TMAS Traffic Data

Issues Observed and Suggested Solutions

Patrick Zhang, P.E.
Travel Monitoring and Surveys Division
Office of Highway Policy Information, FHWA
1200 New Jersey Avenue, SE
Washington, DC 20590
Patrick.Zhang@DOT.GOV
202-366-1941

U.S. Department of Transportation
Federal Highway Administration
Office of Highway Policy Information

Outline

- TMAS volume data and class data submitting status
- Top 10 errors for volume and class data, and solutions
- Technical Illustration – Bring HPMS Data to TMAS Data for Data Quality Control
- Future plans

TMAS Data Status

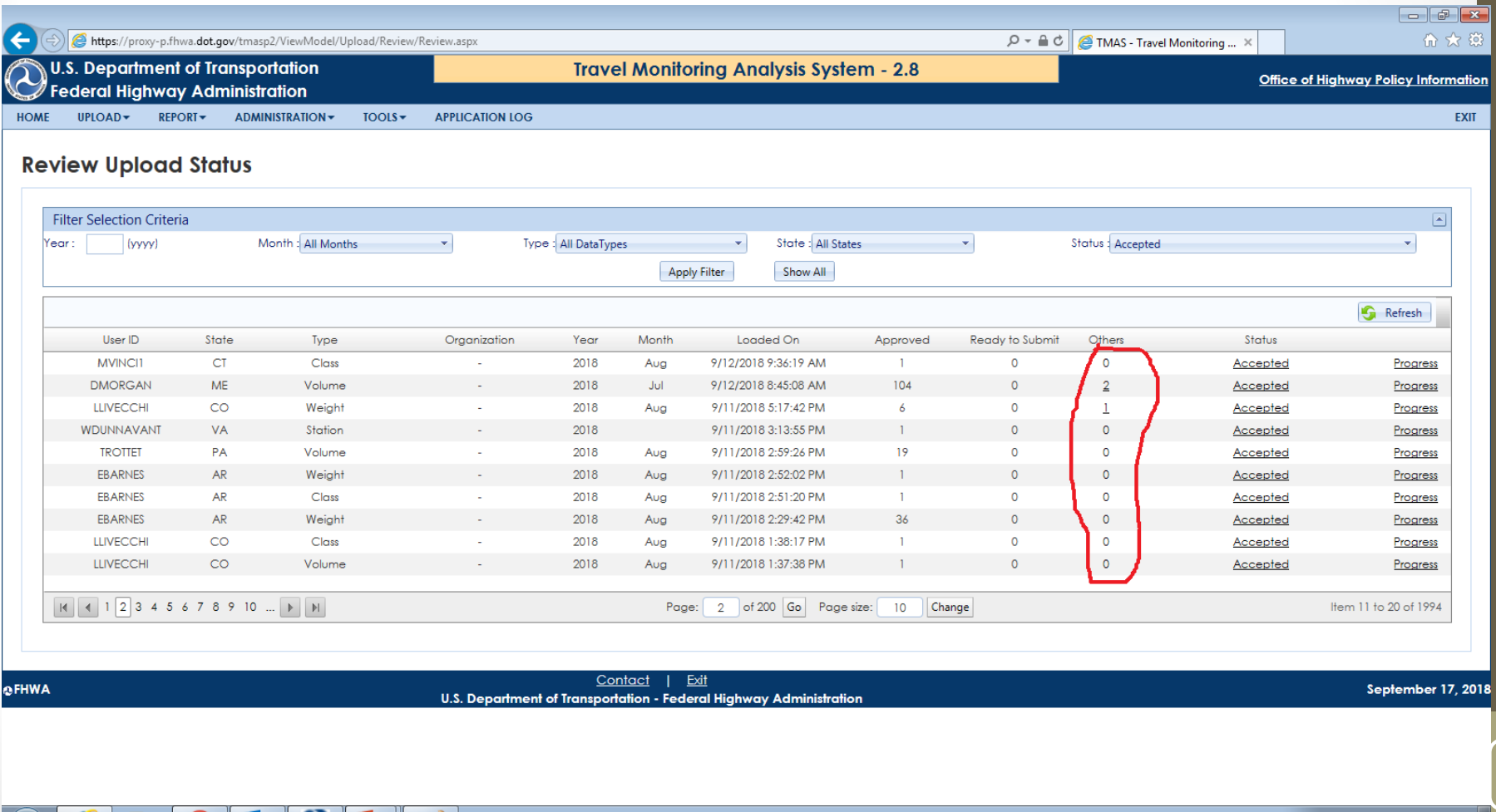
- Most of you have submitted perfect volume data. The class data have fewer critical errors than before. Thank You!
- The majority of you are able to submit your data one month after the closing of previous month. Thank You!
- Critical errors are still in existence.

My Focus

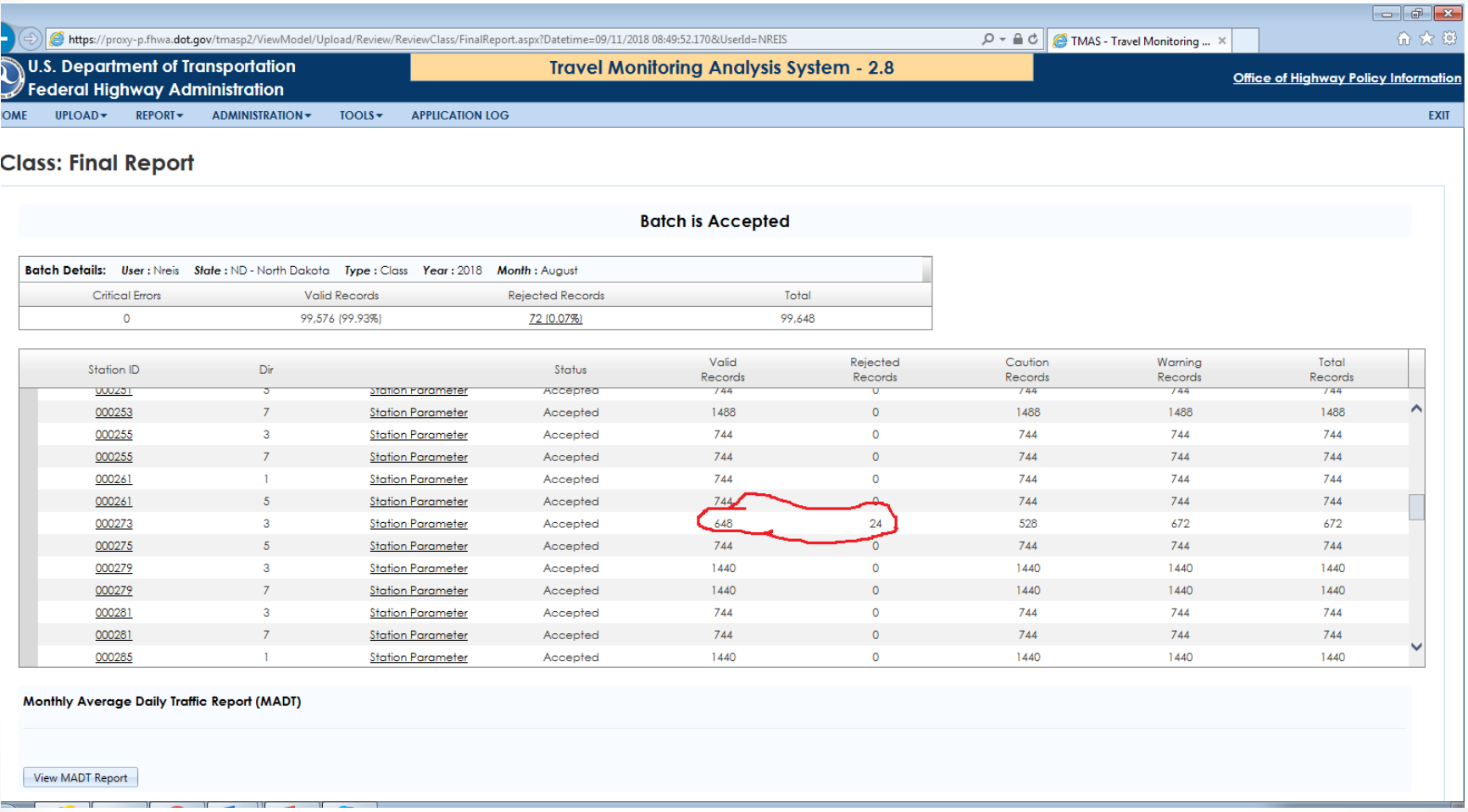
- To support you in any shape or format you desire
- To process your data in a timely manner and provide you quick feedback on issues encountered.
- To work with you to prevent critical errors to occur
- To utilize your data to the maximum possible

