



# Transportation Pooled Fund Program

To create Web-based Traffic Data Visualization and Analysis Tools

## ***User Manual***

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## 2 OVERVIEW OF TRAFFIC DATA ANALYTICS WEB-BASED VISUALIZATION TOOL

The Traffic Data Analytics web-tool is the final product of a pooled fund study to develop a quality traffic data visualization and analytics tool suite that meets freight transportation needs, infrastructure (pavement and bridge) preservation needs, and weight enforcement needs. This tool suite is an integrated traffic data analysis tool with both data quality control functions and data visualization capabilities, designed for ease of use by all agencies. The Traffic Data Analytics tool organizes state-level continuous counts Class and WIM data, TMAS, and HPMS to generate quality data summaries that meet pavement design input, freight analysis, truck weight load trend analysis, bridge load trend analysis and other needs.

Tools	Location in Tool
Station Card Info	Tool Tip on Map
Class Counts	Overview Tab
Class Counts Change Over Time	Overview Tab
Class Counts Raw Data	Overview Tab, Click on Station on Map or In Table
Counts by Weight Raw Data	Overview Tab, Click on Station on Map or In Table
Load Spectra	Overview Tab, Click on Station on Map or In Table, Click on Weight Distribution
Axle Load Spectra	Overview Tab, Click on Station on Map or In Table, Click on Weight Distribution
Class Counts Station Comparison By AADT	Class Tab
Class Counts Monthly Average Daily Traffic Graph	Class Tab
Class Counts Seasonal Adjustment Factor	Class Tab
WIM - Station Comparison by Annual Average Daily	WIM Tab
WIM Monthly Average Daily Tonnage Graph	WIM Tab
WIM AADTonnage Seasonal Adjustment Factor	WIM Tab
HPMS AADT by Road Segment	HPMS Tab
VMT by Road Class	HPMS Tab
Miles of Route by Road	HPMS Tab
Station Comparison by Overweight	Overweight Analysis Tab Table
Overweight Trucks by Day	Overweight Analysis Tab Table, Click on Station
Overweight Trucks by Time	Overweight Analysis Tab Table, Click on Station
Overweight Trucks by Percentage by Time and Day	Overweight Analysis Tab Table, Click on Station
Overweight Axle Loads	Overweight Analysis Tab by comparison or click on station
Bridge Formula	Overweight Analysis Tab by comparison or click on station
Data in the Tool	Data Management Page
Upload Data	Data Management Page

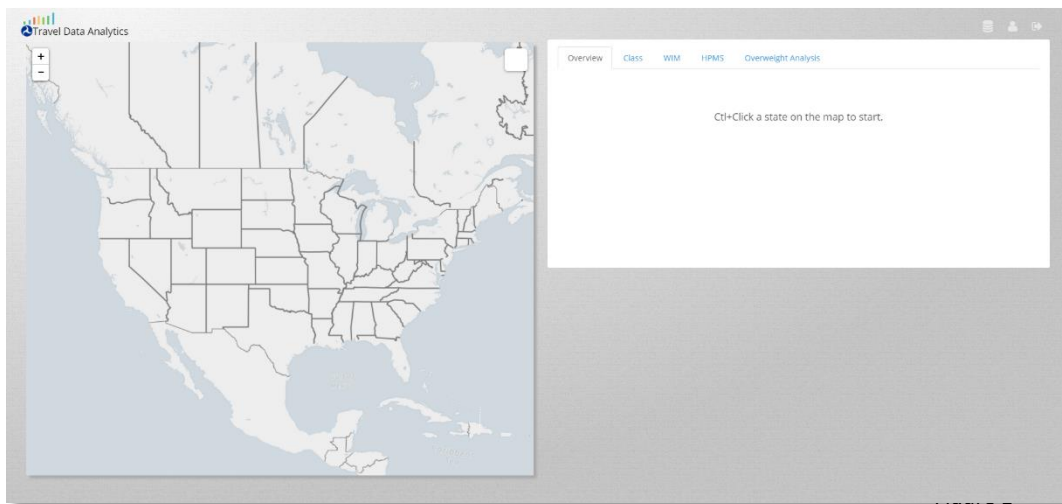
### 3 USER GUIDE BY FEATURE

#### 3.1 STATEWIDE AVERAGE TRAFFIC AND HPMS GRAPHS AND HPMS VIEW

1. Sign in to the site: <http://wim.availabs.org>

**NOTE: whenever the page seems to be stuck, you should refresh your browser and start over again.**

2. If you are a user at a state agency, you will start by landing on a map of your state and the data will default to your state agency data.
3. If you are a national user, your landing map is of the U.S. and your dataset defaults to TMAS. When you scroll over a state it should animate blue. To select a state control+click (ctrl+click) on a state.



4. The data dropdown at the top right of the page contains the different datasets. For the purposes of this test, we will use the TMAS dataset.



Figure 2

**Note:** TMAS dataset. Michigan, North Carolina, Ohio and Pennsylvania should all have excellent statewide data. If you'd like to explore the graphs and map features discussed in this document using those statewide datasets, you can access them using the dropdown menu pictured in Figure 2 above.

- Your statewide dashboard should appear like this:

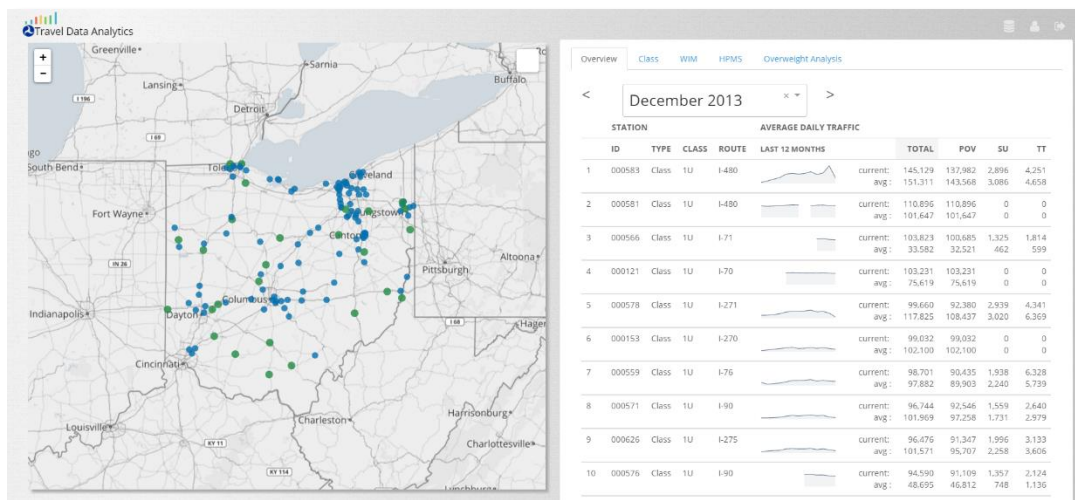


Figure 3

### 3.2 OVERVIEW DASHBOARD

- First, we'll take a look at the dashboard at right.

We see a table of data. Each row in the data indicates one continuous class count station.

The columns include:

- Station ID and Type (WIM/Class)
- Class of the road the station is located on
- Route name
- A spark graph showing the counts recorded at this station over the last 12 months
- And a table of Avg. Daily Traffic showing the current month (top sub-row) over the avg. of all months (bottom sub-row) for Total AADT, Personal Occupancy Vehicle, Single Unit and Tractor Trailer.

