

TURNING MOVEMENT COUNT USER GUIDE

Turning Movement Counts

[Dashboard](#) [Analysis](#) [Admin](#)

Filters Year County Community

Intersection Rank by PHF

Rank	PHF	Intersection
1	1.00	19957 - SR725, SR741
2	1.00	38250 - SOUTH AVE, US 224
3	1.00	119618 - CASCADE CROSSING...
4	1.00	37607 - RAMPS S OF IR 70...
5	1.00	50478 - C161 SCOVILLE RD...
6	1.00	10444 - C120 BURLINGTON RD...
7	1.00	92609 - Eaton Ave, SR 129
8	1.00	58150 - CR 133 - Hitchcock...
9	1.00	108331 - Chase Plaza Dr/Sm...
10	0.99	18151 - C-138 (BARKS RD)...

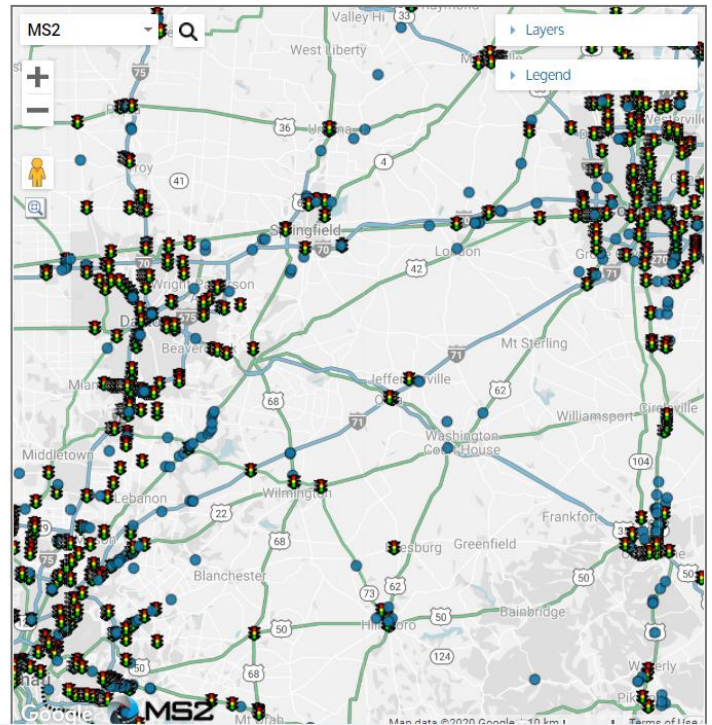
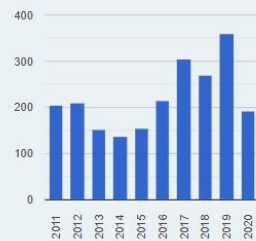
Intersection Rank by Volume

Rank	Volume	Intersection
1	172852	31929 - I-675, WILMINGTON PL...
2	169470	32029 - FEEDWIRE RD, WHIPP R...
3	157409	32529 - IR675 NB RAMP, WILMI...
4	144373	507666 - BENCHWOOD RD, IR 75...
5	127598	9423 - RAMPS N OF IR70, SR25...
6	125493	20557 - C-175 (YANKEE ST), S...
7	123167	19957 - SR725, SR741
8	122047	32429 - MIAMI VALLEY DR, WIL...
9	113394	67857 - BYERS RD, SR725
10	106981	69848 - CEMETARY DR, MONROE...

Peak Hour Volume

AM Peak	7:00AM - 8:00AM
Volume	6856
PM Peak	4:45PM - 5:45PM
Volume	7899

Counts Collected by Year



TMC User Guide



Turning Movement Count (TMC) Documentation

Updated: December 2020

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Turning Movement Count Overview

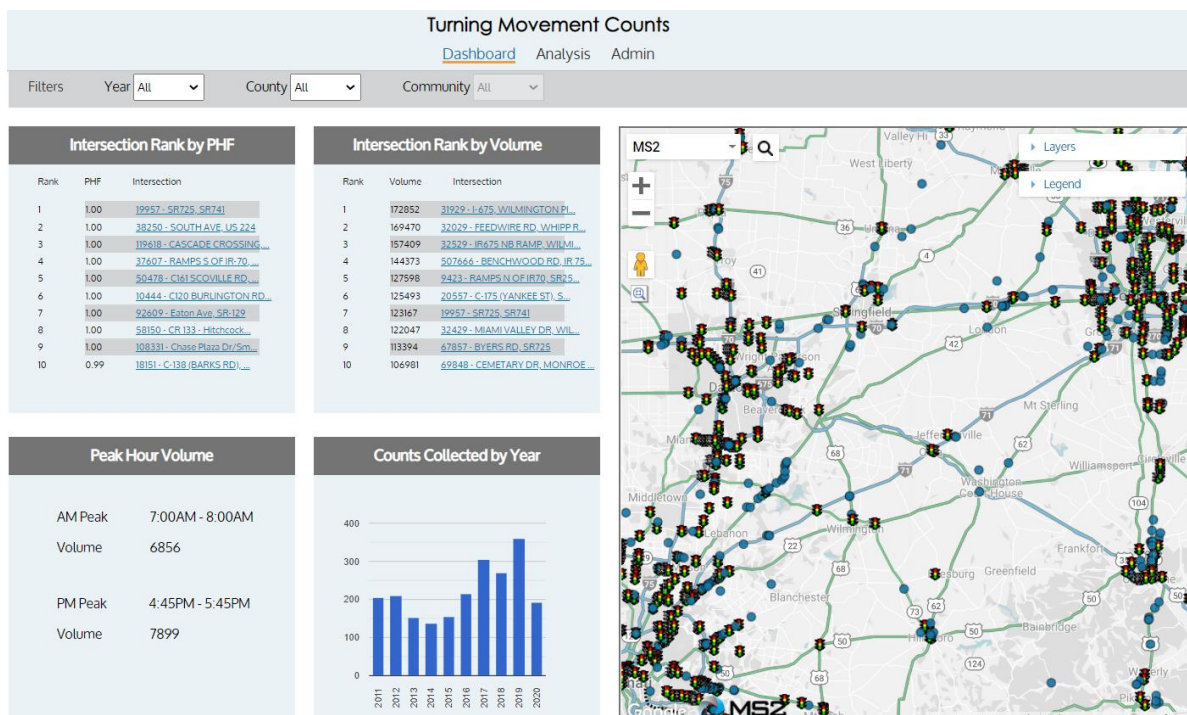
The Turning Movement Count is a powerful tool for the traffic engineer or planner to organize the agency's turning movement count data. It provides a dashboard level summary of the system as well as tools to maintain, review, and report data at the intersection level.

This guide is for users new to the TMC system and will provide an overview of the available features and functions used for many common tasks. Any features not discussed in this guide are considered advanced features. If there are additional questions, feel free to explore the online help guide or contact the staff at MS2 for assistance.

Dashboard

The **Dashboard** page (Figure 1) provides a high level, system overview of the data and locations. There are three main features on this page: filters, charts and map.

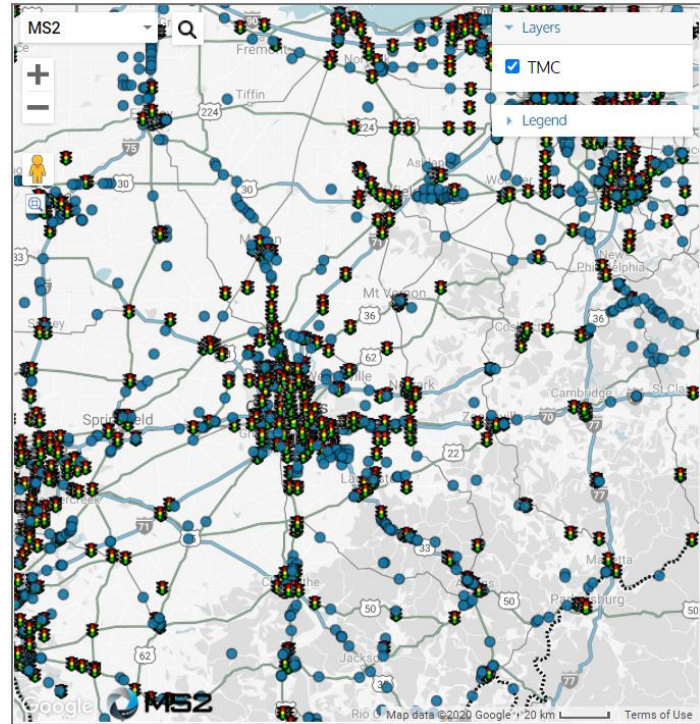
Figure 1: Dashboard page





On the left of the screen are four charts: **Intersection Rank by Peak Hour Factor (PHF)**, **Intersection Rank by Volume**, **Peak Hour Volume** and **Counts Collected by Year** (total at intersection counted by year). To quickly view an annual total, mouse over the **Counts Collected by Year** chart to see the values processed for each year. On the Intersection Rank charts, selecting an intersection hyperlink will zoom the map to that location.

Figure 2: Map

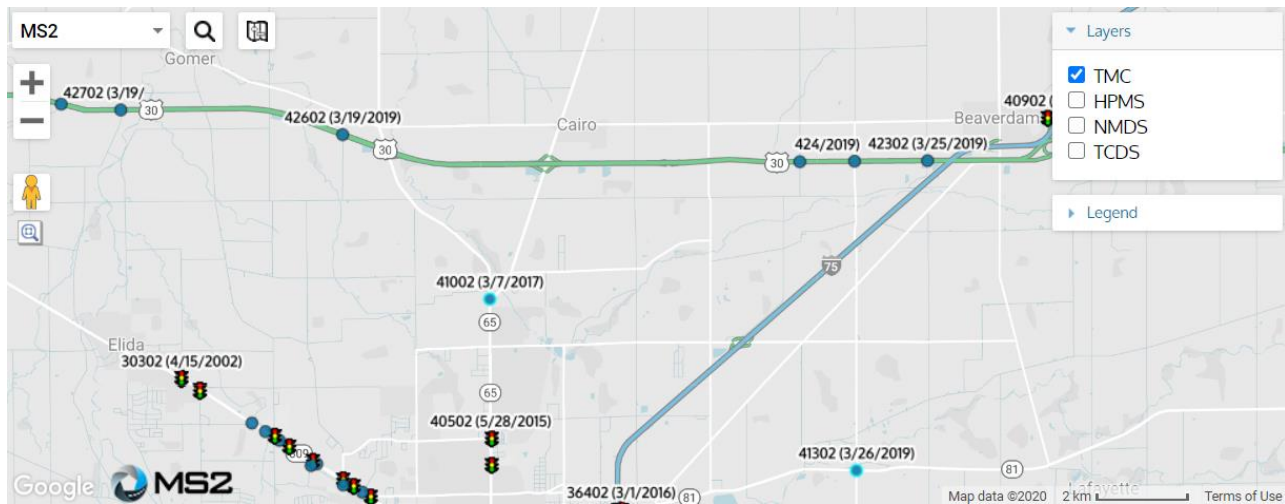
The map (Figure 2) shows all intersections with data recorded in the TMC system and offers a few different options to interact with the data. These include search and zoom capabilities. Additional details will be provided in the **Analysis: Map** section of the guide.



The **Legend** identifies the symbols used within the map including  to represent a signalized intersection and  to represent a non-signalized intersection. Each intersection provides additional information when selected including: Station identification, Count by approach, Year of latest count as well as a link for additional details.

Locations generated using search criteria (Figure 3) will be displayed on the map using a highlighted color around its shape. This helps the user to differentiate the search results from surrounding count stations.

Figure 3: Stations located from the search



Adjust the zoom level on the left side of the map to widen or narrow the view of the area.

Analysis

The **Analysis** page (Figure 4) allows the user to view and report data at a detailed level and most of the work will be performed in this tab. There are four sections which present the information in different ways: Map, Results, Details, and Reports. The information is organized by two tools: **Quick Search** and **Advanced Search** to query station attributes which will generate results presented in a list view and a detail view. The user can search for a single station or a set of stations using the **Quick Search** tool. The **Advanced Search** tool is used to generate more refined search results based on specific station attributes. Users can then request reports through the **Reports** section based on the results of the query.