My Observations on Rejected Data

Example of rejected stations



Example of rejected lanes



Top 10 TMAS Issues and Solutions

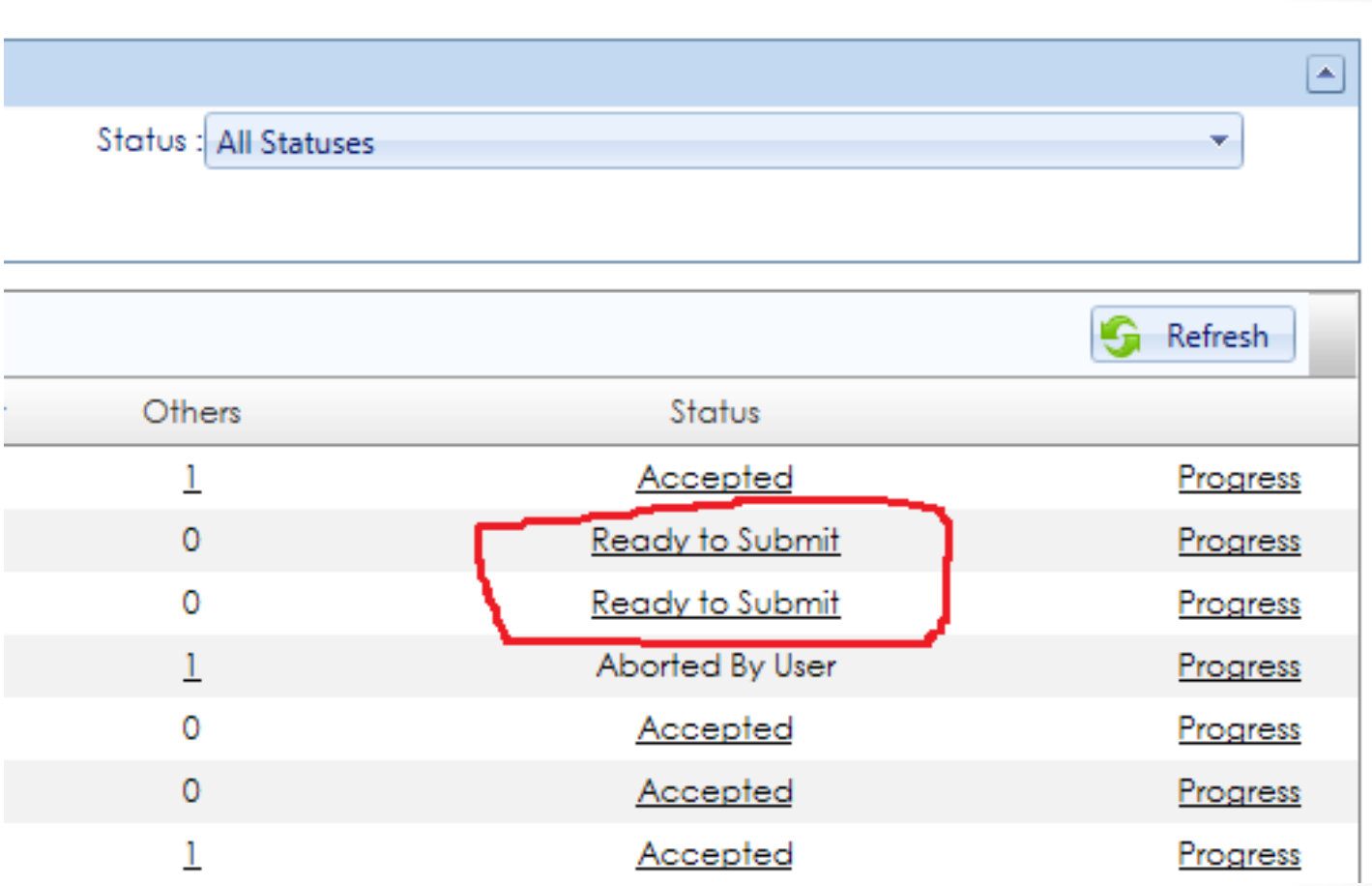
#10

A: Data are uploaded, ready to be reviewed, but never got reviewed and submitted.

B: Data preparers may have encountered certain issue, made no progress to resolve it. Data are just “sitting” there.

Solutions

- Finish the review and submit
- Contact me


Status : All Statuses
Refresh
Others
Status
1
Accepted
Progress
0
Ready to Submit
Progress
0
Ready to Submit
Progress
1
Aborted By User
Progress
0
Accepted
Progress
0
Accepted
Progress
1
Accepted
Progress

#9

Multiple Volume or Class data for the same lane

Solutions

Check lane assignment to determine -

A: wrong lane assignment, or

B: Duplicate data, or

C: Others

Batch is Accepted

	Total
	30,315

Valid Records	Rejected Records	Caution Records	Warning Records	Total Records
180	0	0	0	180
270	0	0	0	270
240	0	0	0	240
174	29	19	0	203
174	0	0	0	174
120	0	0	0	120
180	144	3	0	324
162	0	54	0	162
120	0	0	0	120
120	0	0	0	120
120	0	0	0	120
120	0	36	0	120
114	0	0	0	114

ntact | Exit

#8

Lane and/or direction information in **Station** data do not match lane/direction information in **Volume or Class** data

Solutions

- Lane & direction data are critical data items
- Lane & direction data are part of primary keys
- Check out your Station data. Most likely it is station data error
- FHWA: We may drop direction and lane from primary keys

n : 400010

Summary Report for Station

Total Records	Valid Records	Fatal Records	Critica
240	0	0	

Caution Flags

Error ID	Error Desc
V-200 : Critical Errors	
V-240	Station does not exists in NDB that match the same key fields

Close

#7

Apparent power supply issue to monitoring equipment. Equipment collects data only during day light.

Solution

Maintain the equipment, review the raw data, and review MADT report

	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH
5	0	0	0	0	0	0	0	0	0	34	78	97	156	128	83	108	107	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	9	61	52	58	58	34	18	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	36	71	112	118	144	159	148	160	74	0	0	0	0	0	0	0
1	0	0	0	0	0	0	0	0	36	70	95	95	137	149	140	138	81	11	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	58	107	118	142	154	148	134	169	123	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	2	19	37	82	150	132	75	22	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	37	53	32	37	41	64	79	87	54	15	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	41	58	98	134	144	185	160	188	106	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	56	79	117	156	193	188	207	212	92	59	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	19	103	128	167	158	120	8	24	0	0	0	0	0	0	0
1	0	0	0	0	0	0	0	0	25	76	79	97	120	121	113	124	56	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	13	53	132	187	129	150	192	109	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	127	156	145	139	150	166	164	200	218	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	114	118	144	159	177	157	185	240	128	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	171	158	128	145	169	191	165	197	235	32	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0	18	162	93	171	164	34	0	0	0	0	0	0	0
1	0	0	0	0	0	0	0	0	0	1	77	85	119	109	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	145	148	114	149	157	186	173	196	171	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	149	132	144	119	173	196	156	200	221	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	154	135	127	122	165	165	164	186	200	100	30	0	0	0	0	0
4	0	0	0	0	0	0	0	0	36	107	91	122	158	142	165	143	104	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	99	108	115	94	134	136	148	150	95	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	41	69	110	115	166	181	188	154	173	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	65	72	103	109	105	131	110	135	33	0	0	0	0	0	0
1	0	0	0	0	0	0	0	0	2	13	52	72	83	70	0	38	22	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	22	73	63	56	31	5	15	19	15	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	34	86	104	92	128	137	96	34	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	52	76	109	103	52	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	19	51	75	105	91	77	90	96	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	4	55	38	52	60	31	19	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	29	48	75	85	103	134	125	134	61	0	0	0	0	0	0	0
1	0	0	0	0	0	0	0	0	19	35	52	76	96	131	127	110	83	7	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	43	68	86	123	121	125	124	101	98	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	9	29	34	79	161	132	49	18	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	31	45	47	44	69	82	98	87	72	15	0	0	0	0	0	0

#6

Monitoring devices are out of order generating “0” entry patterns.