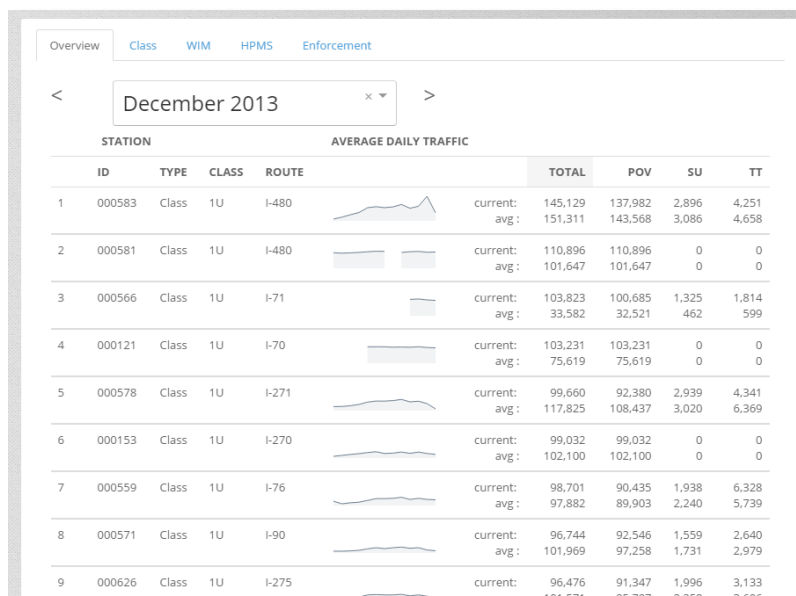


Figure 4



### 3.2.1 Single Station - Class Counts

7. You can select any single station to view the raw continuous counts data for that station either by clicking on the station row or by clicking on a station on the map.
8. Click around on the class filters by clicking on the filters labeled 1-13.

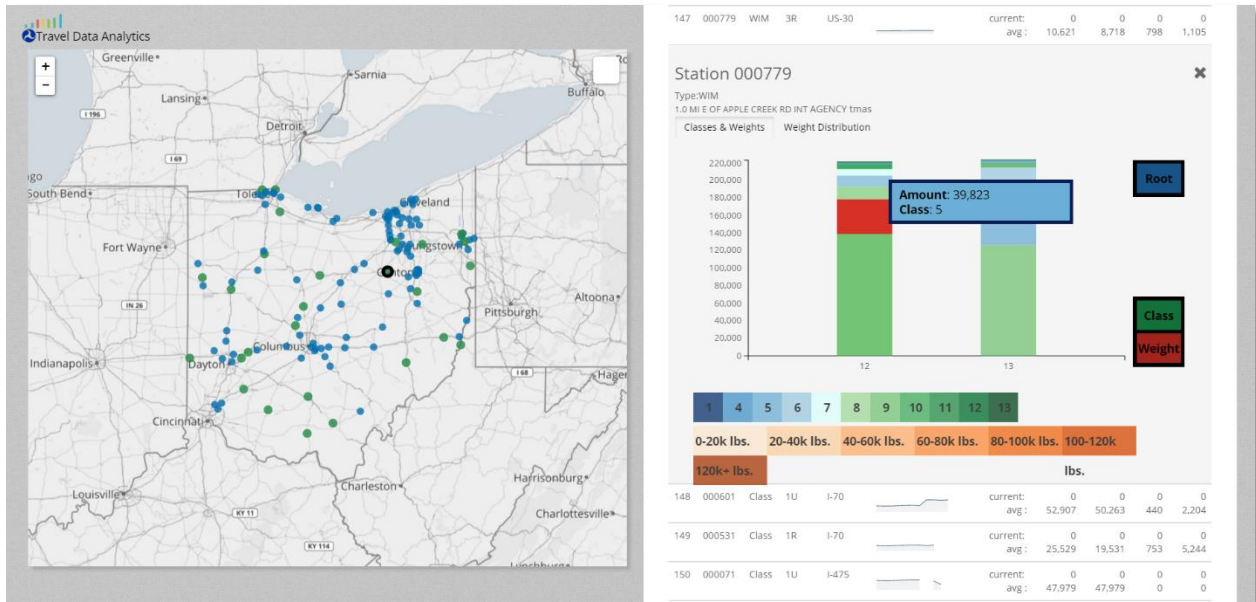


Figure 5

### 3.2.2 Single Station - Weight Counts

9. WIM Stations allow you to also look at raw WIM data for that station by clicking on the "Weight" button.

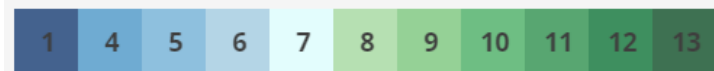


Figure 6

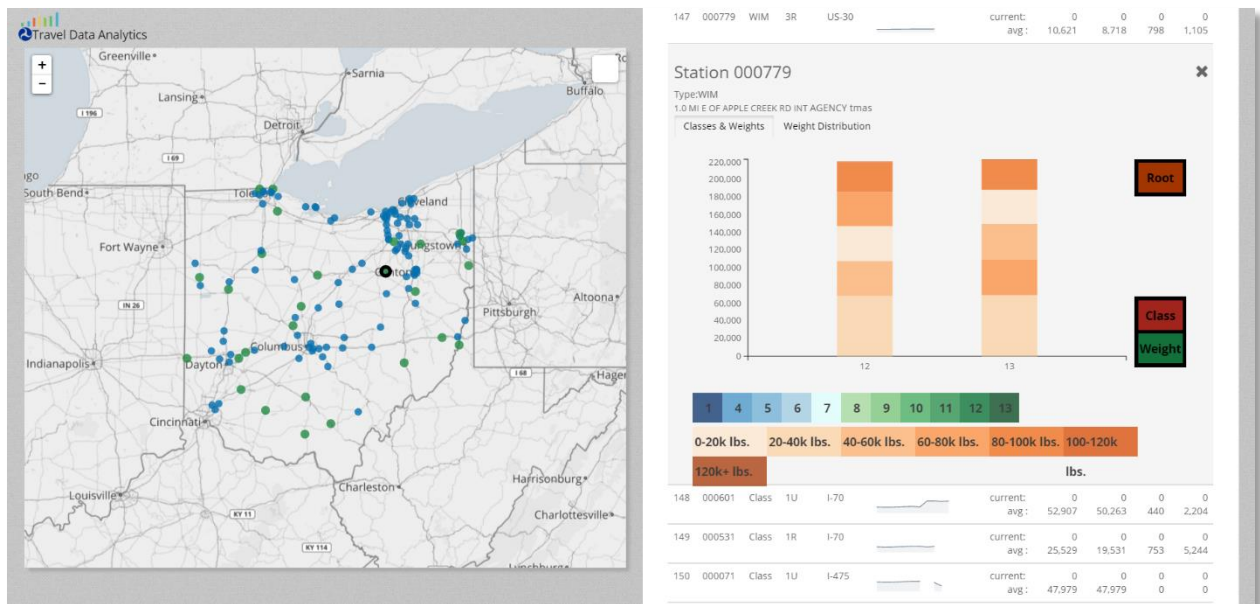


Figure 7

10. You can dig deeper into the raw data by clicking on any bar to view data for the year.

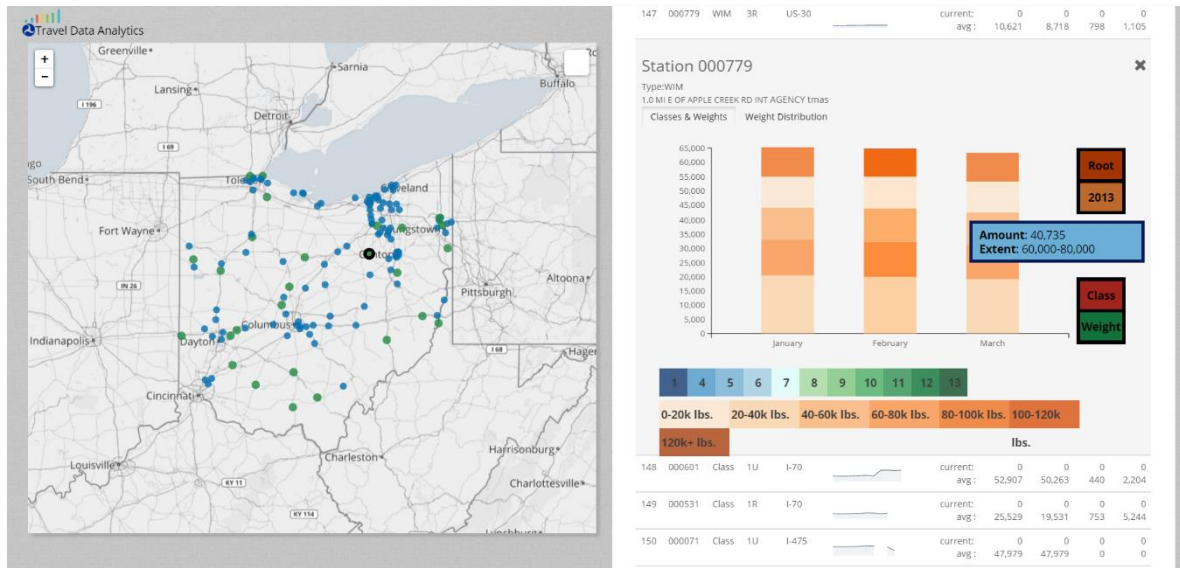


Figure 8

11. The site should now show a number of bars as seen in Figure 8. These bars represent months of a year of available data for this station. The bars in the graph show the months of January through August.

