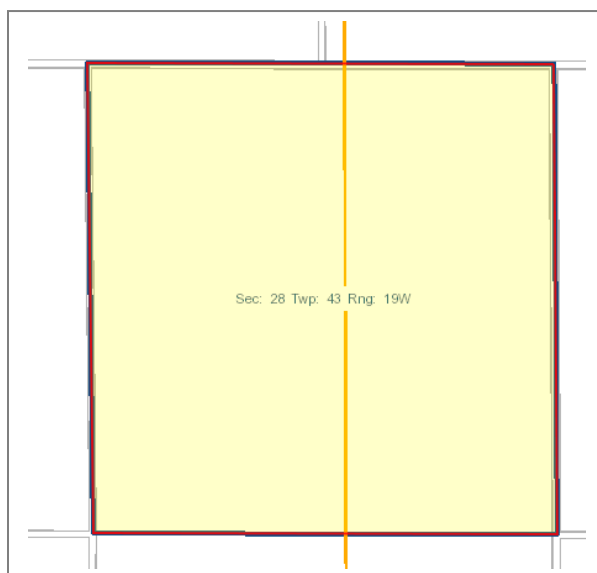
Query Full Extent **3**

Or query location by
 Point Line Polygon

	OBJECTID	TOWNSHIP
Show 4	67	43

The selected PLS section will be displayed and highlighted

- To remove the filter and display all PLS sections, choose the Clear button to delete the Query expression, and then Query Full Extent



Query expression

() AND OR NOT **Clear**

Query Full Extent

Or query location by
 Point Line Polygon