Figure 4: Analysis page

The screenshot displays the MS2 Analysis page interface. At the top, it shows the title "Turning Movement Counts" and navigation tabs for "Dashboard", "Analysis", and "Admin". The MS2 logo is in the top right corner. On the left side, there are two search tabs: "Quick Search" and "Advanced Search". Below these are various search filters:

- Intersection ID: All
- County: All
- Community: All
- Counts Available: All
- Counts Year: All
- Road 1: [Text Input]
- Road 2: [Text Input]
- Road 3: [Text Input]
- Road 4: [Text Input]
- Signalized?: All
- Traffic Control Type: [Text Input]
- Int Owner: [Text Input]
- Maintaining Agency: [Text Input]
- Jurisdiction: [Text Input]
- LRS ID: [Text Input]
- LRS Location Point: [Text Input]
- Control Section: [Text Input]
- Synchro Id: [Text Input]
- Synchro Zone: [Text Input]
- Spot No: [Text Input]
- Location/Count Note: [Text Input]

The main area is a map showing a network of roads with numerous colored markers (blue, yellow, red) representing traffic movement counts. A legend on the right side of the map includes options for TMC (checked), HPMS, NMDS, and TCDS. Below the map is a "Details" section with the text: "Please select an intersection on the Map or from Search results."

Quick Search and Advanced Search

The user can perform a simple search for a single station or set of stations using the **Quick Search** tool. The **Advanced Search** tool can be used to generate refined search results based on specific station attributes. The **Location ID** field produces results for that location. To search based on geographic locations, use the **County** and /or **Community** fields.

The **Counts Available** field will generate a query for locations with associated counts. The **Year** field can be utilized to further refine the **Counts Available** field based on available counts for the year selected by the user.

When the search criteria are selected, click the **Search** button to generate the results for review. The **Advanced Search** tool allows the user to perform a refined search based on many more attributes than the **Quick Search**.

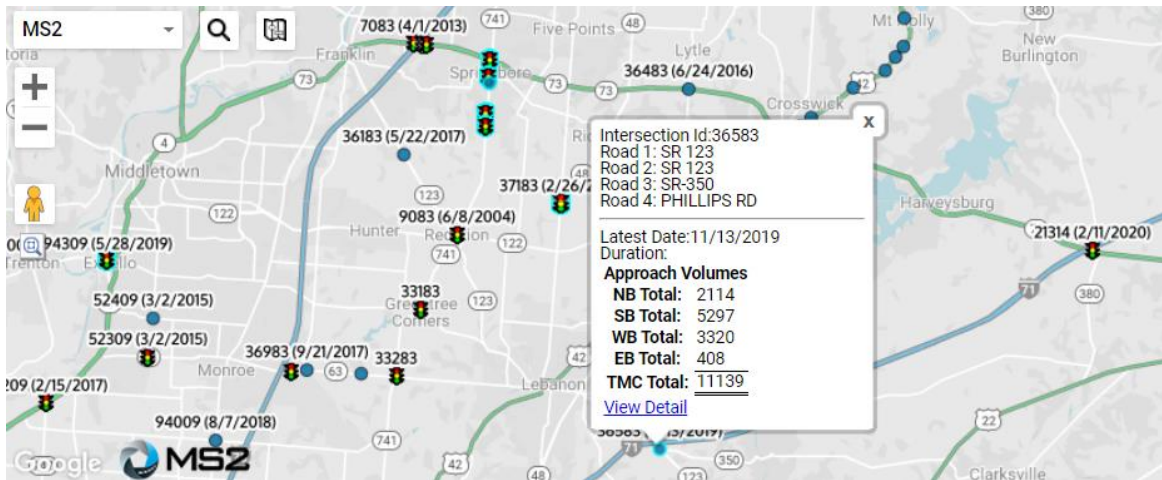
Analysis: Map

The map on the Analysis page is a mirror of the map on the **Dashboard**. Currently there are two symbols (🚦, ●) that are used to represent signalized and non-signalized locations within the turning movement count.

Selecting an intersection will open a pop-up bubble (Figure 5) that provides additional details related to the location and recent count. Also within the pop-up bubble, is a **View Detail** link will direct the user to the **Analysis** page for more information.

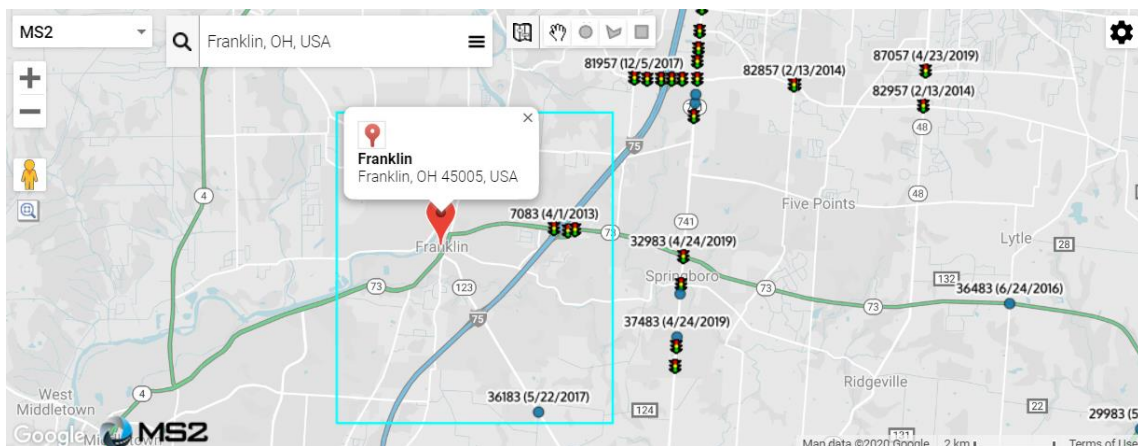
The map navigation tools along the left of the screen provide zooming options for the area. Sitting above the zoom tools is a drop down that allows the user to change the map overlays. The pegman tool 🧑 allows the user to view activity at the street level (when available).

Figure 5: Intersection detail pop-up



To the right side of the Map overlays are two icons that supports data searches. The first one 🔍 allows the user to perform an address search (Figure 6), either for mailing address or coordinates.

Figure 6: Address search option



The second one opens expanded search options to help with area searches.

Within the expanded search options, the first tool is a circle which confines the results to a diameter from the starting point. The second tool is a polygon search which confines the results to an irregular shaped vicinity. The third tool is a rectangular search and confines the results to locations within a rectangular shaped vicinity.

The hand shape which is to the left of the Circle search tool cancels the search action. The shapes of the respective expanded searches performed are displayed in Table 1.

Table 1: Additional search options

Circle	Polygon	Rectangle

Note: The **Map Search** is independent of the **Database Search** (left side panel). However, when the **Map Search** is performed, the **Search** button on the database side has to be selected for the results to be displayed within the **Results** section.

Analysis: Results

The **Analysis: Results** section (Figure 7) on the lower left portion of the screen will display the results of a **Quick Search**, **Advanced Search** or **Map Search**. The column headings can be selected to sort the information in ascending or descending order.

Figure 7: Analysis Results

Filter: <input type="text"/>					
Int ID ▲	County ⇅	Community ⇅	Road 1 ⇅	Road 2 ⇅	Latest Date ⇅
32783	Warren	FRANKLIN	SR73	Sharts Road	04/02/2013
32983	Warren	SPRINGBORO	SR-73(CENTRAL Ave)	SR-741 (MAIN ST)	04/24/2019
33783	Warren	-	C-134	C-230	07/27/2015
36183	Warren	FRANKLIN	ROBIN DR	MCLEAN LN	05/22/2017
36283	Warren	WAYNESVILLE	US 42	MIDDLETOWN RD	04/28/2017
36483	Warren	WAYNESVILLE	TOWNSHIP LINE RD	SR 73	06/24/2016
37183	Warren	LEBANON	PERKINS RD	SR 48	02/26/2019
37283	Warren	SPRINGBORO	SR-741	LOWER SPRINGBORO RD	04/24/2019
37383	Warren	SPRINGBORO	SR-741	Springboro Intermediate School	04/24/2019
37483	Warren	SPRINGBORO	SR-741	HEATHERWOODE BLVD	04/24/2019

Showing 1 to 10 of 14 entries

Previous |
 1 |
 2 |
 Next

The **Filter** field on the top right corner of the **Results** grid is an additional feature that allows the user to filter an item within the query result. For example, after the results are generated the user can narrow the list to intersections using the latest count of 04/24/2019 (see Figure 8) by entering that date in the **Filter** box.

Selecting the **Int Id** (first) column for any intersection entry will take the user to the location details within the **Analysis: Detail** section.

Figure 8: Analysis Results - Filter field

Filter:

Int ID ▲	County ⇅	Community ⇅	Road 1 ⇅	Road 2 ⇅	Latest Date ⇅
32983	Warren	SPRINGBORO	SR-73(CENTRAL Ave)	SR-741 (MAIN ST)	04/24/2019
37283	Warren	SPRINGBORO	SR-741	LOWER SPRINGBORO RD	04/24/2019
37383	Warren	SPRINGBORO	SR-741	Springboro Intermediate School	04/24/2019
37483	Warren	SPRINGBORO	SR-741	HEATHERWOODE BLVD	04/24/2019
37583	Warren	SPRINGBORO	SR-741	SCHOOL DR	04/24/2019
37683	Warren	SPRINGBORO	SR-741	Springboro High School	04/24/2019

Showing 1 to 6 of 6 entries (filtered from 14 total entries) Previous 1 Next

Note: This feature does not change the query results. Rather, it only changes the view of the data on the page (Figure 9).

Figure 9: Filtered results

Turning Movement Counts

Dashboard [Analysis](#) Admin

Quick Search **Advanced Search**

Intersection ID:

County:

Community:

Counts Year:

Details

37183 / PERKINS RD / SR 48

[Intersection](#) [Count](#) [Peak Hour](#)

Intersection Info	
Intersection ID:	37183
County:	Warren
Road 1:	PERKINS RD (EB)
Community 1:	LEBANON
Road 2:	PERKINS RD (WB)
Community 2:	
Road 3:	SR 48 (NB)
Community 3:	
Road 4:	SR 48 (SB)
Community 4:	
Road 5:	
Latitude:	39.502820
Road 6:	
Longitude:	-84.199050
Road 7:	
Road 8:	
LRS Location Point:	
Roundabout:	No
Functional Class:	
Signalized:	Yes
Seasonal Class Factor Groups:	
Int Owner:	anthony.stevens
Expansion Factor Groups:	
Maintaining Agency:	
Synchro Zone:	
Jurisdiction:	
TCDS Location ID:	
NMDS Location ID:	

Results

Filter:

Int ID ▲	County ⇅	Community ⇅	Road 1 ⇅	Road 2 ⇅	Latest Date ⇅
32783	Warren	FRANKLIN	SR73	Sharts Road	04/02/2013
32983	Warren	SPRINGBORO	SR-73(CENTRAL Ave)	SR-741 (MAIN ST)	04/24/2019
33783	Warren		C-134	C-230	07/27/2015
36183	Warren	FRANKLIN	ROBIN DR	MCLEAN LN	05/22/2017
36283	Warren	WAYNESVILLE	US 42	MIDDLETOWN RD	04/28/2017
36483	Warren	WAYNESVILLE	TOWNSHIP LINE RD	SR 73	06/24/2016
37183	Warren	LEBANON	PERKINS RD	SR 48	02/26/2019
37283	Warren	SPRINGBORO	SR-741	LOWER SPRINGBORO RD	04/24/2019
37383	Warren	SPRINGBORO	SR-741	Springboro Intermediate School	04/24/2019
37483	Warren	SPRINGBORO	SR-741	HEATHERWOODE BLVD	04/24/2019

Analysis: Detail

This section is the most comprehensive when reviewing data at the intersection level. There are three tabs providing different levels of detail: **Intersection**, **Count** and **Peak Hour**. Select the **Int ID** from the **Results** section to display the details.

Analysis: Detail- Intersection

The **Detail - Intersection** tab (Figure 10) stores and displays location level details (Road, Latitude, Longitude, etc.) and allows an authorized user to manage the contents. Alongside the intersection details is an **Image and Notes** storage tool.

Editing the intersection will allow the user to complete additional tasks such as integrating with ESRI's Roads and Highways application along with transferring data from TMC to NMDS. More information on these functions will be discussed later in the document.