12. Click around on the weight filters to filter the graph.



Figure 9

13. Click on one of the bars to zoom into the data for one of the months.

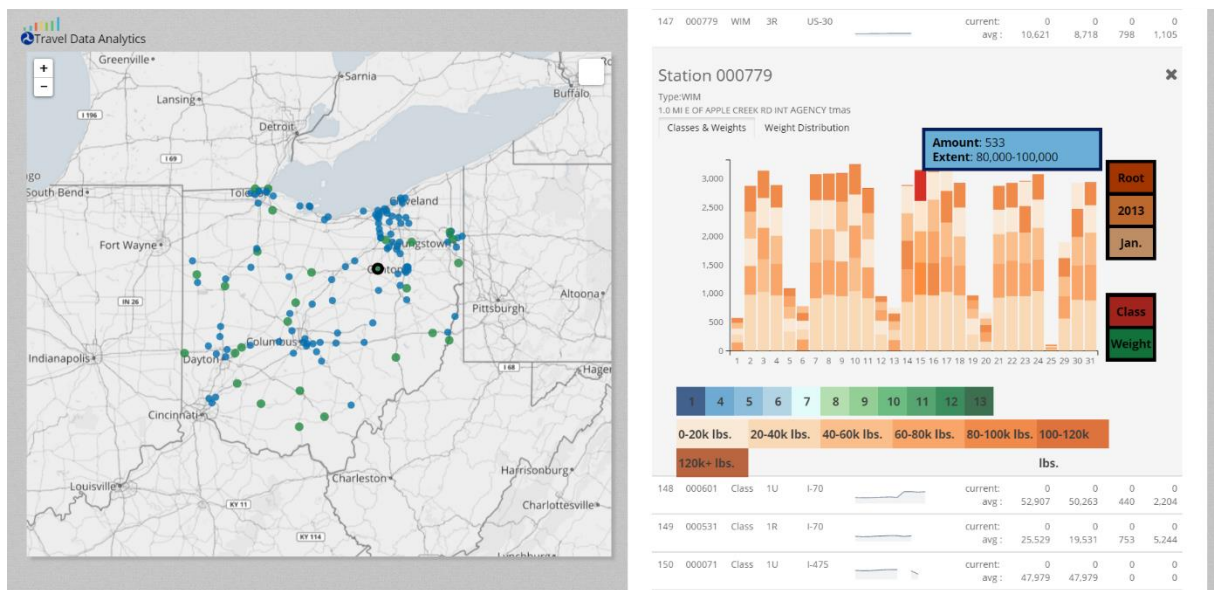


Figure 10

14. Notice on the right side of the screen that the year and month are listed for context. In this case, it is July, 2013 as seen in Figures 10 and 11. To reset the filters, click on the “Root” button in the top right corner of the graph.



Figure 11

### 3.2.3 Single Station - Weight Distribution (Load Spectra)

15. Next, let’s look at the Load Spectra Graph. In the web-tools Load Spectra is labeled Weight Distribution.
16. Click on the Weight Distribution tab.
17. Similar to the stacked graph for Weight Counts (Section 2.1.2 Nos. 9-14), The Weight Distribution graph is filterable by weight bin. Click on the weight bin bars to remove them from the spectra graph.

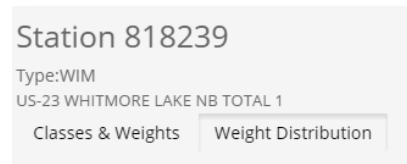
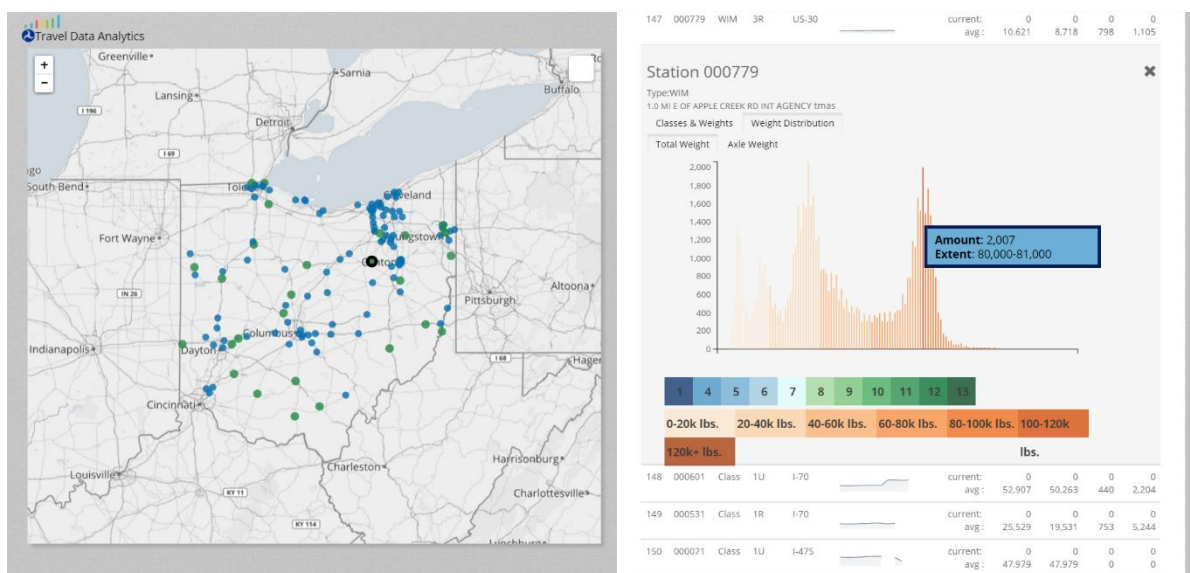


Figure 12



18. The time settings for the Load Spectra Graph are set by the Class & Weights tab. Click on the Classes and Weights tab to view the time settings. When years are listed, as seen in Figure 15, the Load Spectra Graph is showing data for all-time. Click on a year to drill in to that year, a month to drill in to that month.

Figure 13

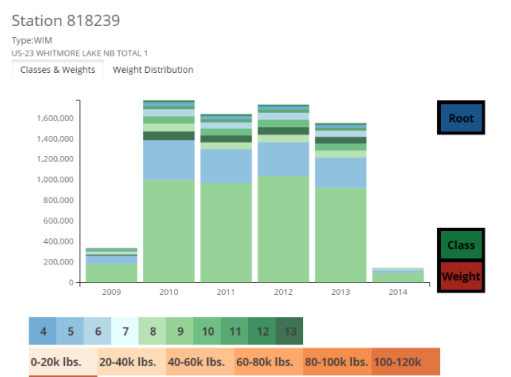


Figure 15

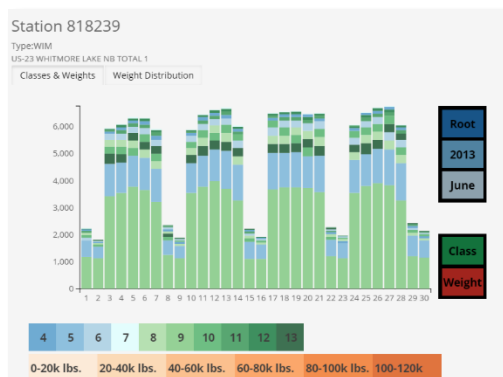


Figure 14



19. Then, once you've set your time parameters (Figure 14 shows June 2013), click on the Weight Distribution tab to view Load Spectra for the month you selected.