(0 is valid entry. But certain 0 pattern is not valid)

Solutions

- Maintenance is needed and perform it in a timely manner
- Pay attention to “blank” entries – equipment is out of order

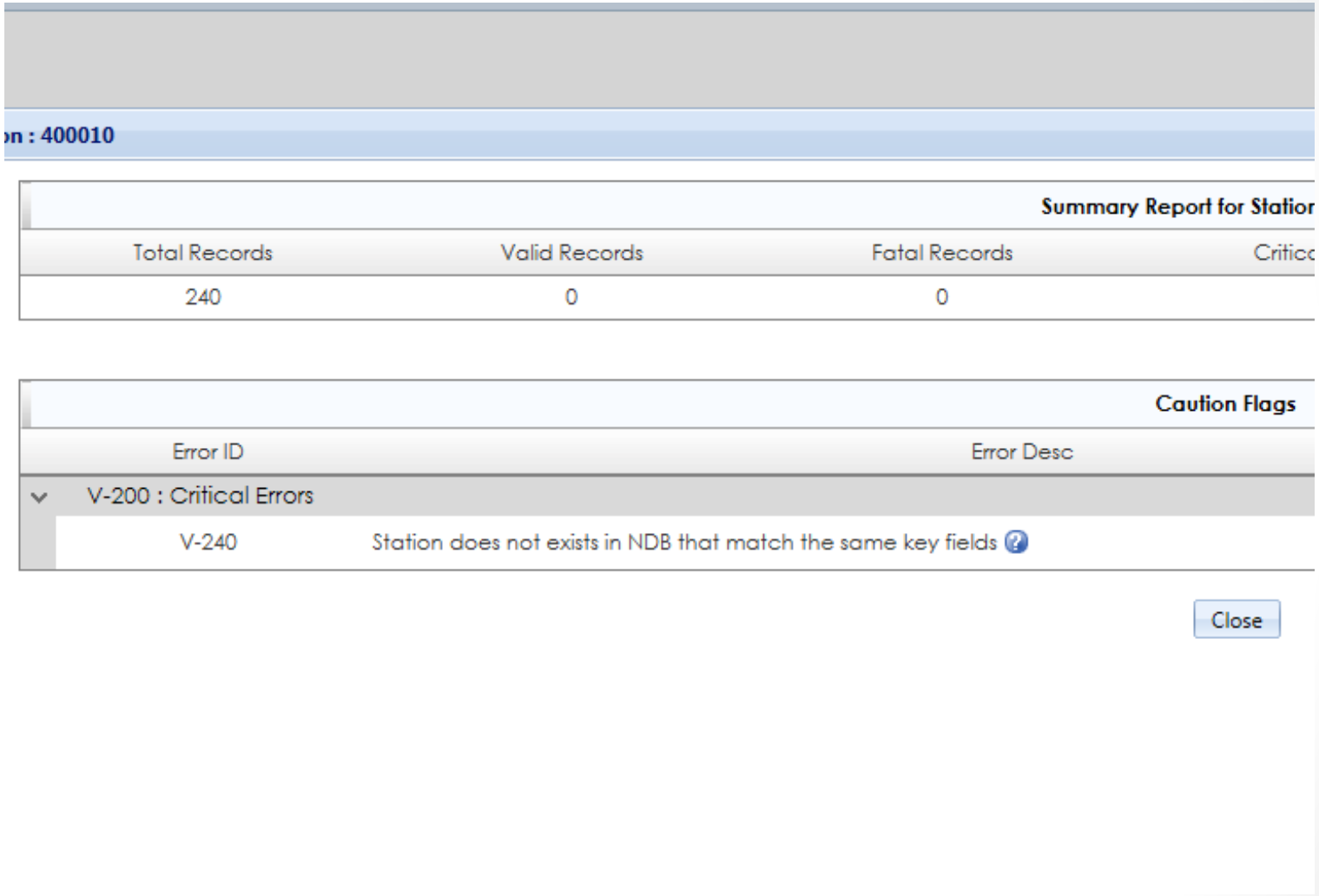
K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH
3	2	1	0	4	11	5	12	10	37	40	49	58	46	55	39	21	19	17	27	13	7	3	2
1	1	1	3	2	5	12	20	27	30	31	59	47	60	62	104	93	66	29	18	11	8	5	3
1	3	2	2	7	7	22	35	43	56	89	83	82	113	239	368	395	239	78	15	12	6	4	35
24	35	22	9	15	11	0	39	70	98	136	188	183	170	164	206	167	201	120	85	71	49	50	36
44	19	12	13	12	41	41	80	117	161	134	150	125	129	100	127	91	58	31	13	7	4	5	7
0	3	0	0	2	4	20	21	27	40	40	49	52	56	76	94	91	52	26	16	12	8	4	5
2	0	2	2	5	7	11	17	31	35	45	76	73	54	99	74	63	48	26	8	13	8	4	2
2	1	3	0	7	8	5	14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	38	49	53	49	66	83	94	46	7	2	5	2	5	0
0	0	0	0	0	0	0	0	0	13	0	0	0	19	51	94	100	68	35	14	4	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	7
4	1	2	0	0	0	0	0	0	12	35	1	0	9	19	34	33	32	17	12	8	4	8	6
3	0	0	1	1	2	9	6	23	23	31	62	46	56	48	52	36	32	22	11	16	5	4	1
1	0	0	1	6	9	13	19	24	35	39	37	30	58	61	82	120	66	36	10	7	0	4	2
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	29	41	36	46	61	75	93	132	75	36	18	15	4	6	9
12	4	2	2	4	6	4	5	14	17	33	37	26	36	30	37	38	27	18	11	8	3	4	1
4	0	2	5	15	50	29	32	22	19	37	34	32	42	31	44	33	29	14	11	8	4	6	3
0	1	2	4	10	65	27	35	74	35	30	36	33	36	35	44	43	23	22	11	9	5	6	2
2	2	4	4	20	56	37	34	33	29	42	37	43	35	32	37	29	31	16	14	9	5	3	2
3	2	1	3	17	41	38	29	38	31	31	45	46	43	35	39	37	32	28	20	9	9	5	11
1	2	0	8	20	17	9	15	34	31	40	45	55	52	51	48	48	24	25	17	6	12	10	6
9	2	0	3	14	8	16	12	18	36	48	56	40	53	38	35	35	17	4	15	6	5	4	3
0	1	3	2	12	71	123	51	30	21	40	37	39	47	26	44	35	21	15	8	5	2	2	3
0	0	1	3	19	67	51	37	38	41	33	40	33	33	41	40	33	26	25	11	5	4	11	4
1	1	0	4	22	61	54	43	33	41	29	54	39	40	38	44	34	28	24	15	21	6	4	4
1	3	1	6	25	64	38	55	45	34	34	44	45	38	33	40	28	27	16	9	16	9	3	5
3	0	1	2	23	55	45	34	35	32	29	41	34	41	51	45	38	24	19	17	10	13	7	12
3	1	2	2	15	11	11	15	29	30	47	36	42	52	49	42	49	27	16	20	15	4	7	8
5	4	2	1	18	8	9	10	17	29	42	59	40	55	33	36	28	21	8	16	6	11	6	4

#5

Station data are missing

Solutions

- Develop appropriate station data according to the TMG format
- Remember – all TMAS data must have its corresponding station data
- When you have a new station, make sure you add it to the station file.
- Call for assistance as needed