Figure 10: Detail - Intersection view

Details

37183 / PERKINS RD / SR 48

[Intersection](#)
[Count](#)
[Peak Hour](#)

[Edit Intersection](#)
[Delete Intersection](#)

Intersection Info			
Intersection ID:	37183	County:	Warren
Road 1:	PERKINS RD (EB)	Community 1:	LEBANON
Road 2:	PERKINS RD (WB)	Community 2:	
Road 3:	SR 48 (NB)	Community 3:	
Road 4:	SR 48 (SB)	Community 4:	
Road 5:		Latitude:	39.502820
Road 6:		Longitude:	-84.199050
Road 7:		LRS ID:	
Road 8:		LRS Location Point:	
Roundabout:	No	Functional Class:	
Signalized:	Yes	Seasonal Class Factor Groups:	
Int Owner:	anthony [REDACTED]	Expansion Factor Groups:	
Maintaining Agency:		Synchro Zone:	
Jurisdiction:		TCDS Location ID:	
		NMDS Location ID:	

Images And Notes

File Name : N/A

<
0 of 0
>

Add
Edit/Delete

Analysis: Detail - Intersection Notes

The **Analysis: Detail- Intersection Notes** page (Figure 11) allows a user to create notes for tracking activity at the intersection. Notes can be displayed for internal staff or made available to the public. Notes can be attached to locations with valid counts and may be edited or deleted at any time.

Figure 11: Image and Notes

Intersection Info			
Intersection ID:	868	County:	Monroe
Road 1:	US-23	Community 1:	Unknown
Road 2:	Plank	Community 2:	
Road 3:		Community 3:	
Road 4:		Community 4:	
Road 5:		Latitude:	42.079290
Road 6:		Longitude:	-83.670711
Road 7:		LRS ID:	1226001
Road 8:		LRS Location Point:	0.6488
Roundabout:	Unknown	Functional Class:	(4) Minor Arterial
Signalized:	No	Seasonal Class Factor Groups:	
Int Owner:		Expansion Factor Groups:	
Maintaining Agency:		Synchro Zone:	
Jurisdiction:		TCDS Location ID:	
		NMDS Location ID:	

Figure 12: Image and Notes addition

To create a note, select the **Add** button under the Images and Notes section which will open a new window. Enter the note in the text box and depending on the level of privacy needed, select or deselect the 'Visible to Public' checkbox if this will be displayed to the public (Figure 12).

Files (documents and images) may be added to a note or used as a stand-alone item. Save and repeat the process to add more when needed.

To edit or delete a note, select the **Edit/Delete** button under the **Images and Notes** section, The **Edit/Delete** button will only show if there is a note or image stored. The user will have the option to change the contents of the note or delete it.

The next and previous arrows will take the user to the next or previous image/note. To cancel the current action, click the blue in the upper right corner of the screen.

Analysis: Detail- Count

The **Count** tab will display the details for a specific count. It includes the attributes of the count, an Hourly Count and a grid view of the data. The **Calendar View** (Figure 13) on the top left portion of the tab allows the user to find and select additional counts at this location.

Figure 13: Details – Count Calendar view

Details

103852 / RIVER STYX RD / SHARON COPLEY RD

Intersection **Count** Peak Hour

Change to List View

January 2019

Su	Mo	Tu	We	Th	Fr	Sa
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

Count Info

Count Date : Tuesday, January 15, 2019

PHV : 1,111

Peak Hour : 4:30 PM

Duration : 6:00 AM - 7:00 PM

TMC Owner : anthony [REDACTED]

Edit Count Delete Count

Images And Notes

File Name : N/A

0 of 0

Add Edit/Delete

The **List View** option (Figure 14) will display the most recent counts for the location.

Figure 14: Detail Count - List view

Details

103852 / RIVER STYX RD / SHARON COPLEY RD

Intersection **Count** Peak Hour

Change to Calendar View

Display	Date	PHV	Peak Hour	Duration	TMC Owner
<input checked="" type="radio"/>	Tuesday, January 15, 2019	1,111	4:30 PM	6:00 AM - 7:00 PM	anthony [REDACTED]
<input type="radio"/>	Wednesday, August 22, 2018	1,352	4:45 PM	6:00 AM - 7:00 PM	anthony [REDACTED]

Count # of 2 PREVIOUS NEXT

Edit Count Delete Count

Images And Notes

File Name : N/A

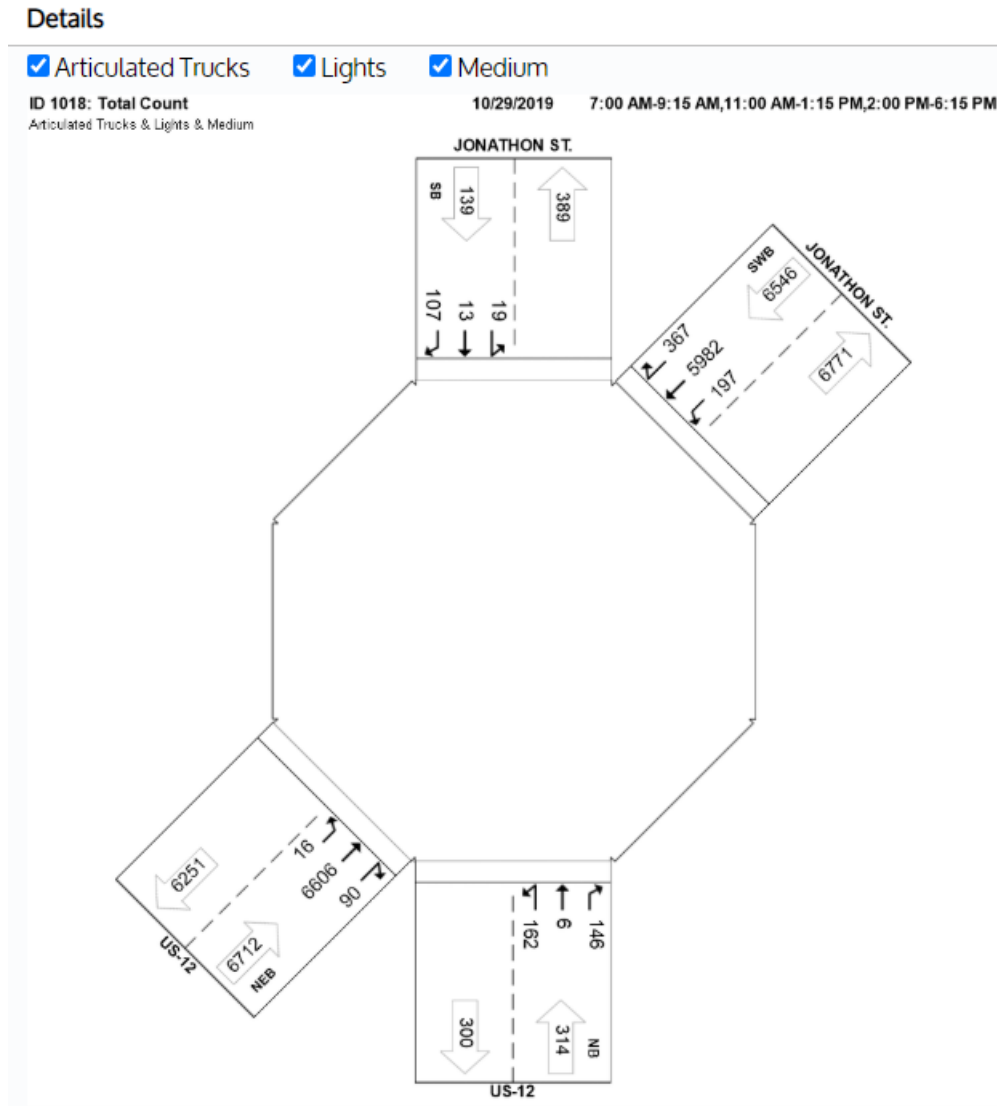
0 of 0

Add Edit/Delete

The **Intersection Diagram** (Figure 15) will accommodate and show through and turning traffic heading in up to eight directions (EB, WB, NB, SB, NEB, SEB, NWB and SWB) at the intersection.

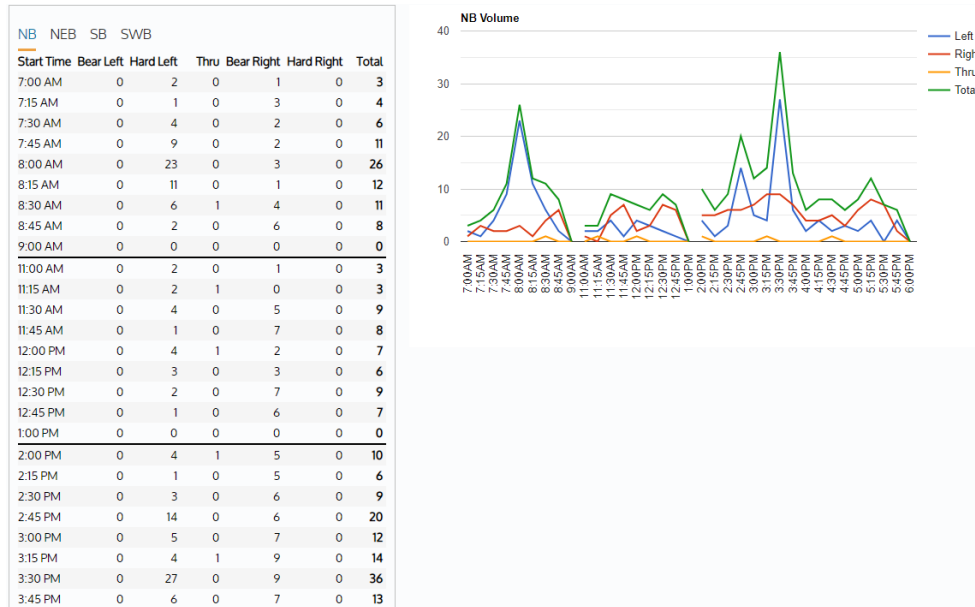
Total traffic as well as lane direction movement is displayed with arrows to show the flow pattern. Traffic volumes will be presented in 15-minute or 1-hour time blocks throughout the day for collected data.

Figure 15: Intersection Diagram



In Figure 16, the user can mouse over the graph to view the respective data points by direction. Within the grid, direction is displayed across the top and time intervals are along the left side. Directional volume counts within the grid can be viewed by switching the direction header (default is NB).

Figure 16: Intersection counts

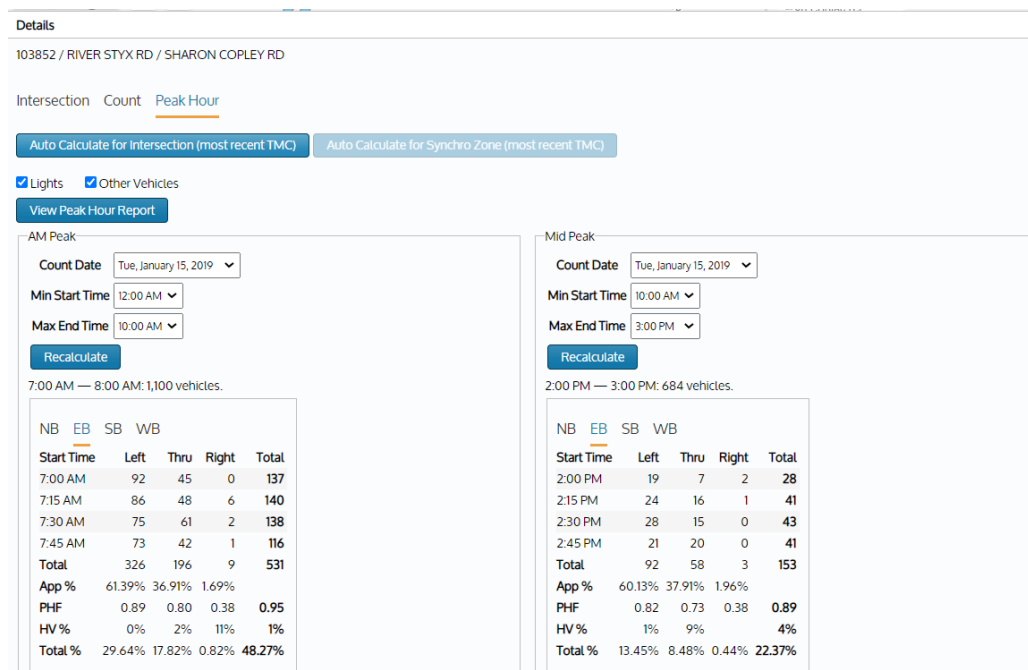


Analysis: Detail - Peak Hour

The **Analysis: Detail – Peak Hour** page (Figure 17) allows the user to generate peak hour counts using two calculation options: Intersection and Corridor. The peak hour calculations are based on at least 60 minutes of continuous data collected.