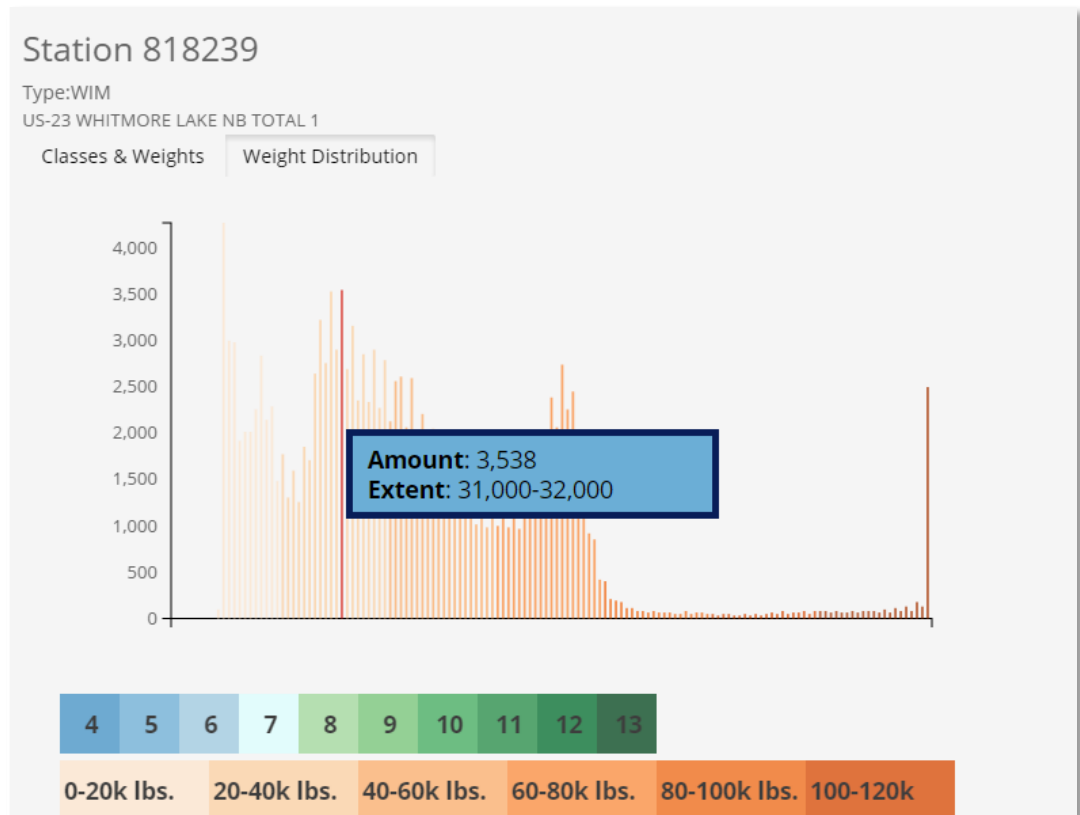


Figure 16

### 3.3 CLASS TAB

20. Scroll back up to the top of the page and click on the "Class" tab.

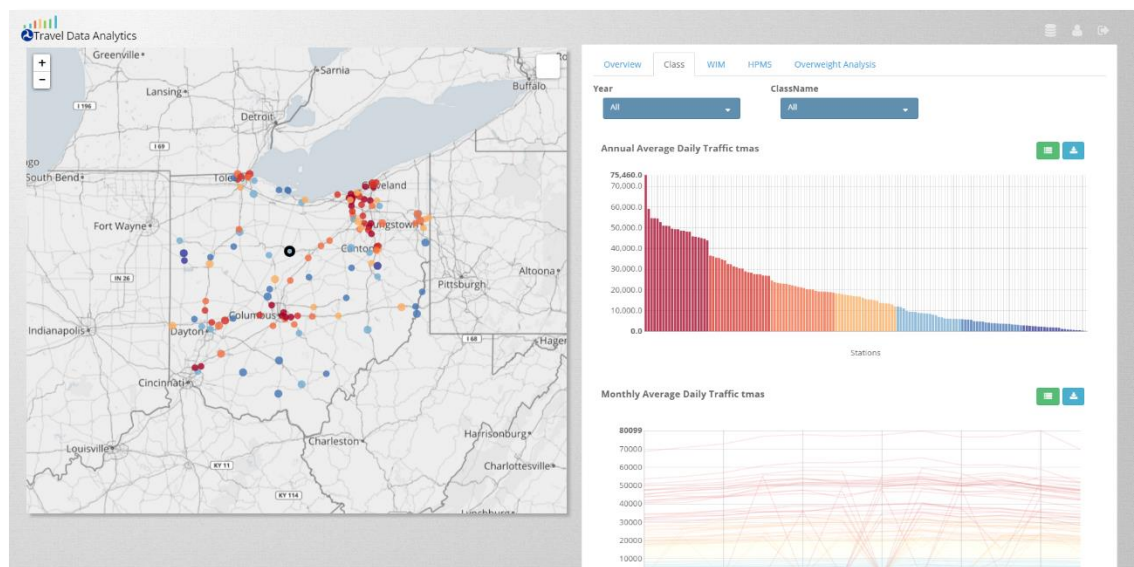


Figure 17

21. Now let's take a look at the map on the left side. The map shows all of the stations in the state for which there is data. They are represented by circles. The size and color of the circle correspond with the Annual Average Daily Traffic for that station.
22. Also notice, in Figure 18, how when you scroll your cursor over a station the station card appears as a tool tip. The station also highlights yellow in the AADT graph on the right.

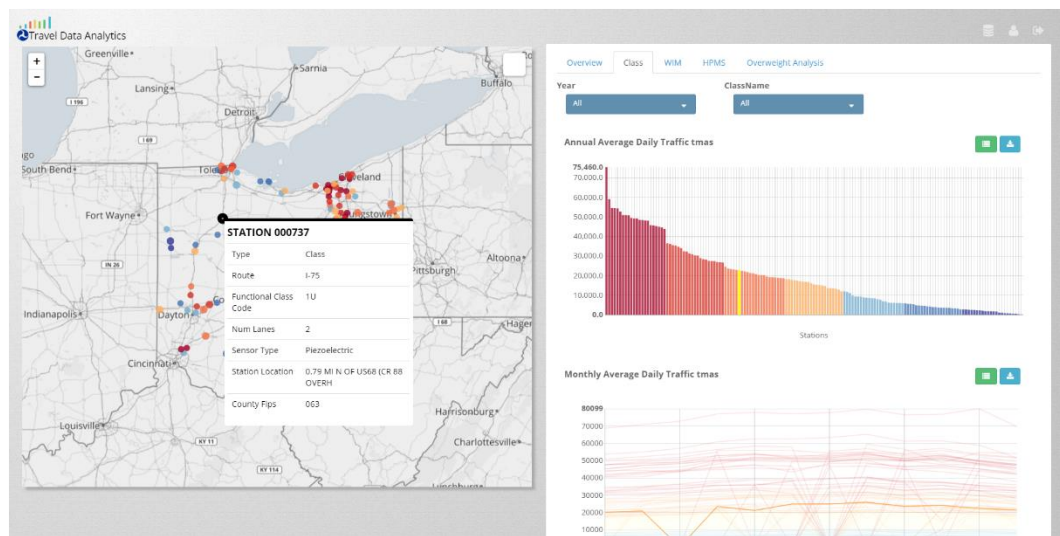


Figure 18

23. **Annual Average Daily Traffic.** To find data for this graph, AVAIL uses the class data and takes the simple average of all days (when data for a day is missing, the denominator is reduced by one) as per the Traffic Monitoring Guide:

- a. **AADT – Annual Average Daily Traffic –**  
The total volume of vehicle traffic of a highway or road for a year

divided by 365 days. It is meant to represent traffic on a typical day of the year. The Traffic Monitoring Guide lists two basic procedures for calculating AADT. In the first of these techniques, AADT is computed as the simple average of all 365 days in a given year (unless a leap year).