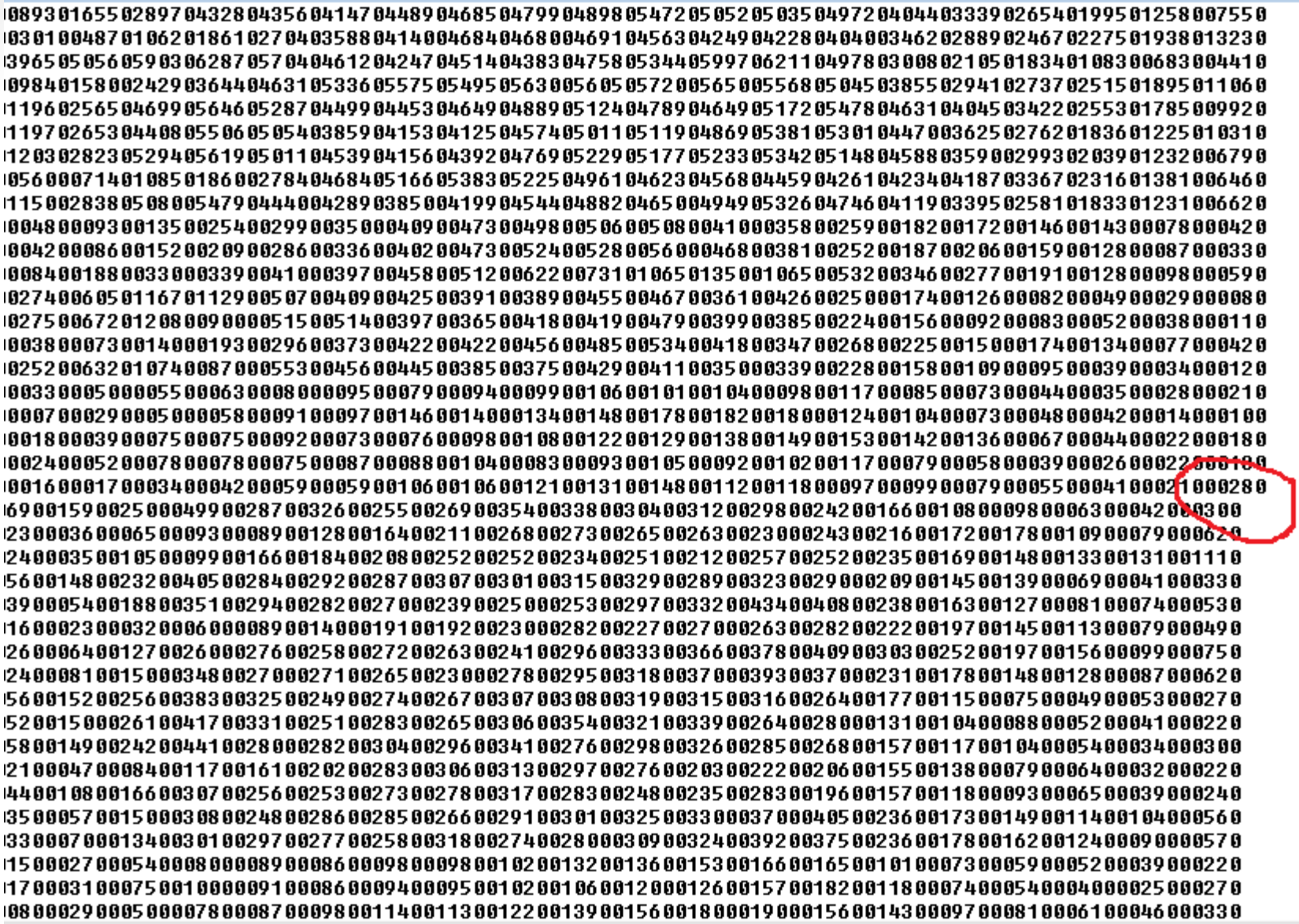

on : 400010
Summary Report for Statior
Total Records
Valid Records
Fatal Records
Critic
240
0
0
Caution Flags
Error ID
Error Desc
V-200 : Critical Errors
V-240
Station does not exists in NDB that match the same key fields
Close

#4

- Volume or class data have rigid column formats.
- If a variable is misaligned, all data are wrong.

Solutions

- Identify which data items are misaligned, missed, or entered into the wrong column.
- You can use Excel to verify it through the delimited function.



Data Issue #3

- # for vehicle classes in **Class** Data do not match class information in **Station** data
- Source of the “invalid total” error

Solutions

- Make sure the # of class in **Class** data matches class in **Station** data
- FHWA – assessing new method to read all class data regardless Station vehicle class data

Batch is Accepted

Total
285,695

Valid Records	Rejected Records	Caution Records
1454	34	1454
2901	75	2901
2946	30	2946
1487	1	1391
1470	18	1470
728	760	704
724	764	628

Total Records	Valid Records
1488	728

Direction	Error ID	
C-200 : Critical Errors		
3	C-230	Invalid Total
C-300 : Quality Control Check		

#2

Data elimination – overreaching in data quality control. Significant amount of volume and class data are removed for part of a month.

Solutions

- Data quality control is good.
- However, be extremely cautions in deleting data
- TMAS has some good built in logic for data quality control
- Submit your data unless you know is truly wrong.

#1

- Roadway function class data are wrong with both Station and Volume Data
- Station ID changes

Solutions

- Make sure you assign FC correctly
- Try your best to maintain a stable Station naming convention
- Do not change your station ID, period!

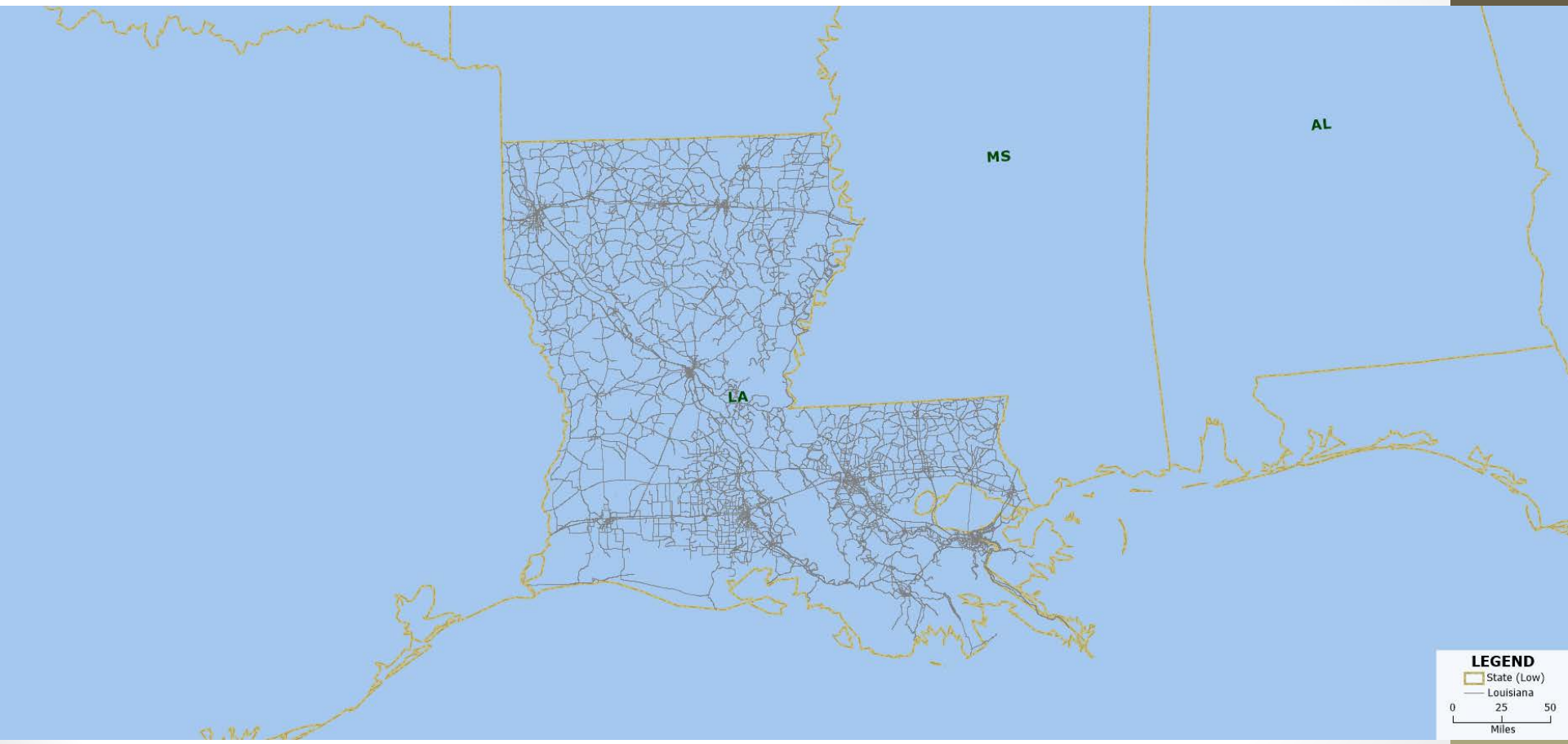
MADT Report

Jul	3U	000048	3	5349	8311	8449	7477	8576	8502	6076	7518	8263	5713 -
Jul	3U	000048	7	5160	8083	8267	7422	8241	8423	6122	7367	8087	5641 -
Jul	4R	000057	1	2226	2824	2812	2790	0	0	2557	2596	2809	2392 -
Jul	4R	000057	5	1599	2045	1982	1888	0	0	1718	1840	1972	1659 -
Jul	5R	000061	1	539	692	700	656	721	742	596	668	702	568 -
Jul	5R	000061	5	531	705	692	661	702	723	558	658	697	545 -
Jul	6R	000063	3	28579	33117	33448	30591	35406	39207	31526	32847	34354	30053 -
Jul	6R	000063	7	31887	33723	32176	29435	34090	36674	30355	32547	33220	31121 -
Jul	6R	000065	3	19328	23440	23109	21724	24452	27572	22678	22960	24059	21003 -
Jul	6R	000065	7	21759	24249	24530	22103	25085	27015	23925	23974	24596	22842 -
Jul	6R	000079	3	40005	52005	51139	47179	52258	52781	43082	48290	51074	41544 -
Jul	6R	000079	7	37383	50605	52058	48233	54422	55558	44411	48733	52175	40897 -
Jul	6R	000084	3	33065	33726	32900	32053	34058	35792	34500	33679	33708	33783 -
Jul	6R	000084	7	39330	35648	33880	32800	36232	39176	37268	36351	35547	38299 -