Peak AM, Mid and PM are also shown for the count with volumes shown by approach direction.

Figure 17: Peak Hour view



Analysis: Report

For users familiar with MS2's Traffic Count Database System (TCDS) module and creating reports, the TMC module similarly uses the **Report Center** to generate reports.

Select the report type from the **Name** drop down of the **Reports**. The date range will be required depending on the report. Once the selections are confirmed, use the **Run Report** button to generate the results. The report (see Figure 18) can be saved using the available formats shown in the drop down of the disc icon.

Figure 18: Sample Report

Volume By Approach 1/1/2020 Through 6/30/2020																										
TMC Date 3/5/2020		Time Interval 15 Min.		Intersection ID 507665				Classification Summary				Owner ID anthony.stevens														
County Montgomery		Community DAYTON				Roads BENCHWOOD RD, IR 75 NB ramp, IR 75 SB ramp, WYSE RD																				
LRS ID 75		LRS Milepoint 18.7999992370605																								
Start Time	IR 75 NB ramp Northbound					BENCHWOOD RD Eastbound					IR 75 SB ramp Southbound					WYSE RD Westbound					Total					
	Left	Thru	Right	U-Turn	Ped	NB Total	Left	Thru	Right	U-Turn	Ped	EB Total	Left	Thru	Right	U-Turn	Ped	SB Total	Left	Thru		Right	U-Turn	Ped	WB Total	
6:00AM	25	0	23	0	0	48	29	30	0	0	0	59	0	0	0	0	0	0	0	0	15	6	0	0	21	128
6:15AM	21	0	29	0	0	50	44	37	0	0	0	81	0	0	0	0	0	0	0	0	16	5	0	0	21	152
6:30AM	40	0	40	0	0	80	53	59	0	0	0	112	0	0	0	0	0	0	0	0	25	20	0	0	45	237
6:45AM	59	0	59	0	0	118	50	122	0	0	0	172	0	0	0	0	0	0	0	0	17	16	0	0	33	323
Hour Total	145	0	151	0	0	296	176	248	0	0	0	424	0	0	0	0	0	0	0	0	73	47	0	0	120	840
7:00AM	47	0	57	0	0	104	48	85	0	0	0	133	0	0	0	0	0	0	0	0	17	16	0	0	33	270
7:15AM	51	0	62	0	0	113	57	106	0	0	0	163	0	0	0	0	0	0	0	0	30	21	0	0	51	327
7:30AM	86	0	89	0	0	175	77	141	0	0	0	218	0	0	0	0	0	0	0	0	29	26	0	0	55	448
7:45AM	81	0	103	0	0	184	69	161	0	0	0	230	0	0	0	0	0	0	0	0	35	18	0	0	53	467
Hour Total	265	0	311	0	0	576	251	493	0	0	0	744	0	0	0	0	0	0	0	0	111	81	0	0	192	1,512
8:00AM	77	0	79	0	0	156	57	130	0	0	0	187	0	0	0	0	0	0	0	0	33	18	0	0	51	394
8:15AM	77	2	67	0	0	146	48	77	0	0	0	125	0	0	0	0	0	0	0	0	45	14	0	0	59	330
8:30AM	60	0	63	0	0	123	70	69	0	0	0	139	0	0	0	0	0	0	0	0	35	22	0	1	57	319
8:45AM	73	0	58	0	0	131	45	62	0	0	0	107	0	0	0	0	0	0	0	0	46	23	0	0	69	307
Hour Total	287	2	267	0	0	556	220	338	0	0	0	558	0	0	0	0	0	0	0	0	159	77	0	1	236	1,350
9:00AM	67	0	48	0	0	115	41	59	0	0	0	100	0	0	0	0	0	0	0	0	31	22	0	0	53	268
9:15AM	64	0	32	0	0	96	43	49	0	0	0	92	0	0	0	0	0	0	0	0	30	22	0	0	52	240
9:30AM	59	0	34	0	0	93	50	46	0	0	0	96	0	0	0	0	0	0	0	0	28	28	0	0	56	245
9:45AM	77	0	39	0	0	116	43	49	0	0	0	92	0	0	0	0	0	0	0	0	30	26	0	0	56	264
Hour Total	267	0	153	0	0	420	177	203	0	0	0	380	0	0	0	0	0	0	0	0	119	98	0	0	217	1,017
10:00AM	74	0	22	0	0	96	54	25	0	0	0	79	0	0	0	0	0	0	0	0	38	23	0	0	61	236
10:15AM	52	0	35	0	0	87	60	40	0	0	0	100	0	0	0	0	0	0	0	0	37	25	0	1	62	249
10:30AM	56	0	30	0	0	86	67	48	0	0	0	115	0	0	0	0	0	0	0	0	32	39	0	0	71	272
10:45AM	95	0	27	0	0	122	48	38	0	0	0	86	0	0	0	0	0	0	0	0	50	30	0	0	80	288

Admin

The previous items are features available to the public viewer. The Admin page (Figure 19) describes functionality and additional features available to users at the admin level and above.

Figure 19: Admin page

Download template files: [Basic](#) | [Advanced](#)

Admin: Upload

Use the **Admin: Upload** page (Figure 20) to import count files into the TMC module. The following selections are available to support the upload:

Import Type – Drop down list displaying available file types supported by MS2

Add Files – Link to load files from the computer

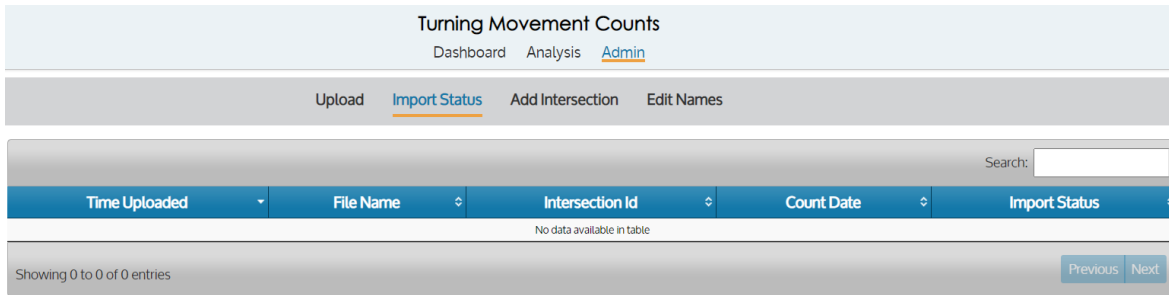
Start Upload – Begin the import process **Cancel Upload** – Abort the import process

Figure 20: Admin Upload page view

Admin: Import Status

During the count file upload process, the **Admin: Import Status** page (Figure 21) displays the progress of the file imports. The column headings on the grid can be selected to sort the information in ascending or descending order. The Search field on the top right is an additional feature which allows the user to search previous results.

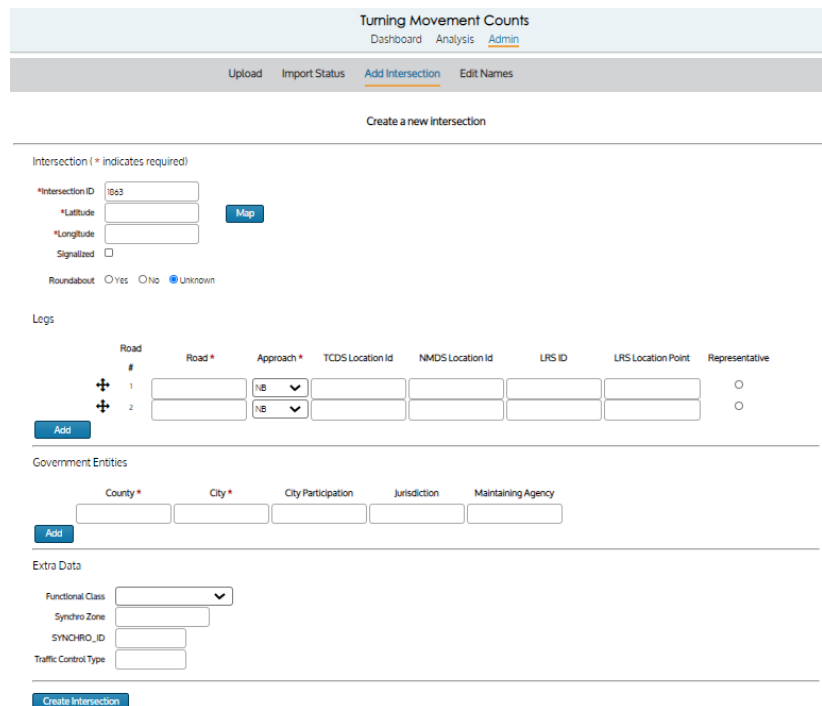
Figure 21: Admin - Import Status view



Admin: Add Intersection

The **Admin: Add Intersection** page (Figure 22) allows a user to create new intersections for collecting Turning Movement Counts. The user must complete the required fields indicated with red asterisks. Some of the required fields may be pre-populated based on agency preference. A reference guide for the Intersection labels are presented in Table 1.

Figure 22: Admin - Add Intersection page view



Admin: Intersection Reference Guide

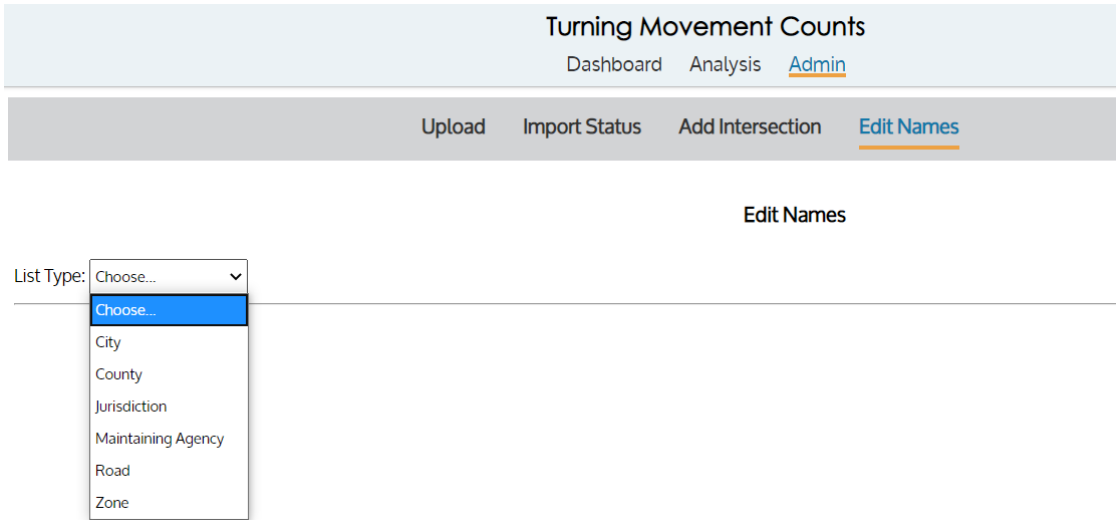
Table 1: Intersection reference guide

Intersection
Intersection ID – Unique ID for tracking intersection
Latitude – Geographical coordinate of intersection
Longitude – Geographical coordinate of intersection
Signalized – Indication of whether an intersection is using a traffic signal. Controls the icon on the map.
Roundabout – indication that the intersection is a roundabout
Legs
Road #- Numerical value assigned to the leg. Ordering of the legs are not critical for TMC module and is used to aid Roads & Highway integrations.
Road – Name of road
Approach – Direction of traffic flow at intersection
TCDS Location ID – ID of location within TCDS for completing data transfer operations
NMDS Location ID – ID of location within NMDS for completing data transfer operations
LRS ID – ID used for tracking special reference points
LRS Location Point – Measured reference point to identify a location
Representative – This is the approach that will be used for the intersection's functional class, and LRS information.
Government Entity
County – Geographic region within an agency's jurisdiction
City – Geographic region within a county
City Participation – Only used when two cities own the same intersection. Shown as a percentage of ownership
Jurisdiction – Geographic region managed within a state
Maintaining agency – Organization through which data is processed
Extra Data
Functional Class – Category of road. If multiple values, choose the highest level
Synchro Zone – Used in Synchro analysis. Multiple zones can be put into the same synchro zone to compute a common peak hour
Synchro_ID – Used in Synchro analysis as in identifier for the intersection.
Traffic Control Type – Signal type used for managing traffic flow