When days of data are missing, the denominator is simply reduced by the number of missing days:

- i. A simple average of all days; and
- ii. An average of averages (the American Association of State Highway Transportation Officials (AASHTO) method).

The AASHTO formulation for AADT is as follows:

$$AADT = \frac{1}{7} \sum_{i=1}^7 \left[ \frac{1}{12} \sum_{j=1}^{12} \left( \frac{1}{n} \sum_{k=1}^n VOL_{ijk} \right) \right]$$

Where:

- $VOL$  = daily traffic for day  $k$ , of DOW  $i$ , and month  $j$   
 $i$  = day of the week  
 $j$  = month of the year  
 $k$  = 1 when the day is the first occurrence of that day of the week in a month, 4 when it is the fourth day of the week  
 $n$  = the number of days of that day of the week during that month (usually between one and five, depending on the number of missing data)

Figure 20

24. The second graph is **Monthly Average Daily Traffic**.

- a. Monthly Avg. Daily Traffic sums all traffic in a month and divides by the number of days in that month. For all of the days of data that are missing from a given month, the graphing algorithm reduces the denominator by one.

- b. **MADT = Sum of Traffic in Month / Number of Day of Data in Month**

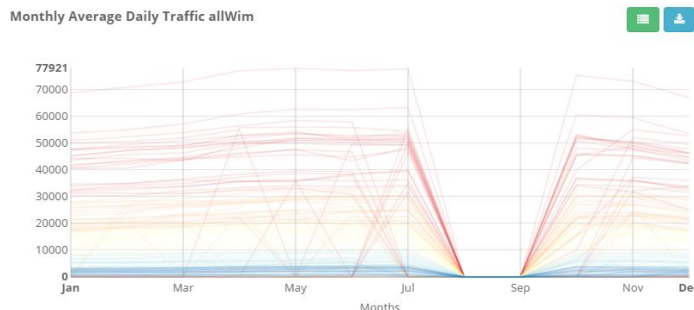


Figure 21

25. The Bottom graph on this page is the **Seasonal Adjustment Factor** graph.

- a. To calculate the Seasonal Adjustment Factor, AVAIL takes the Monthly Average Daily Traffic and Divides it by the Annual Average Daily Traffic.

$$\text{SAF} = \text{MADT} / \text{AADT}$$

- b. The Seasonal Adjustment factor shows how much more or less traffic than average, a station sees in any given month.

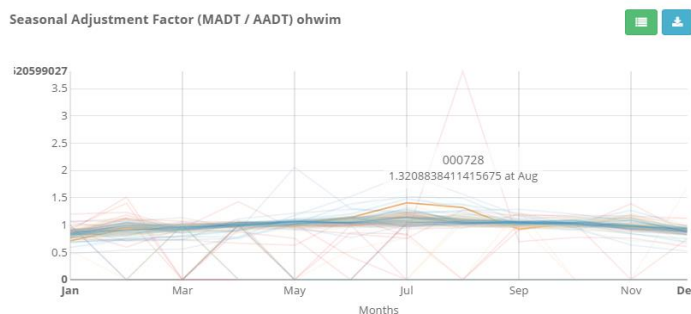
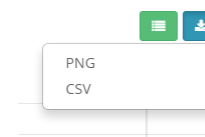


Figure 22

26. Also notice, some of the graphs have a set of icons in the top right.

- a. The green icon is a table icon. You can view tabular data for the graph by clicking on it.
- b. The blue icon is to download an image of the graph or a comma separated values file of the tabular data.
- c. Figure 23 is an example of the tabular data of the MADT Graph.



Station Id	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
16421	1.10	0.91	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.89	1.16	0.94
109511	1.49	0.61	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.82	1.44	0.64
16411	1.17	1.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.58	1.14	1.07
16811	1.10	1.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.80	1.10	0.99

Figure 23

### 3.4 WIM TAB

27. Scroll back up to the top of the page and click on the WIM tab.

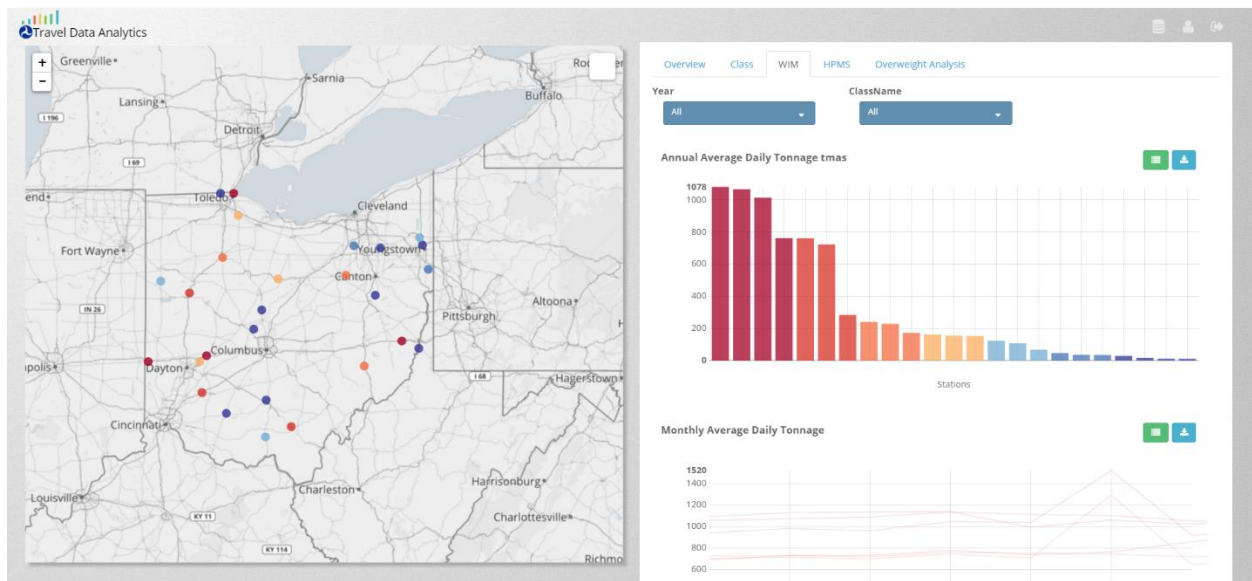


Figure 24

28. Notice first in Figure 24 that the stations appearing on the map have been filtered. The only stations appearing now are the WIM stations.
29. The WIM Graphs are exact replicas of the Class Graphs but are generated using weight data (in tons) instead of counts data.
30. The **Annual Average Daily Tonnage** graph is an exact replica of the Annual Average Daily Traffic graph listed above (Bullet Number 18). The algorithm for creating the AADTonnage graph is the same as the one used to make the AADTraffic graph except using Tons instead of Counts
31. MADTonnage and Seasonality of Tonnage Graphs are replicas of the MADTraffic (Bullet Number 19) and Seasonality of Traffic (Bullet Number 20) graphs.