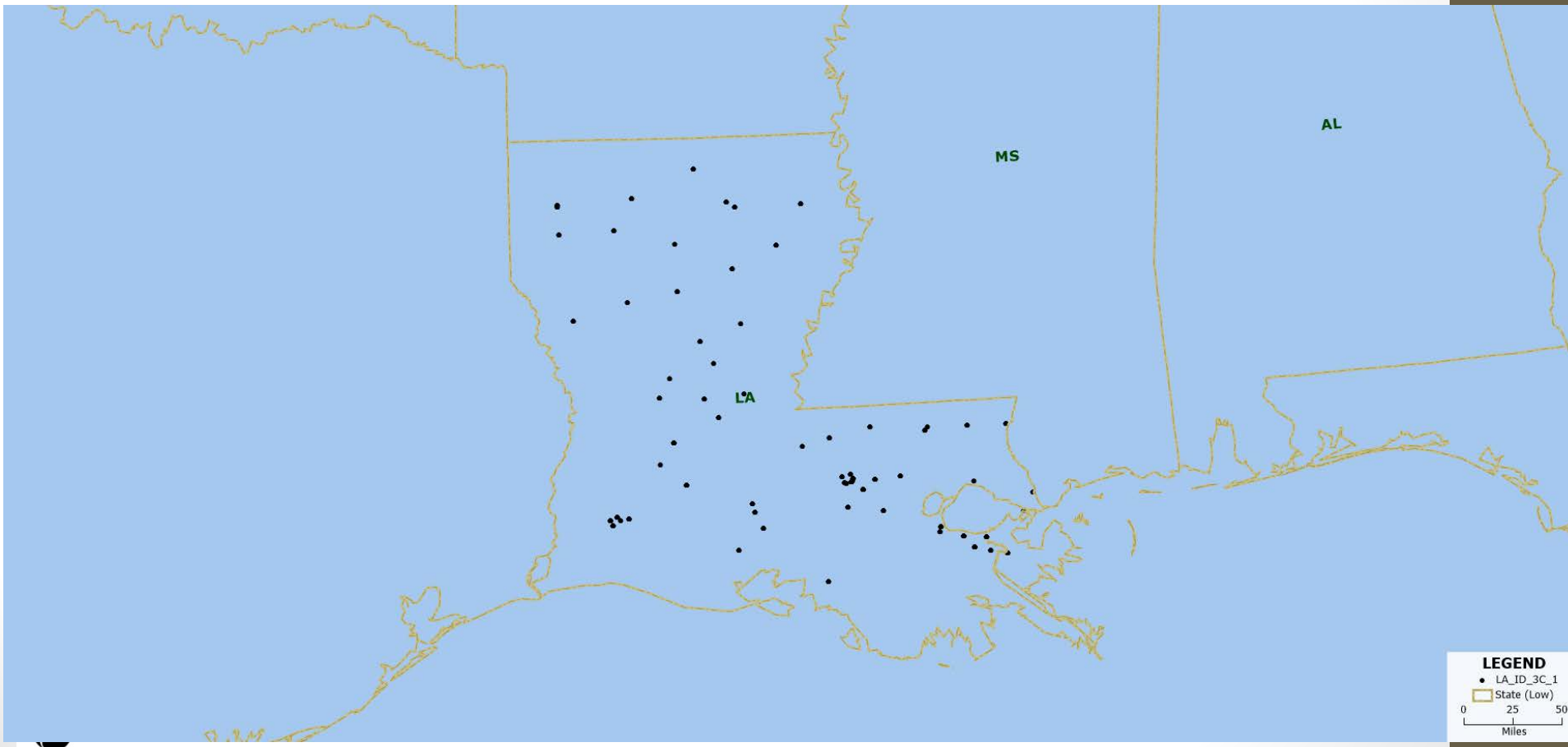
A Technical Illustration on How to Bring HPMS Data to TMAS Data for Data Quality Review and Control

U.S. Department of Transportation
Federal Highway Administration
Office of Highway Policy Information