Admin: Edit Names

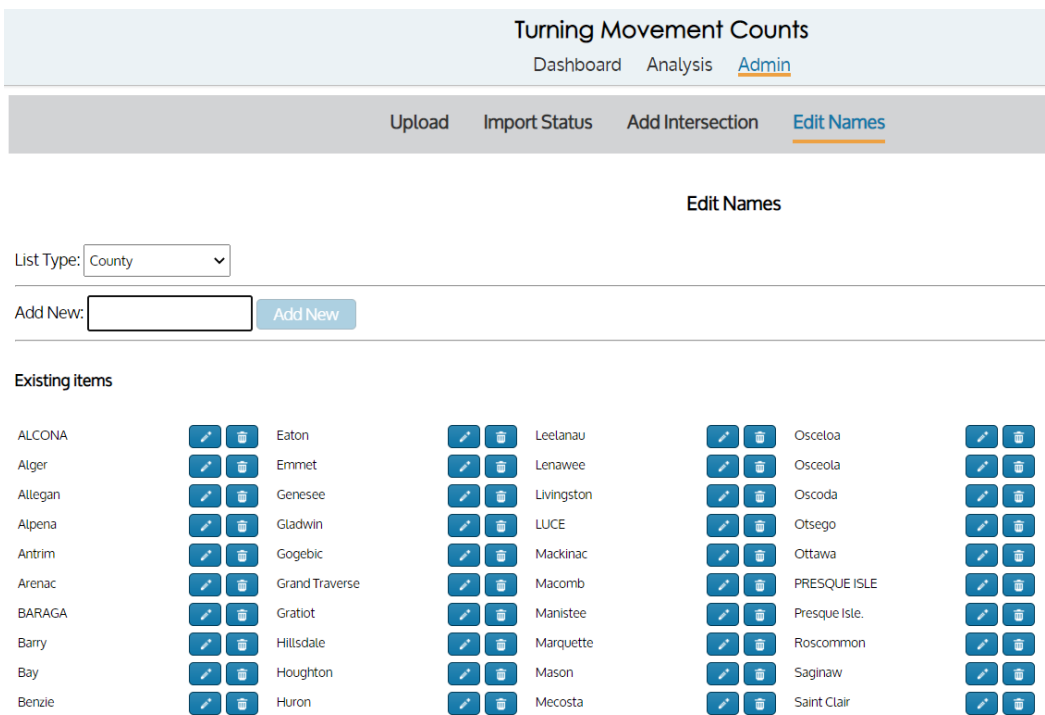
The **Admin: Edit Names** page allows a user to verify and adjust the names of existing attributes in the system. Those attributes include: City, County, Junction, Maintaining Agency, Road and Zone.

Figure 23: List of fields available under Edit Names



To begin an action, select the category from the **List Type** drop down menu (Figure 23). Perform a search for the attribute to confirm its existence, then review the existing items (Figure 24) and select the desired action to complete the process (add, edit, delete).

Figure 24: Available items based on List selection

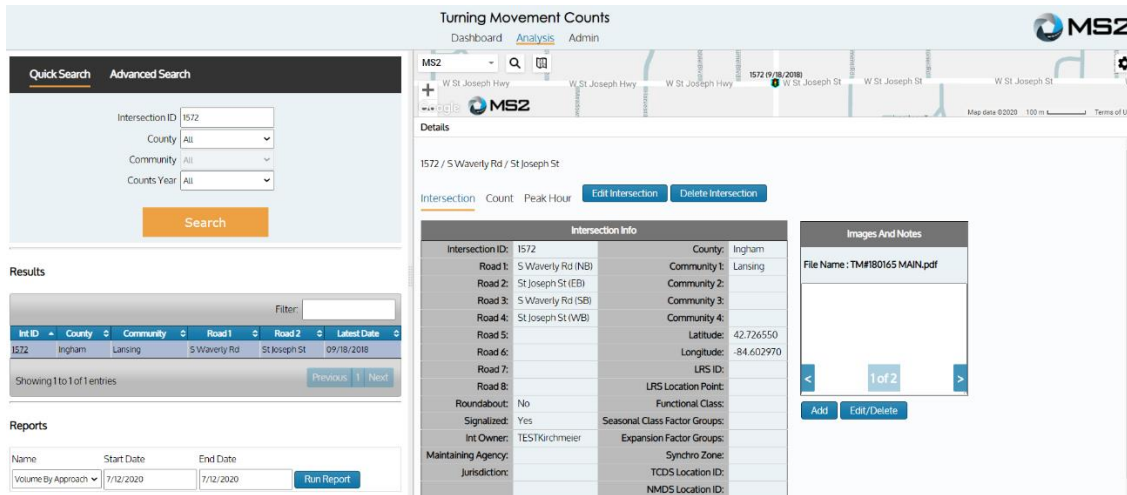


ESRI's Roads and Highways® Extension

An additional feature within the module is the integration of the ESRI's Roads and Highways® (R&H) extension. This would only be available to agencies using the integrated applications. When creating new locations or editing existing locations, attributes can be pulled from the agency's Roads & Highways® software to use in MS2's TMC module. The following steps will demonstrate the use of the R&H integration:

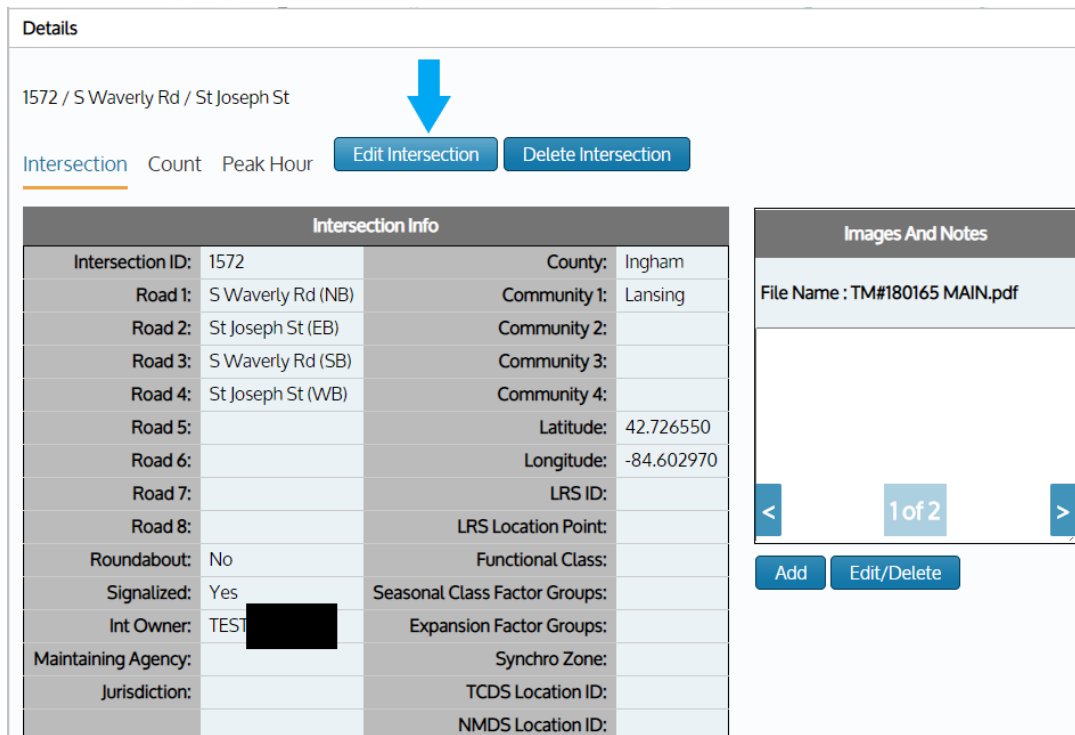
1. Perform a search using either the **Quick Search**, **Advanced Search** or **Map** tab (Figure 25)

Figure 25: Search results



2. Within the Location tab of the **Analysis: Details** section, select the **Edit Intersection** button (Figure 26)

Figure 26: Edit Intersection button



3. A new window (Figure 27) will open to review the intersection details

Figure 27: View inside Edit Intersection

Edit Intersection

Intersection (* indicates required)

*Intersection ID

*Latitude

*Longitude

*Owner

Signalized

Roundabout Yes No Unknown

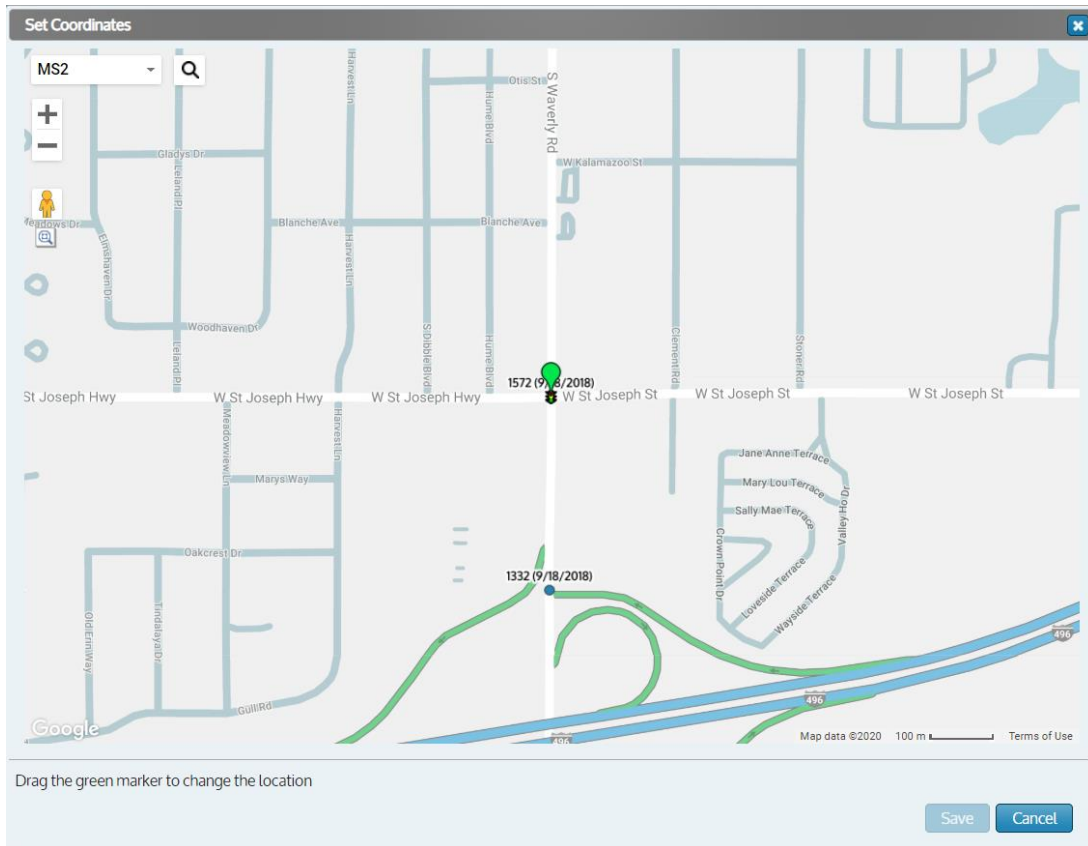
Legs

	Road #	Road*	Approach*	TCDS Location Id	NMDS Location Id	LRS ID	LRS Location Point	Representative	
<input type="button" value="Remove"/>	+	1	S Waverly Rd	NB		33-09999N_NB	570708	9.9700003	<input type="radio"/>
<input type="button" value="Remove"/>	+	2	St Joseph St	EB		33-09999N_EB	570708	9.9700003	<input type="radio"/>
<input type="button" value="Remove"/>	+	3	S Waverly Rd	SB		33-09999N_SB	570708	9.9700003	<input type="radio"/>
<input type="button" value="Remove"/>	+	4	St Joseph St	WB		33-09999N_WB	570708	9.9700003	<input type="radio"/>