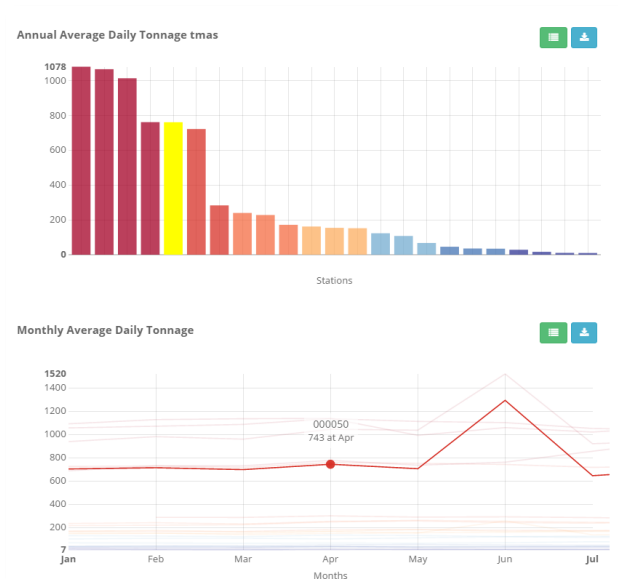


Figure 25



### 3.5 WIM AND CLASS TAB FILTERS

32. Let's take a look at how the filters effect the graphs

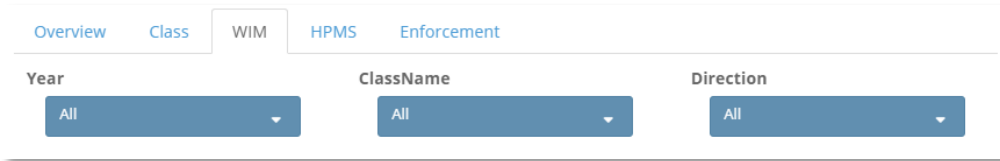


Figure 26

- a. There are three filters to choose from for the Class and WIM tabs:
  - i. Year
  - ii. Classname
  - iii. Direction
33. The Year filter is default to All. When All is selected the graphs show an average of all data in the system. By clicking on the Year filter you can select data for a given year for which there is data.

- a. After selecting a year, a new filter will appear. You can now select a given month.

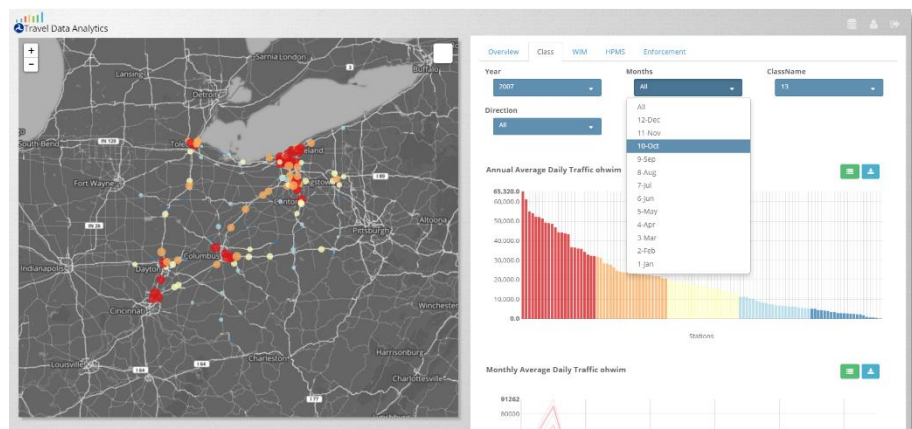


Figure 27

34. The ClassName and Direction filters also default to "All." When All is selected the graphs below show the AADTraffic or AADTonnage of all classes. Filter for Class 9 to see Class or WIM graphs of Class 9 vehicles. Filter by direction to see data from stations traveling in a given direction.

### 3.6 HPMS TAB

35. To view HPMS Data for road segments in a state, click the HPMS Tab.

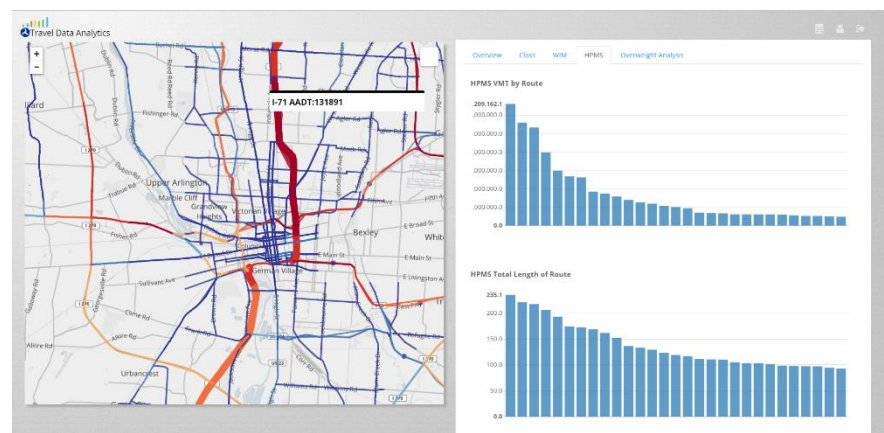


Figure 28

36. When you scroll over an HPMS road segment, a box displays HPMS road segment and AADT information (Figure 28).
37. You can zoom in to the map by putting your cursor on the map and scrolling in or out.
38. Map tools include magnification (+/-) and layer switch (Terrain, Light and Dark Colored Maps and Satellite).

### 3.7 OVERWEIGHT ANALYSIS TAB

39. Click on the Overweight Analysis Tab.

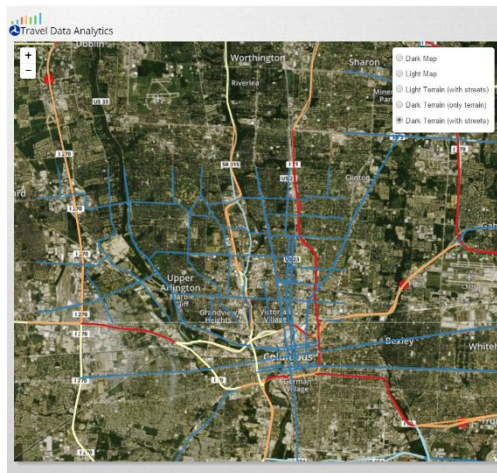


Figure 29

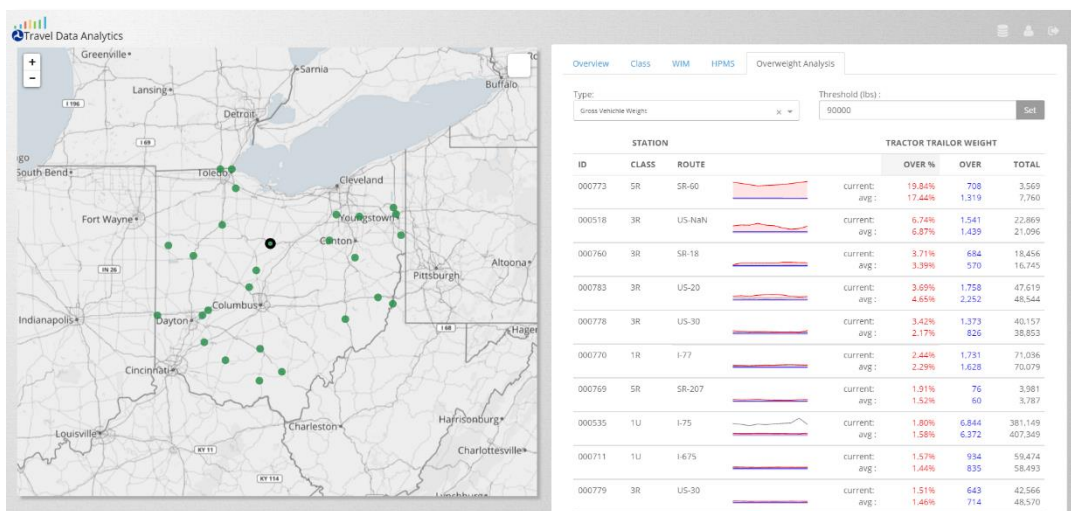


Figure 30

40. The Map once again filters stations, leaving only WIM stations. Scroll over the stations in the Overweight Analysis list to see their location on the map.
41. The Overweight Analysis Table shows all of the WIM stations in the state, similar to the Overview Table. The Overweight Analysis Table defaults to the latest month of data in the system and shows a series of Columns (Station ID, Route Class, Route Name, Overweight %, Overweight Total, and Total Counts). The rows show each station. The sub-rows show the all-time average and the current month.