2017 LA HPMS Data

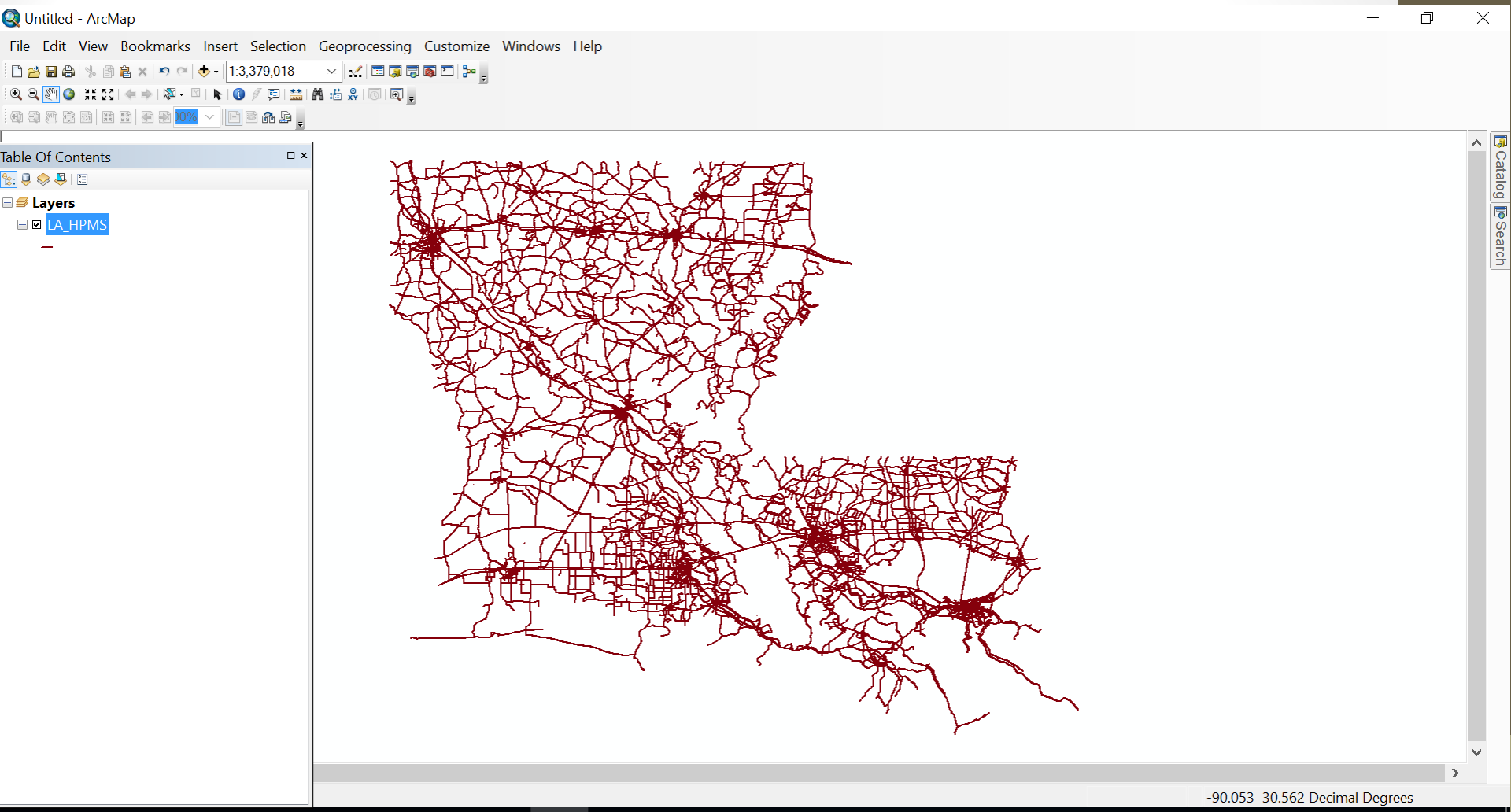


2017 LA TMAS Station

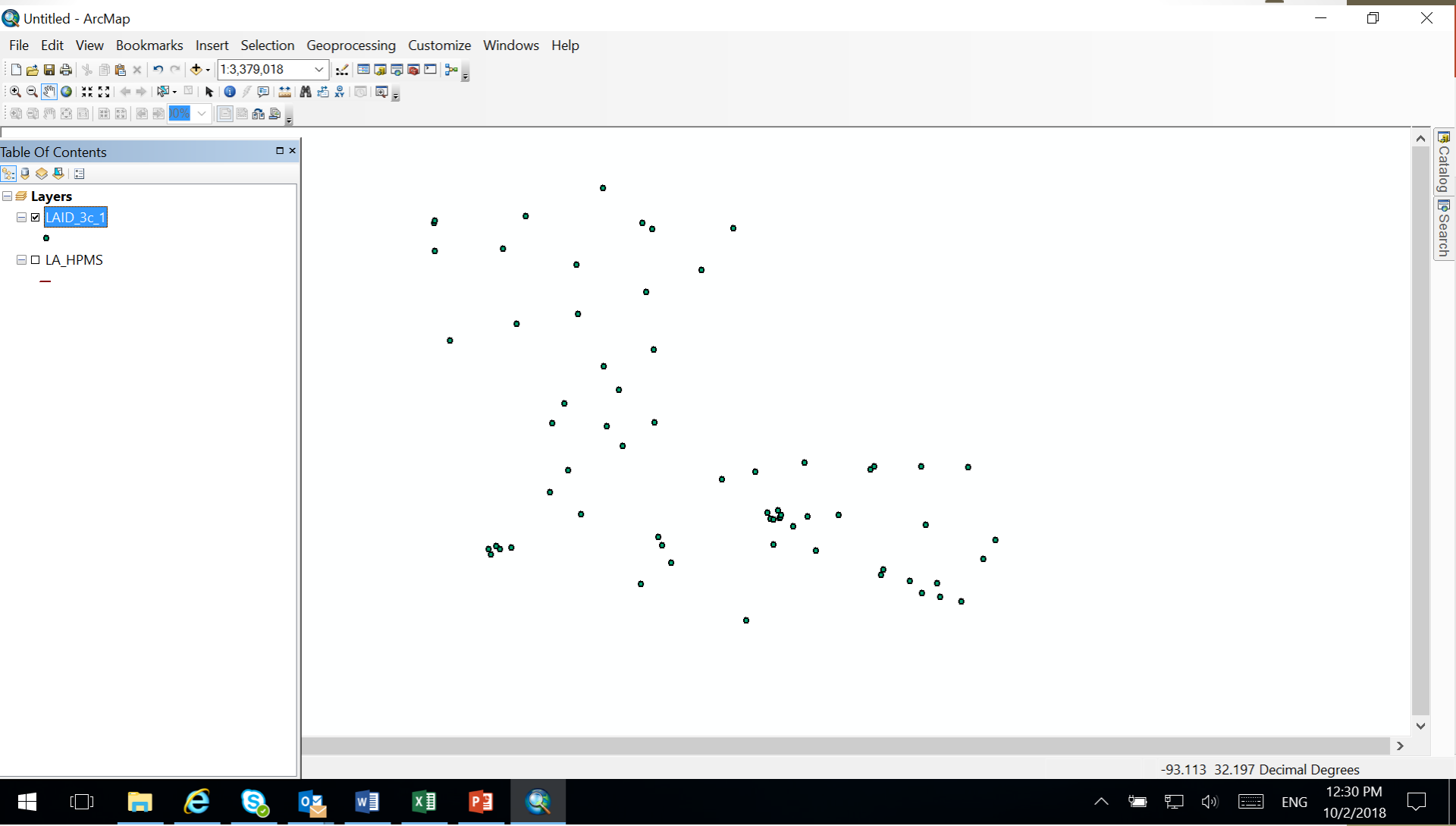


U.S. Department of Transportation
Federal Highway Administration
Office of Highway Policy Information