Government Entities

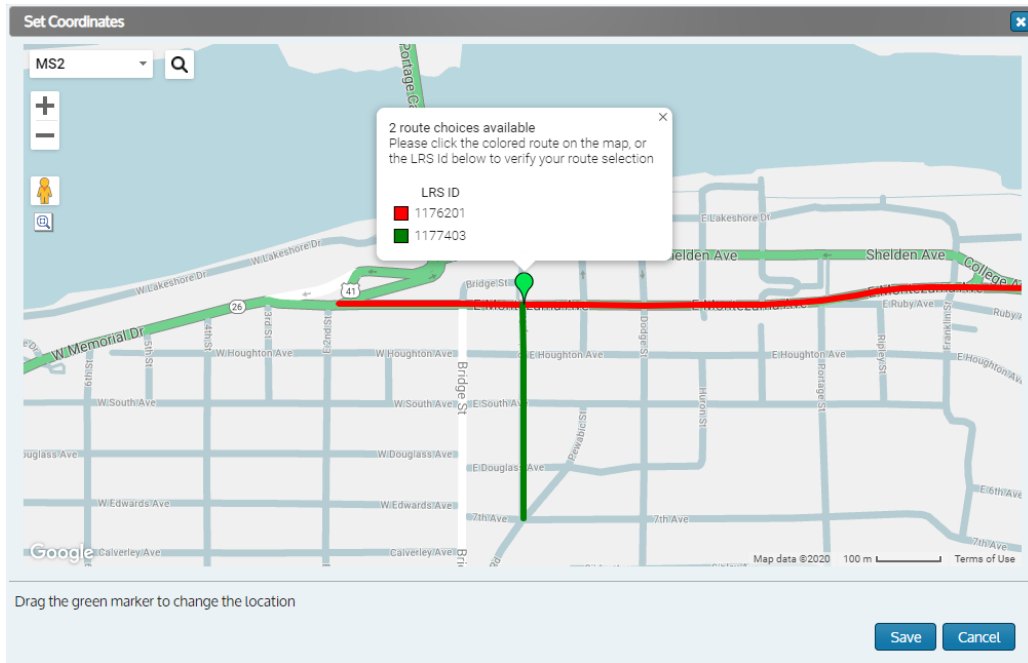
4. Select the **Map** button (Figure 28) to open the intersection view

Figure 28: Map view of intersection



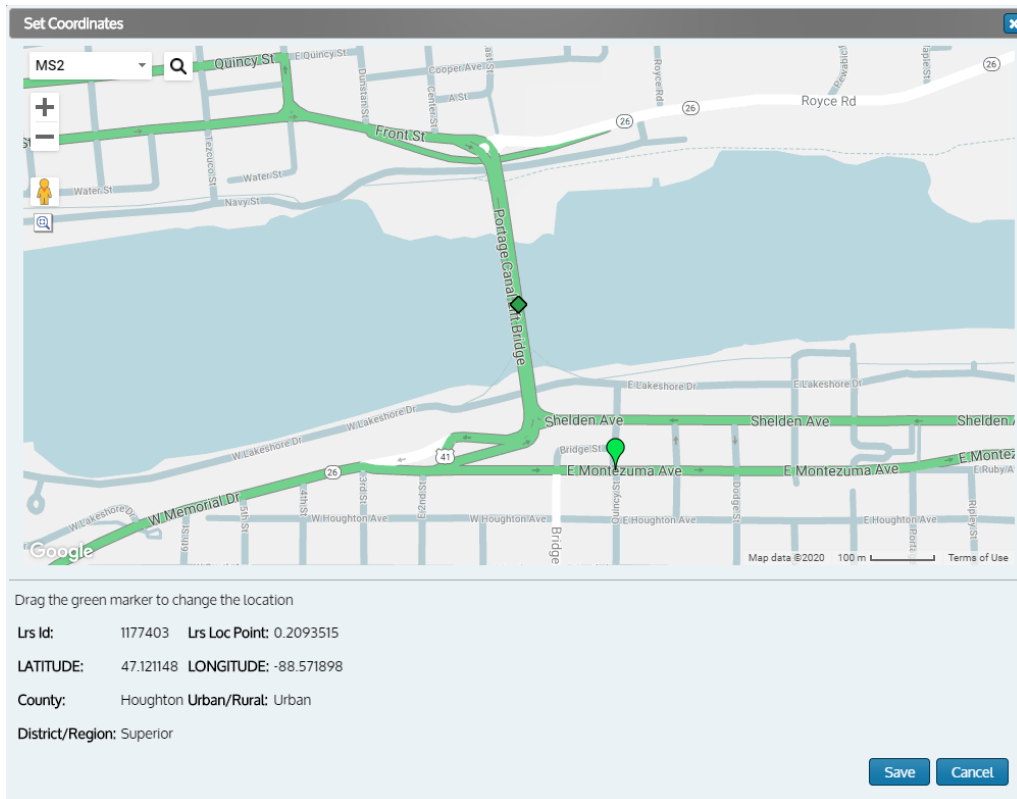
- Click and drag the existing (green) icon (Figure 29) to the new desired intersection.

Figure 29: Existing Intersection marker



- The new coordinates (Figure 30) will be displayed below the map for verification. This shows the attributes that are being pulled from the agency's Roads and Highways.

Figure 30: New Intersection marker



7. Click the **Save** button to update the intersection details (Figure 31)

Figure 31: Update Intersection coordinates

8. Review the updated attributes, then click the **Save** button to complete the update.

Figure 32: Interchanging Leg feature

9. The **Road #** is not necessary for the TMC module and is available for the agency to organize the approaches as desired. Using the compass arrows, the order of the legs can be changed (Figure 32). This can be used with the Roads & Highways and associates the leg to a numerical value.

10. Select the **Representative** leg using the radio button then click **Save** button. This Functional Class, LRS ID and LRS Location Point from this leg will be used for the intersection.

Appendix: File Import Process

MS2 supports the majority of equipment makers and will continue to offer software support based on the needs of its clients. As a result, the information presented below will guide users through the import process noting differences in file types.

It's best to develop and follow a naming convention, especially when managing multiple file types. Prior to loading a file it is important to confirm that the location exists within the system.

Importing from MS2 Excel Template

Figure 33: File Import view - MS2 Template

1. Visit the TMC module and login before going to the **Admin** page.
2. Download one of the MS2 Excel Templates (Figure 33 -- Advanced is for intersections with more than 4 legs).
3. Open the template in Excel and either manually enter all of the data, or copy/paste from another source.
4. The formatting of the Excel file and its tabs must not be changed. Use a numeric value to manage the Station ID. When using the copy/paste option, make sure to right click and choose "Paste Special..." then choose Values only.
5. The file can now be uploaded through the XLS import process.

Importing from Petra (Ver. 3.3.1) or PetraPro (Ver. 1.5)

Figure 34: File Import view - Petra/Petra Pro Template

1. Download or open the count as normal in the Petra software.
2. For PetraPro go to File -> Export -> ASCII Text. For Petra go to File -> Export and change the bottom dropdown menu 'Save as type:' to 'ASCII (*.txt)'.

3. Choose a specific (easily accessible) place to export the files.
4. Follow a naming convention to store the files would help to include the intersection ID (e.g. '101.txt').
Click 'Save'.
5. Choose 'All Groups' and 'Comma delimited' and click 'OK'.
6. Visit the TMC module and login before going to the Admin page.
7. Click on the Import Type drop down menu and select Petra Txt (Figure 34).
8. Click the 'Add files' button, browse to the txt files you exported and select them.
9. Click 'Start Upload' to begin the import process.
10. The Import Status tab will display the progress of the files.

Note: The TMC headers in Petra must be left completely default. There must be 4 approaches with 4 directions on each (Right, Thru, Left, Ped). To use a file with the headers already changed, copy and paste the data into a new default Petra file.

Importing from Miovision

Figure 35: File Import view - Miovision Template

Turning Movement Counts

Dashboard Analysis [Admin](#)

Upload Import Status Add Intersection Edit Names

Import Type: Mio Vision CSV Full

+ Add files Start upload Cancel upload

Mio Vision CSV Full: 9999_Miovision.csv	20.77 KB		Cancel
-----------------------------------------	----------	--	--------

1. Download the "Intersection Count CSV Full" from the Miovision software.
2. Visit the TMC module before going to the Admin page.
3. Click on the 'ImportType' drop down menu and select Miovision CSV (Figure 35).
4. Click the 'Add files' button, browse to the .csv files that were saved and import them.
5. Click the 'Start upload' button to begin the import process.
6. The import status page will display the progress of the files.

Note: Miovision multiple day import files are now supported by the software. The file has limited information so will be assumed the days are consecutive. When the time jumps "back in time" the reader will apply it to the following day. For example, "5:00 PM" followed by "9:00 AM", the 9:00 am will be the first hour of the next day.

Appendix: TMC Crosswalk Convention Data Management

MS2 supports two conventions with respect to the collection and display of Pedestrian Crosswalk data within the TMC module, the Right Hand Rule Convention and the Same Approach Convention. The Right Hand Rule associates pedestrians in the crosswalk with the leg from which a right turning vehicle would cross that crosswalk, regardless of whether that leg physically exists at the intersection. The Same Approach (as the name implies) assigns the data to the approach the pedestrian crossed. The tables and illustrations below shows the approaches captured and represented within the database.

Right Hand Rule

Crossed Approach*	Stored Approach**
North Bound	East Bound
North East Bound	South East Bound
East Bound	South Bound
South East Bound	South West Bound
South Bound	West Bound
South West Bound	North West Bound
West Bound	North Bound
North West Bound	North East Bound

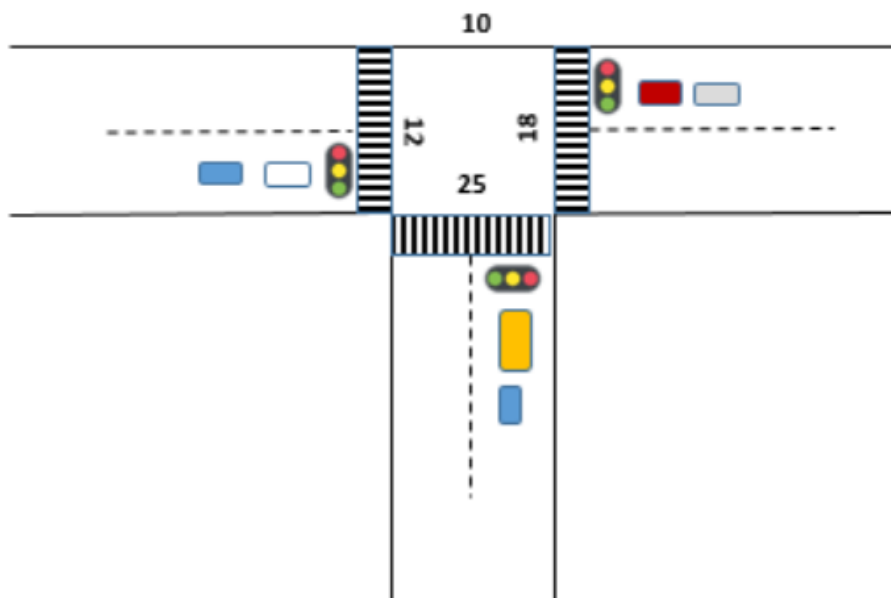
Same Approach

Crossed Approach	Stored Approach
North Bound	North Bound
North East Bound	North East Bound
East Bound	East Bound
South East Bound	South East Bound
South Bound	South Bound
South West Bound	South West Bound
West Bound	West Bound
North West Bound	North West Bound

*Crossed Approach – denotes the approach used by the pedestrian to cross the intersection

** Stored Approach – denotes the approach captured by MS2 to represent Crosswalk activity

Figure 36: Pedestrian Crossing illustration



Note: in the above illustration (Figure 36), pedestrians crossing the EB approach (12) would be stored

- On the EB Approach for formats using the Same Approach Convention
- On the SB Approach using the Right Hand Rule Convention

File Format	Convention Used
Miovision	Same Approach
Denver Excel - custom	Same Approach
ORDOT Excel - custom	Same Approach
Petra	Right Hand Rule
MS2 Template	Right Hand Rule

Appendix: TMC Module to NMDS Module Data Transfer

An additional component of the TMC application allows data to be transferred to the Non-Motorized Database System (NMDS) application. The key benefit of this tool is push bike and pedestrian data collected with a turning movement to the NMDS module.

In managing this process, the agency will need both modules. Within each module, there is a setup process to ensure the data will be correctly transferred and stored. **Note:** this is an overnight process which will retrieve available data and fill the gaps within NMDS.

Setting up NMDS

Use the following steps to review and confirm NMDS is prepared for the data transfer:

1. Log into the NMDS module.
2. Perform a search for the location to which data will be transferred.
3. Select the Edit Location button within the Analysis Detail page (Figure 37).
4. Confirm there are locations for each of the respective approaches and they are designated with the correct path types with intersection selected.
5. If any of the approaches are missing, it will need to be created.