STATION			TRACTOR TRAILOR WEIGHT VIOLATIONS			
ID	CLASS	ROUTE		OVER %	OVER	TOTAL
000776	5R	SR-183		current:	23.78%	316
				avg :	14.81%	382
						1,329
						2,584

Figure 31

- a. The spark line in the station row of the Overweight Analysis Table, shows the trend of overweight violations at this station over the last year ending at the selected month. The spark line shows overweight % (red line) and number of overweight (blue line).

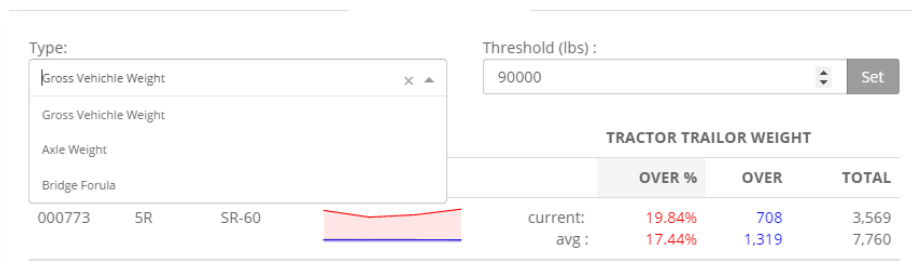


Figure 32

- b. At the top of the Overweight Analysis Table are settings for Overweight Type (Gross Vehicle Weight, Axle Weight and Bridge Formula) and an Overweight Threshold setting

### 3.7.1 Single Station Overweight Analysis Graphs

42. Select a station to open up single station overweight graphs (Figure 32).

43. Two overweight graphs appear.

- a. Heat Graph: The first shows overweight truck information for an average day. This “heat graph” has day of week as a y-axis, Sunday (top) through Saturday (bottom), and the x-axis shows the hours in a day. The heat graph shows the hours of the day with the highest average of overweight violations.

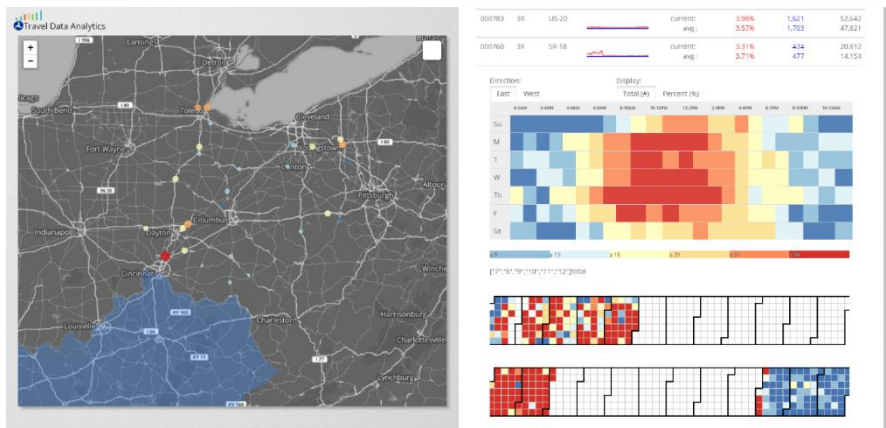


Figure 34

- b. Calendar Graph. This graph shows all of the available data for the chosen station, by day, month and year where days with highest numbers of violations are red and lowest are blue.

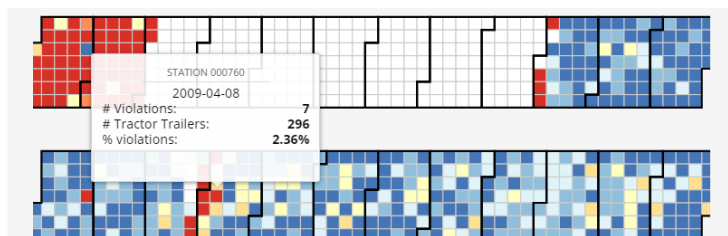


Figure 33

#### 44. Filter in the single station

##### Overweight Analysis graphs

- Both graphs can be viewed by Total (number of violations) and percent (number of violations/number of tractor trailer trucks).
- Both graphs can also be filtered by direction of travel.

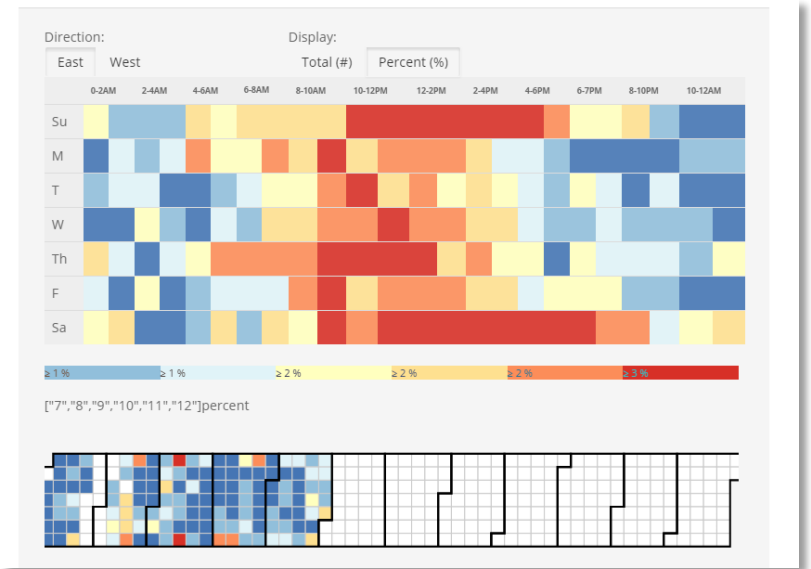


Figure 35



### 3.8 DATA MANAGEMENT

1. Log in to [wim.availabs.org](http://wim.availabs.org).
2. In the top right corner of the page, there are three icons.
3. Click on the icon of the person in the middle and a dropdown menu appears.