Add HPSM shape files into ArcMap

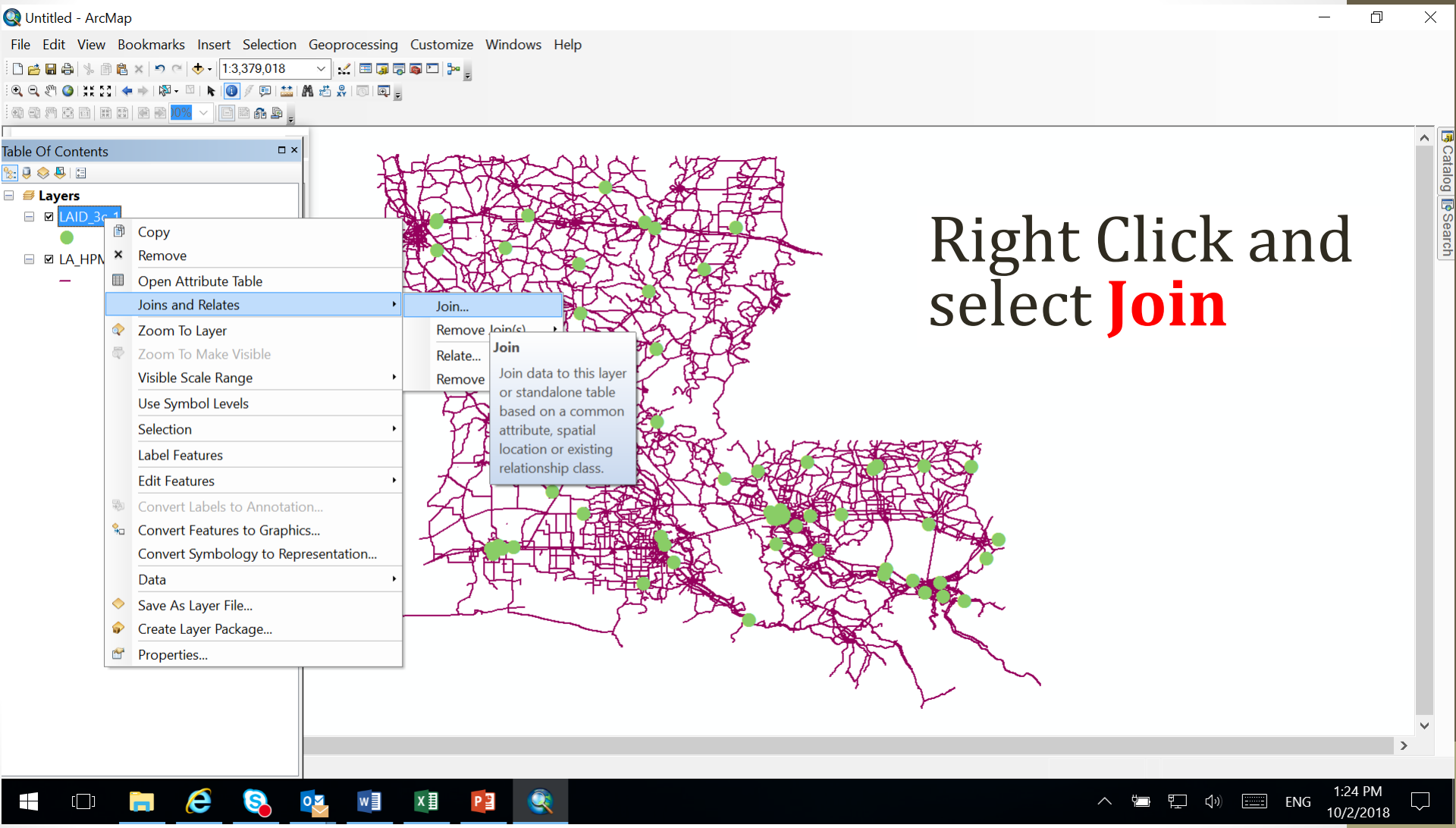


Add TMAS station file into ArcMap

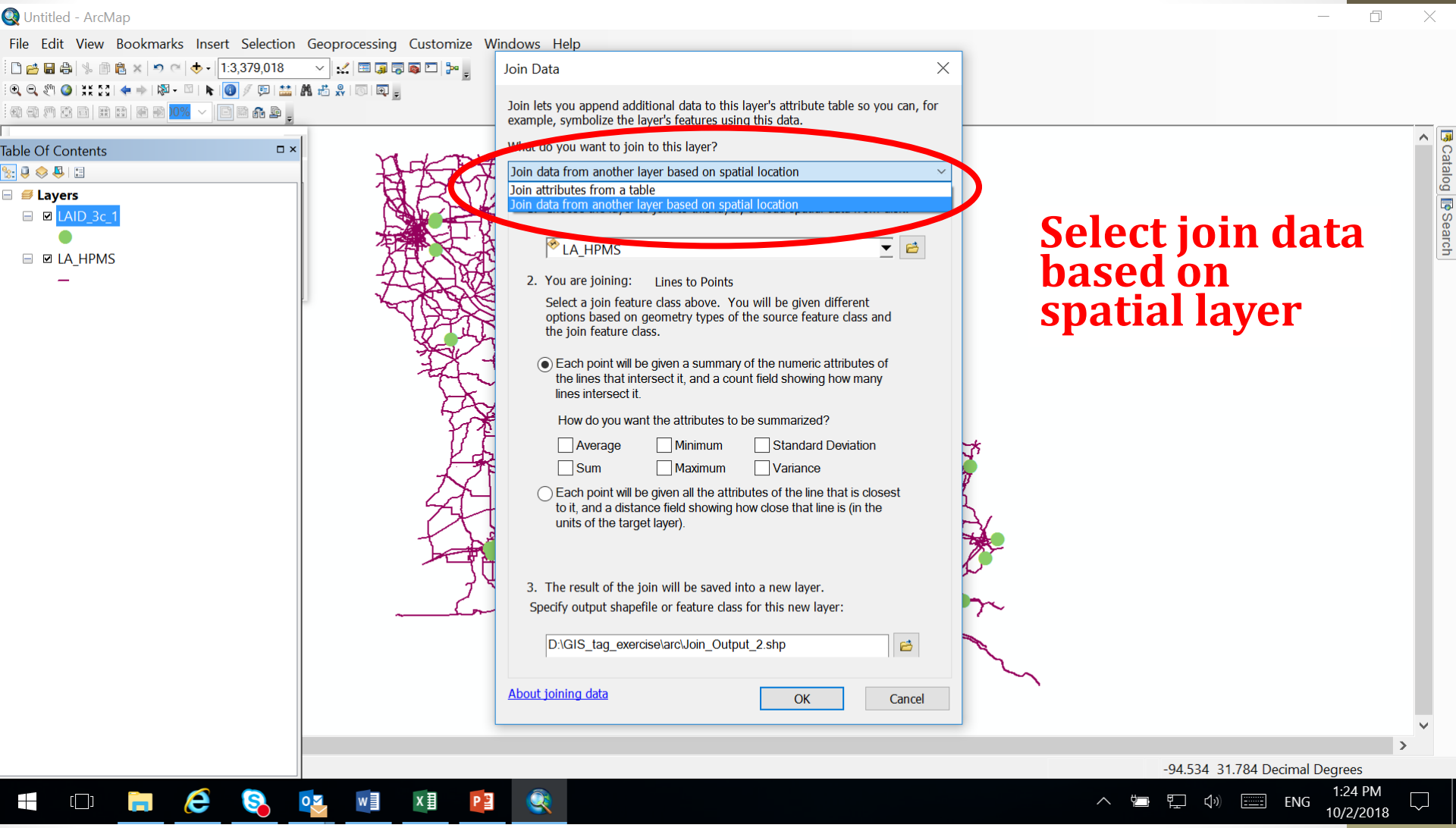


U.S. Department of Transportation
Federal Highway Administration
Office of Highway Policy Information