Figure 37: NMDS module - Edit Location view

The screenshot shows the 'Edit Info' window for a location in the NMDS module. The form includes the following fields and options:

- Location ID:** 33-09999N_NB (with a 'Generate ID' button)
- Description:** (empty text box)
- County:** Ingham
- Community:** Lansing
- Jurisdiction:** (empty text box)
- Located On:** (empty text box)
- District/Region:** (empty text box)
- Latitude:** 42.7264
- Longitude:** -84.60299 (with a 'Map' button)
- TMG Station ID:** (empty text box)
- Lrs Id:** (empty text box)
- Lrs Loc Point:** (empty text box)
- Functional Class:** [None]
- Owner:** (empty dropdown)
- Permanent:**
- Active:**
- Seasonal Factors:** [None] (with a 'Select SF Groups' button)
- Q/C Group:** Default Group
- Urban/Rural:** [select]
- Travel Direction:** NS
- Selected Pathways:**
 - West:** Bike Lane, Bike Path, Roadway, Sidewalk, Trail, Unspecified
 - East:** Bike Lane, Bike Path, Roadway, Sidewalk, Trail, Unspecified
 - Bottom:** Crosswalk
- Radio Buttons:** Road Associated, Intersection, No Road Associated
- Buttons:** 'Save Location' at the bottom right.

Example

The following example uses station 1572 from TMC and 33-0999N from NMDS. The four approaches were setup in NMDS as follows:

Edit Info
✕

Location Id * Generate ID

Description

County *

Community *

Jurisdiction

Located On

Travel Direction *

Road Associated

Intersection

No Road Associated

Selected Pathways * ?

West	East
<input checked="" type="checkbox"/> Bike Lane	<input checked="" type="checkbox"/> Bike Lane
<input checked="" type="checkbox"/> Bike Path	<input checked="" type="checkbox"/> Bike Path
<input checked="" type="checkbox"/> Roadway	<input checked="" type="checkbox"/> Roadway
<input checked="" type="checkbox"/> Sidewalk	<input checked="" type="checkbox"/> Sidewalk
<input type="checkbox"/> Trail	<input type="checkbox"/> Trail
<input type="checkbox"/> Unspecified	<input type="checkbox"/> Unspecified

Crosswalk ?

NB Approach

Edit Info
✕

Location Id * Generate ID

Description

County *

Community *

Jurisdiction

Located On

Travel Direction *

Road Associated

Intersection

No Road Associated

Selected Pathways * ?

North	South
<input type="checkbox"/> Bike Lane	<input type="checkbox"/> Bike Lane
<input checked="" type="checkbox"/> Bike Path	<input checked="" type="checkbox"/> Bike Path
<input type="checkbox"/> Roadway	<input type="checkbox"/> Roadway
<input checked="" type="checkbox"/> Sidewalk	<input checked="" type="checkbox"/> Sidewalk
<input type="checkbox"/> Trail	<input type="checkbox"/> Trail
<input type="checkbox"/> Unspecified	<input type="checkbox"/> Unspecified

Crosswalk ?

EB Approach

Edit Info
✕

Location Id * Generate ID

Description

County *

Community *

Jurisdiction

Located On

Travel Direction *

Road Associated

Intersection

No Road Associated

Selected Pathways * ?

West	East
<input type="checkbox"/> Bike Lane	<input type="checkbox"/> Bike Lane
<input checked="" type="checkbox"/> Bike Path	<input checked="" type="checkbox"/> Bike Path
<input checked="" type="checkbox"/> Roadway	<input checked="" type="checkbox"/> Roadway
<input checked="" type="checkbox"/> Sidewalk	<input checked="" type="checkbox"/> Sidewalk
<input type="checkbox"/> Trail	<input type="checkbox"/> Trail
<input type="checkbox"/> Unspecified	<input type="checkbox"/> Unspecified

Crosswalk ?

SB Approach

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WB Approach

Notice in the above images the **Selected Pathways** vary by direction but must include at least one valid pathway (Bike Lane, Bike Path, Roadway and Sidewalk). The name of the NDMS location must include the underscore direction, i.e., _NB. The other key categories include the Crosswalk and the Intersection (Road Associated) checkboxes.

Setting up TMC Intersection mapping

Once the data is in the TMC application, the user will need to complete the following steps:

1. Perform a search of the intersection

Figure 38: Detail - Intersection tab

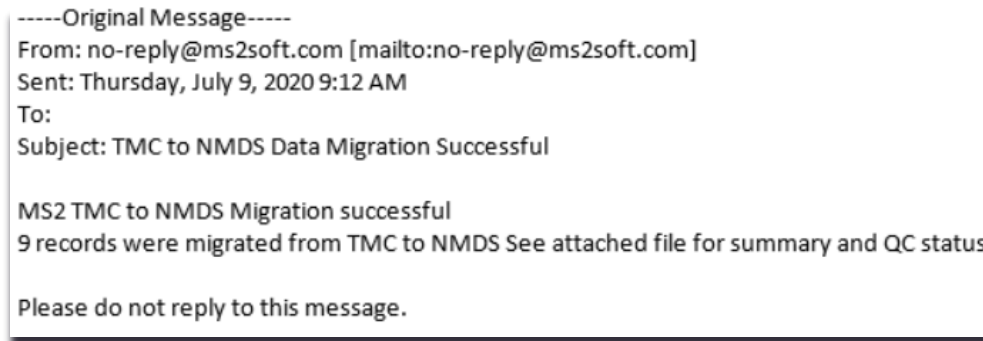
2. Select the **Edit Intersection** button within the **Details: intersection** tab (Figure 38)
3. Complete the **NMDS Location Id** for each leg that has been setup for data transfer within the Edit Intersection window (Figure 39).

Figure 39: View inside Edit Intersection

4. Click the **Save** button.

The overnight process will begin to look for records with data that can be transferred over to the NMDS application. An email notification will be sent to owners of the count to verify the completion of data transfer (Figure 41).

Figure 40 Data Transfer email notification



When there is a successful transfer of data from TMC to NMDS, a file will be included as an attachment for review (Figure 41).

Figure 41: Data transfer results

IntersectionId	CountDate	Approach	PathType	Mode	Volume	NmdsLocationId	QcStatus
1572	10/27/2016 0:00	NB	Bike Lane	Bike	1	33-09999N_NB	Accepted
1572	10/27/2016 0:00	WB	Bike Path	Bike	3	33-09999N_WB	Accepted
1572	10/27/2016 0:00	SB	Roadway	Bike	1	33-09999N_SB	Accepted
1572	10/27/2016 0:00	EB	Sidewalk	Bike	3	33-09999N_EB	Accepted
1572	10/27/2016 0:00	EB	Crosswalk	Ped	29	33-09999N_EB	Accepted
1572	10/27/2016 0:00	NB	Crosswalk	Ped	60	33-09999N_NB	Accepted
1572	10/27/2016 0:00	SB	Crosswalk	Ped	91	33-09999N_SB	Accepted
1572	10/27/2016 0:00	WB	Crosswalk	Ped	204	33-09999N_WB	Accepted
1572	9/18/2018 0:00	EB	Crosswalk	Ped	5	33-09999N_EB	Accepted
1572	9/18/2018 0:00	NB	Crosswalk	Ped	2	33-09999N_NB	Accepted
1572	9/18/2018 0:00	SB	Crosswalk	Ped	11	33-09999N_SB	Accepted
1572	9/18/2018 0:00	WB	Crosswalk	Ped	22	33-09999N_WB	Accepted

Overview of Mapping TMC approach counts to NMDS pathways

See the diagram below (Figure 42) for an example of setting up a 4-leg intersection in the UI to 4 NMDS locations. Figure 43 shows the intersection diagram and NMDS locations referenced. The NMDS location ids are for reference only to the diagrams and do not follow actual required naming convention.

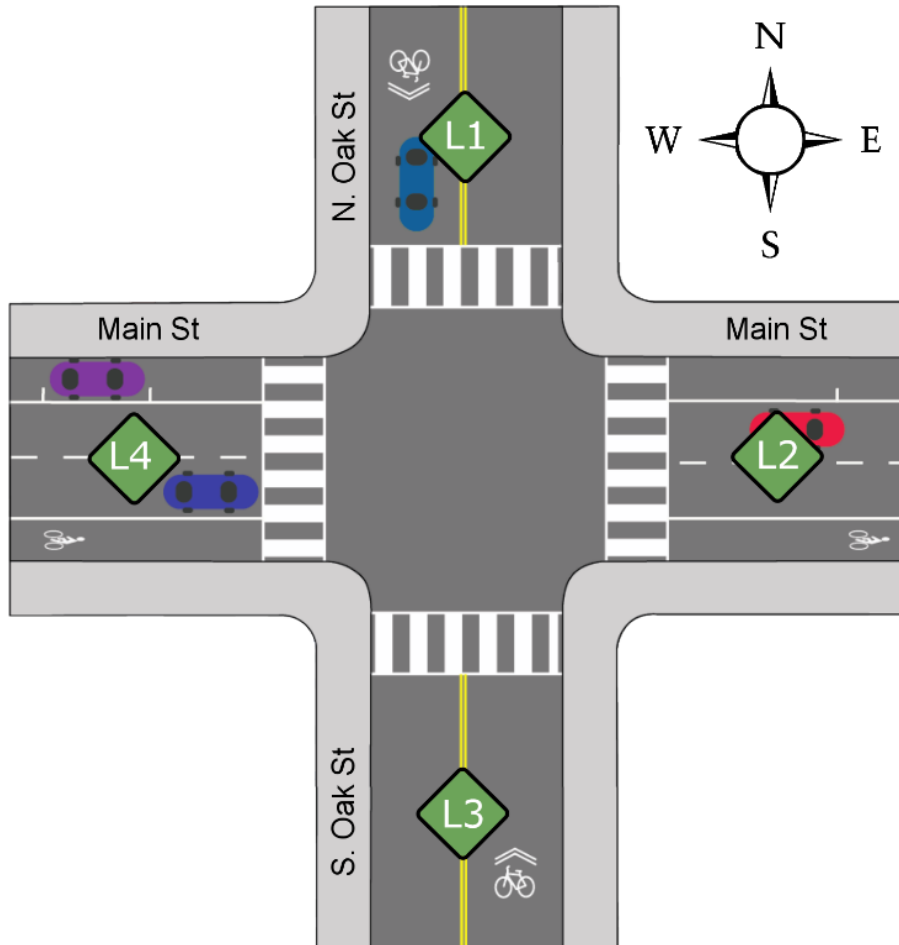
Based on the current data collected for turning movements, pedestrian data is counted within crosswalks. Due to limitations of the TMC data, pedestrian data will be mapped to the NMDS location that captures data for that crosswalk.

Figure 42. TMC Edit Intersection UI

Legs

	Road *	Approach *	TCDS Location Id	NMDS Location Id
	S Oak Dr	NB		L3
	MAIN ST.	EB		L4
Remove	N Oak Dr	SB		L1
Remove	MAIN ST.	WB		L2
Add				

Figure 43. 4-Legged Intersection w/ NMDS locations



Bike Turning Movements (Pathway Assignment Priority)

If a TMC count has bicycle turning movements, they will be need to be mapped to the corresponding NMDS locations. Also, if the NMDS locations do not have pathways setup to correspond to the approach, a logic will be used when mapping the data. The logic is defined as follows, where a lower number is the preference:

1. Bike Lane
2. Roadway
3. Sidewalk
4. Bike Path
5. Error Message To User at Intersection Edit Save

To further clarify this, a TMC count with bikes counted with vehicles will be mapped to the NMDS pathway = 1. Bike Lane; if Bike Lane does not exist, then will be applied to pathway = 2. Roadway; if Roadway does not exist then will be applied to pathway = 3. Sidewalk; if Sidewalk does not exist, then will be applied to pathway = Bike Path; if none of them exist an error to the user will pop up when saving the TMC intersection.

Using the diagram in Figure 44, bikes counted for the East bound approach will be applied to the bike lane pathway for the NMDS location, L4.