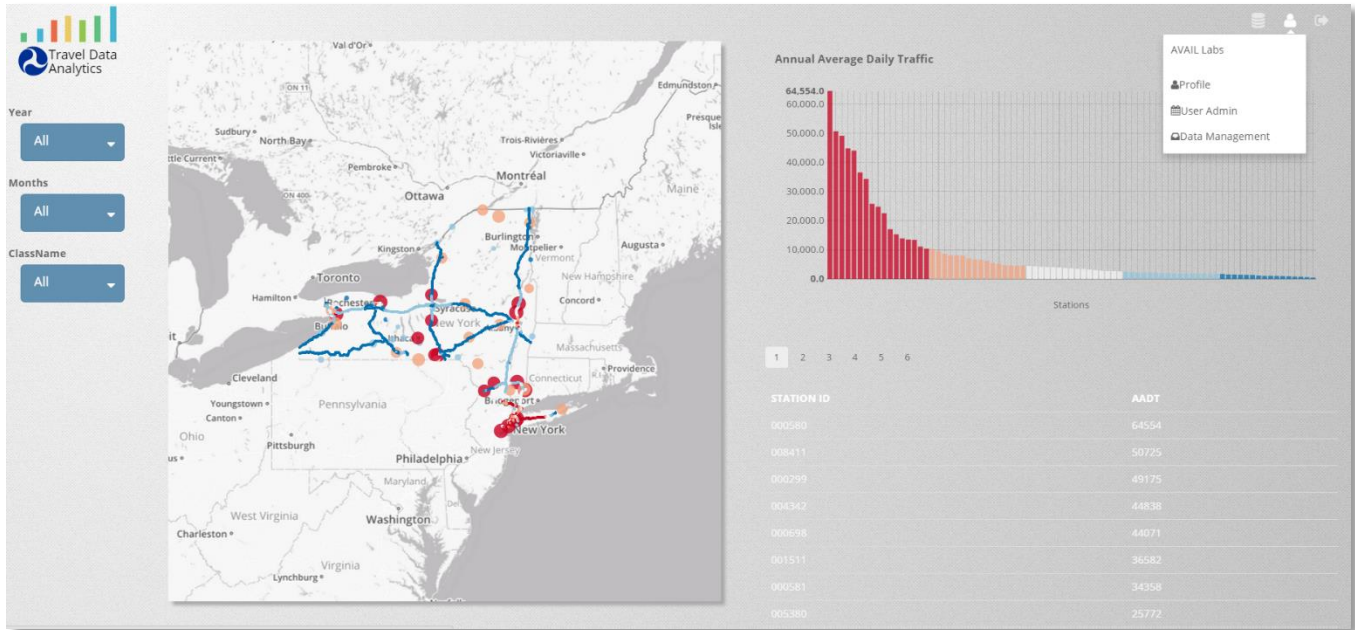


Figure 36

4. At the bottom of this menu, choose Data Management.
5. You should now see the data management page shown in Figure 37.

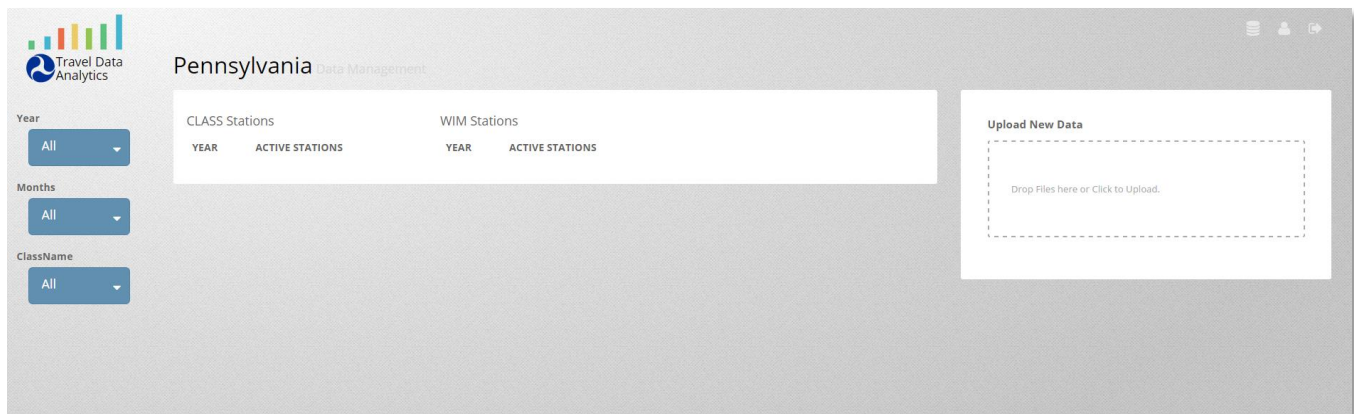


Figure 37

### 3.8.1 Data Upload

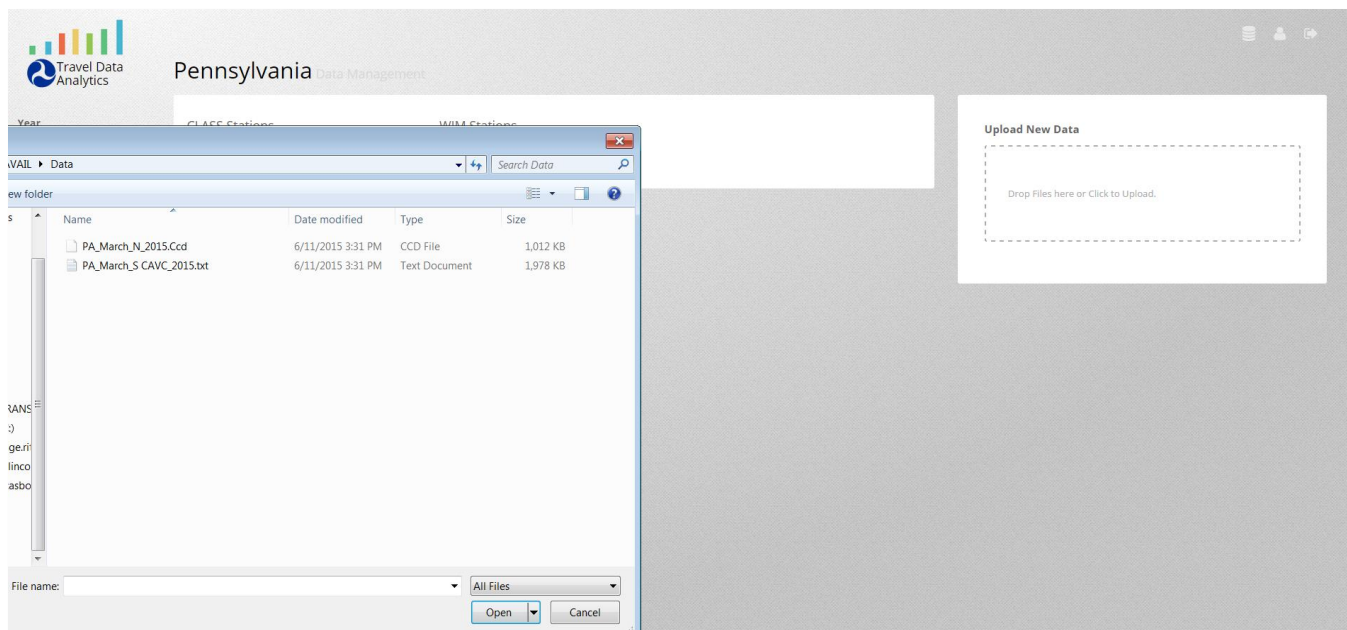


Figure 38

6. To upload an agency's own new data, simply click in the box located on the right side of the page, labeled "Upload New Data."
7. As seen in Figure 37, you should now be able to search your files for a WIM or Class data file.
8. After clicking on the file, you should now see the status of the file upload on the right side of the page, as seen in Figure 39.

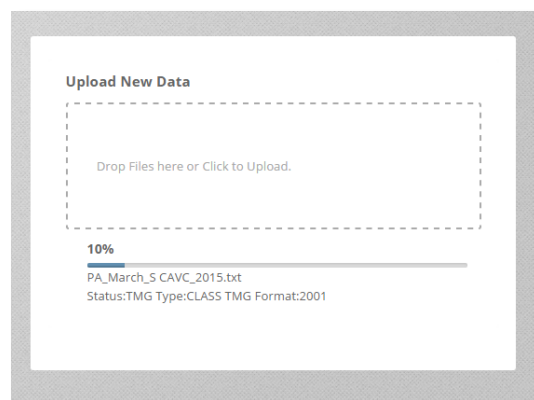


Figure 39

### 3.8.2 Calendar Graph of Uploaded Data

9. The available data for your state appears in calendar form. This is a general overview of available data for your state. Class data is listed on the left and WIM data is listed on the right. Dates with more data appear red. Dates with less data appear blue.

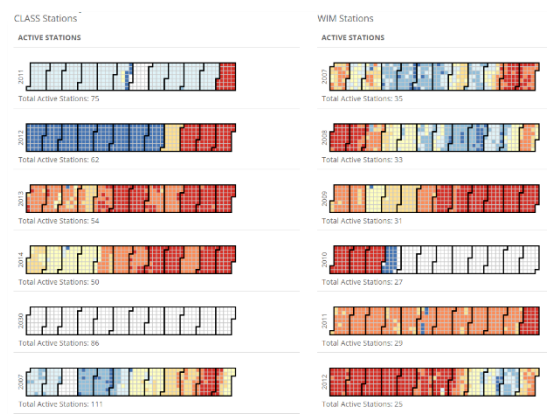


Figure 40