For L4, Bike in Bike Lane-> left turn goes to L1 Roadway

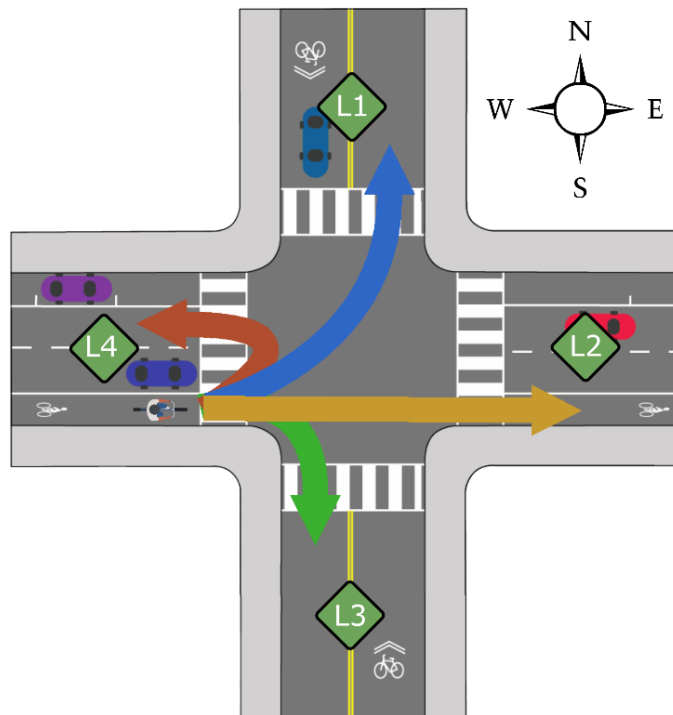
Thru movement go to L2 bike lane

Right Turns go to L3 roadway

Left Turns go to L1 roadway

U-turn go to L4 roadway

Figure 44. Example of Bike Pathways



Application with Offsets

When importing bicycle counts who do not turn, both the approaching NMDS location and the departing NMDS location will each get a NMDS count where the Offset and Direction will always match, and the pathway will match unless the pathway assignment priority comes into play.

Using the example in Figure 45, both L1 and L3 will get the following count:

L3: Offset: East, Pathway: Roadway, Direction: North
 L1: Offset: East, Pathway: Roadway, Direction: North

Figure 45. Bike Thru Movement

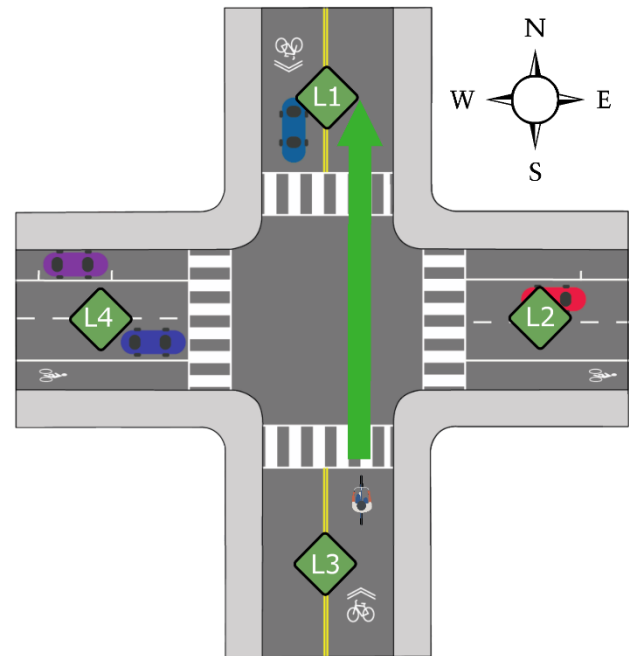


Figure 46. Bike Right Turn

When importing bicycle counts who turn (not including U-Turn), both the approaching NMDS location and the departing NMDS location will each receive a count where the departing Offset and Direction will always be perpendicular to the approach Offset and direction. The pathway will match unless the Pathway Assignment Priority comes into play.

Figure 46 shows L2 and L3 will get the following count:

L3: Offset: East, Pathway: Roadway, Direction: North
 L2: Offset: South, Pathway: Bike Lane, Direction: East

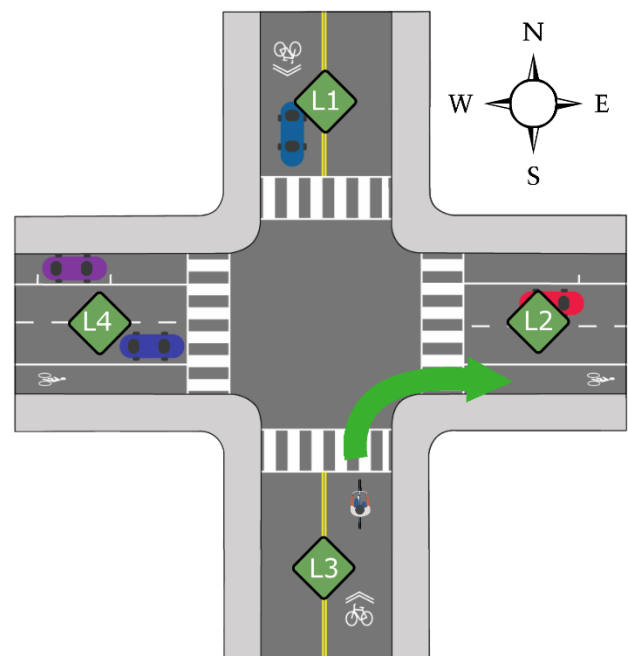
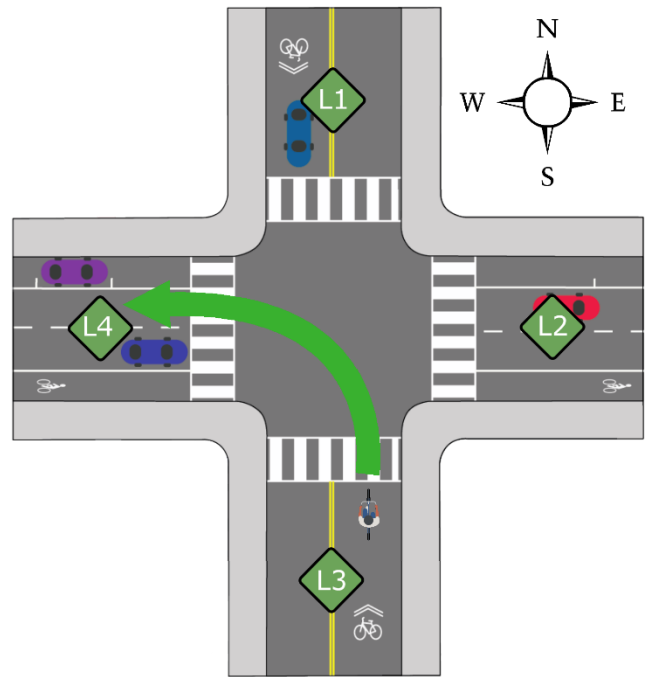


Figure 47 shows both L3 and L4 will get the following count:

- L3: Offset: East, Pathway: Roadway, Direction: North
- L4: Offset: North, Pathway: Roadway, Direction: West

Figure 47. Bike Turn Left Movement

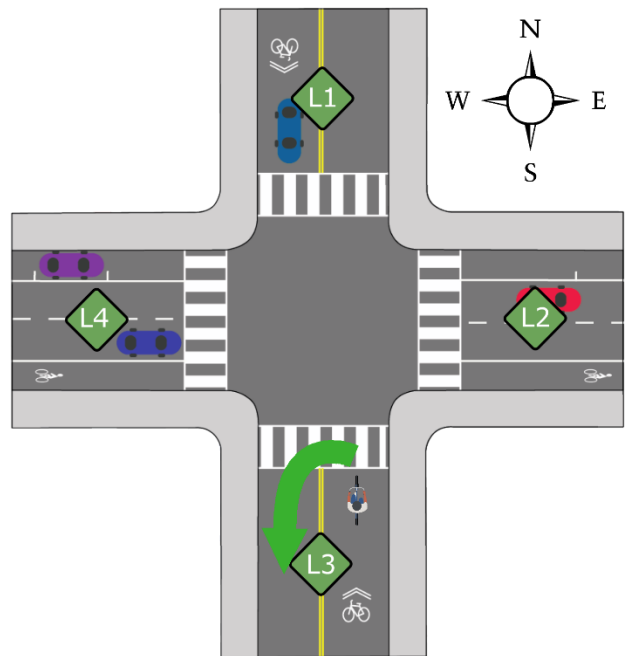


When a bicycle count is denoted as a U-turn, the NMDS location will get 2 counts and the offset and direction will be opposing directions. The pathway will match unless the Pathway Assignment Priority comes into play.

Figure 48 shows L3 will get the following count:

- L3: Offset: East, Pathway: Roadway, Direction: North
- L3: Offset: West, Pathway: Roadway, Direction: South

Figure 48 Bike U-Turns



Errors:

General Errors (apply to all file formats)

The file was missing count data.

This is caused by the count file being empty.

There is either duplicate data in the file or a count already exists with data that matches the data you tried to import (count date + time + approach + classification).

A specific turn count must be unique for a combination of the count date, the count time, the approach direction and the classification. This error may be raised if the imported count file has duplicated data, or if the specific count data has already been imported.

It is possible to add data to an existing count date via import, as long as the detailed count data is unique.

Missing Intersection ID

This means that the count file was missing the intersection ID. The location & encoding of the intersection ID varies by file import format.

Could not find intersection with a matching ID

The file provided an intersection ID, but we couldn't find a matching intersection for the agency.
MS2 Excel import format

First worksheet is missing the required "Date:" header

The first worksheet in the workbook must have a "Date:" header in column A.

Could not recognize Date with value:

We found a date value, but we couldn't parse it, because it didn't match one of our allowed formats: "MM/dd/yyyy", "M/dd/yyyy", "MM/d/yyyy", "M/d/yyyy".

First worksheet is missing the required "IntID:" header

Column A is required to have this header value.

Worksheet "{name}" doesn't have a recognized data header row.

This worksheet is missing a "TIME" header in column A.

Count value out of range.

Individual turn counts must be positive values (≥ 0) and less than 32,767.

Could not find a classification with the name {importType} on sheet named {name}

The worksheet specified a vehicle or pedestrian that is not recognized by Ms2.

Duplicate values: one or more cells have values for the same count time/class/approach/movement type. Column: {column}

The sheet contains duplicated data.

Column has a value, but it doesn't have a header.

We found a number in a data row under a column that doesn't have a header.

Could not parse column header (unknown approach): {value}

The column header was not recognized.

Could not parse column header (unknown movement type): {value}

The column header was not recognized.

Miovision CSV Import Format

Data file was missing a required header line: "{header}"

A required header from column A was missing.

Unknown time format:

The start time for a row could not be understood.

Invalid File Header: Start Date not recognized.

We found a value for start date, but couldn't parse it as a date.

File is missing a Site Code, please edit the file to specify the intersection's ID.

We found the site code header, but the follow value was missing.

Missing classification name on line {line}

The classification name must follow the "***NewClass" line.

Unknown classification ({className}) on line {line}

The classification we found wasn't one recognized by MS2.

The number of data columns doesn't match up with the number of approaches. Expecting an equal number of data columns per approach.

Each approach in the file must have the same number of turn data columns.

Unknown approach ({name}) on line {LineNumber}.

We could not recognize the approach on this line.

Expecting Start Time column header on line {LineNumber}

We expect the row that has the column headers to start with "Start Time".

Missing classification for column labeled {name}

Column contains an unknown classification.

Missing row with Movement Present

We require the section to have a row that starts with this label to indicate movement present.

Invalid count value {value} at column {column}

The value wasn't a valid numeric value, or was out of range (0 – 32,676).

Duplicate values: one or more cells have values for the same count time/class/approach/movement type. Column: {column}

The row contains duplicated data.

Petra Import Format

Data file was missing a required header line: "{header}"

A required header from column A was missing.

Unknown time format:

The start time for a row could not be understood.

Invalid File Header: Start Date not recognized.

We found a value for start date, but couldn't parse it as a date.

Data file was missing the required column headers line (starting with Start Time / End Time).

After the line with "Street Name" we require a line that starts with one of these two values.

The street names row doesn't have the same number of columns as the data header row.

We expect the same number of columns in the street name, and start/end time rows.

Could not parse approach direction: {direction}

The direction wasn't recognized.

Found duplicate approaches: {approach}

The street names specified the same approach direction twice.

Invalid count value {value} at column {column}

The value wasn't a valid numeric value, or was out of range (0 – 32,676).

Missing definition for bank {number}

This file data in the bank with this number, but no vehicle classification for that bank was provided by the admin when the file was uploaded.

Missing {vehicle or pedestrian} classification for bank {number}

The admin provided a definition for this bank when uploading, but the definition provided is missing either the vehicle or pedestrian classification which is required by the data.

Duplicate values: one or more cells have values for the same count time/class/approach/movement type.**Column: {column}**

The row contains duplicated data.