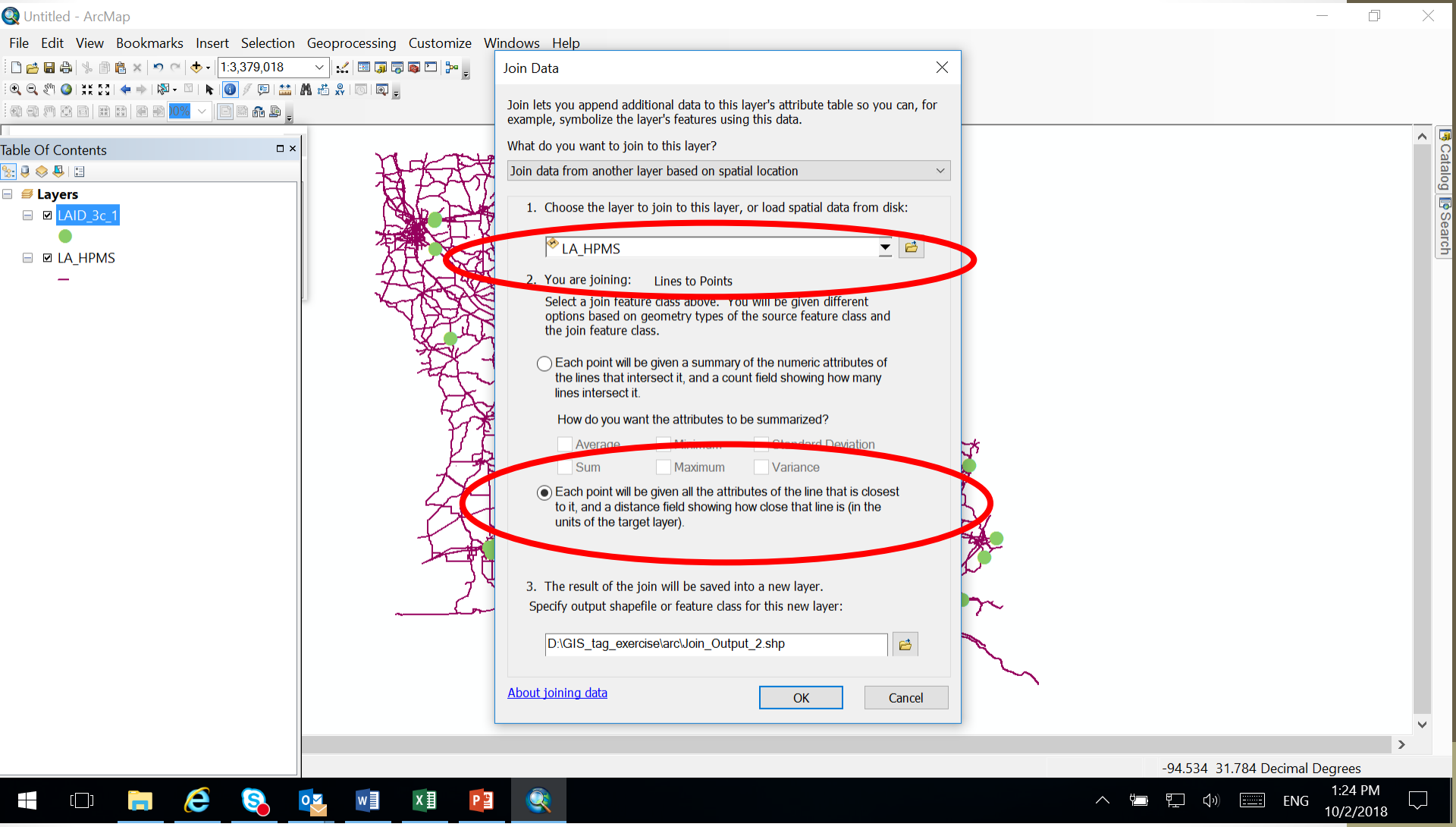
JOIN both data sets

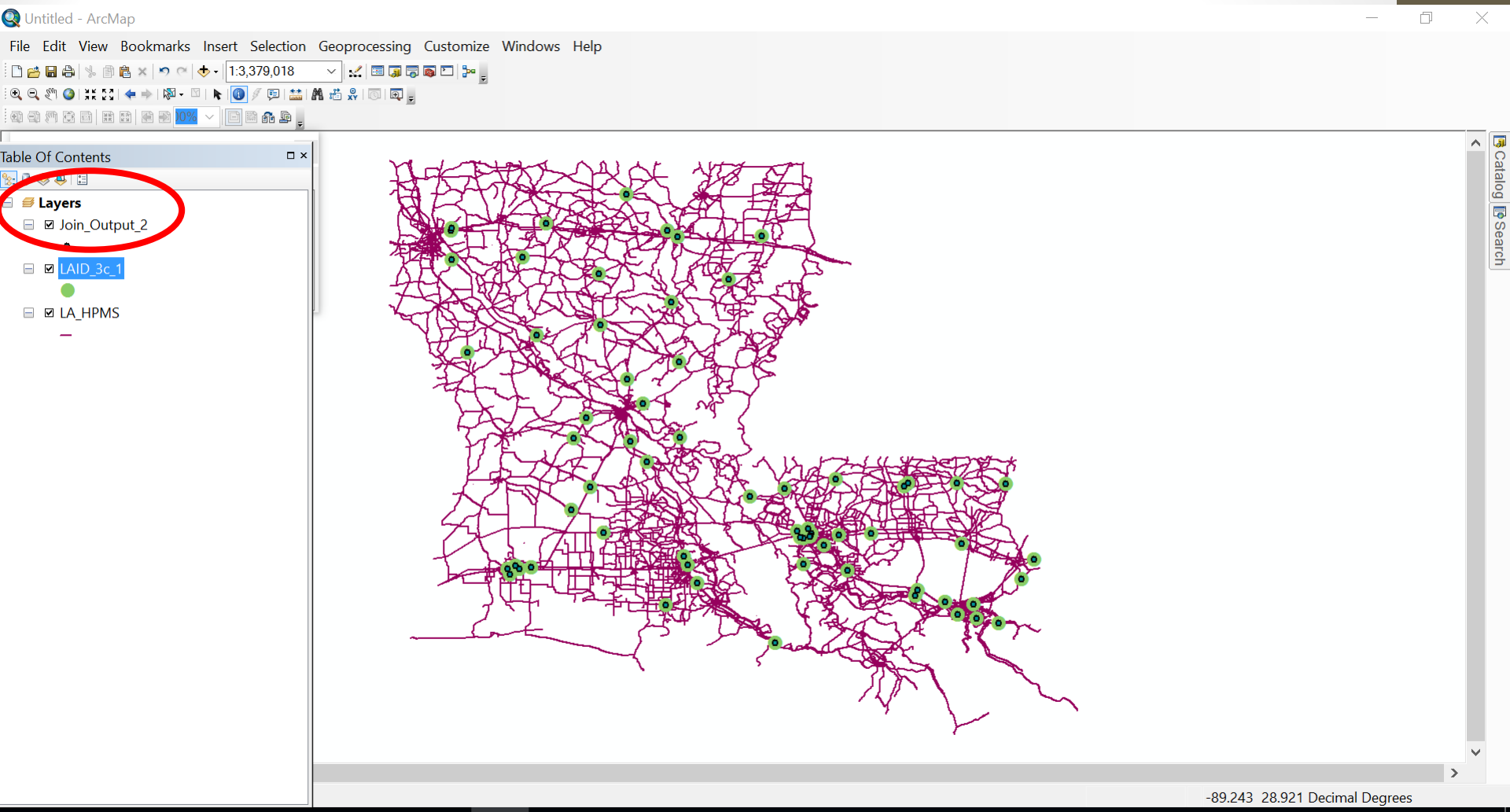


Select join data based on spatial layer

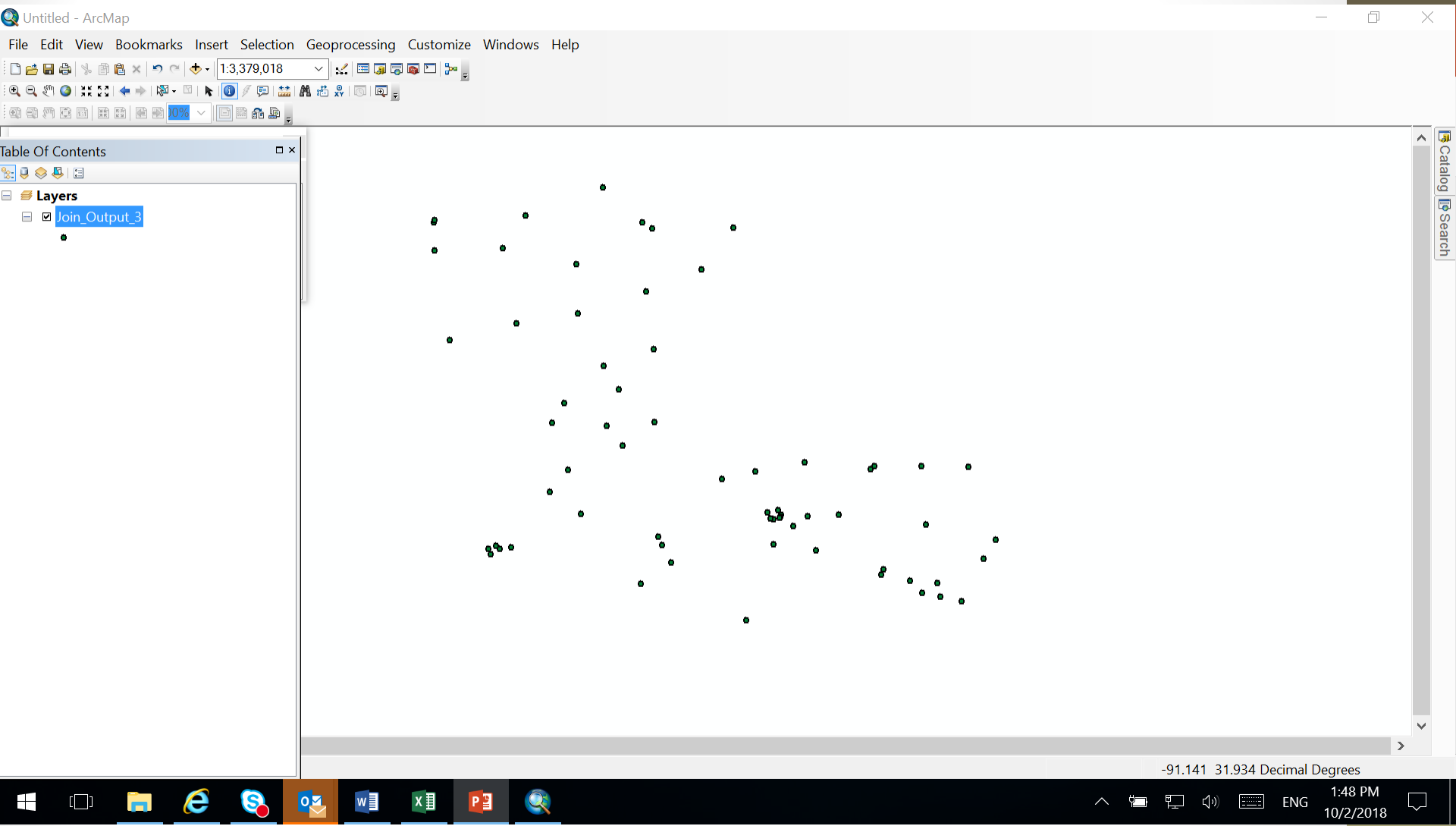


Select join data based on spatial layer


Untitled - ArcMap
File Edit View Bookmarks Insert Selection Geoprocessing Customize Windows Help
1:3,379,018
Table Of Contents
Layers
LAID_3c_1
LA_HPMS
Join Data
Join lets you append additional data to this layer's attribute table so you can, for example, symbolize the layer's features using this data.
What do you want to join to this layer?
Join data from another layer based on spatial location
1. Choose the layer to join to this layer, or load spatial data from disk:
LA_HPMS
2. You are joining: Lines to Points
Select a join feature class above. You will be given different options based on geometry types of the source feature class and the join feature class.
Each point will be given a summary of the numeric attributes of the lines that intersect it, and a count field showing how many lines intersect it.
How do you want the attributes to be summarized?
Average
Sum
Maximum
Variance
Each point will be given all the attributes of the line that is closest to it, and a distance field showing how close that line is (in the units of the target layer).
3. The result of the join will be saved into a new layer.
Specify output shapefile or feature class for this new layer:
D:\GIS_tag_exercise\arc\Join_Output_2.shp
About joining data
OK
Cancel
Catalog
Search
-94.534 31.784 Decimal Degrees
ENG
1:24 PM
10/2/2018



U.S. Department of Transportation
Federal Highway Administration
Office of Highway Policy Information


Untitled - ArcMap
File Edit View Bookmarks Insert Selection Geoprocessing Customize Windows Help
1:3,379,018
Table Of Contents
Layers
Join_Output_3
Catalog
Search
-91.141 31.934 Decimal Degrees
ENG
1:48 PM
10/2/2018

All HPMS data from the closest segments are transferred

Table

Join_Output_2

FID	Shape	LA_HPMS_FID	ID	NEW_FUNCAT	FID_2	LA_HPMS_ID	MEASURE	YEAR_RECOR	STATE_CODE	ROUTE_ID	BEGIN_POIN	END_POINT	ROUTE_NUMB	ROUTE_NAME	ROUTE_QUAL	ROUTE_SIGN	F_SYSTEM
0	Point	242	139	3	1167	1189	7.9	2016	22	022-05-1-010	7.9	8	84	84	1	3	3
1	Point	243	140	3	1167	1189	7.9	2016	22	022-05-1-010	7.9	8	84	84	1	3	3
2	Point	162	127	3	2839	2896	1.2	2016	22	007-04-1-010	1.2	1.3	61	61	1	3	3
3	Point	163	128	3	2839	2896	1.2	2016	22	007-04-1-010	1.2	1.3	61	61	1	3	3
4	Point	164	129	3	2839	2896	1.2	2016	22	007-04-1-010	1.2	1.3	61	61	1	3	3
5	Point	165	130	3	2839	2896	1.2	2016	22	007-04-1-010	1.2	1.3	61	61	1	3	3
6	Point	42	229	3	3054	3119	12.5	2016	22	014-04-1-010	12.5	12.6	165	165	1	3	3
7	Point	43	230	3	3054	3119	12.5	2016	22	014-04-1-010	12.5	12.6	165	165	1	3	3
8	Point	44	231	3	3054	3119	12.5	2016	22	014-04-1-010	12.5	12.6	165	165	1	3	3
9	Point	45	232	3	3054	3119	12.5	2016	22	014-04-1-010	12.5	12.6	165	165	1	3	3
10	Point															3	3
11	Point															3	3
12	Point															3	3
13	Point															3	3
14	Point	1														4	4
15	Point	1														4	4
16	Point															0	5
17	Point															0	5
18	Point	84	77	6	10472	10874	8.7	2016	22	090-04-1-010	8.7	11.615	0		0	0	6
19	Point	85	78	6	10472	10874	8.7	2016	22	090-04-1-010	8.7	11.615	0		0	0	6
20	Point	86	79	6	10472	10874	8.7	2016	22	090-04-1-010	8.7	11.615	0		0	0	6
21	Point	87	80	6	10472	10874	8.7	2016	22	090-04-1-010	8.7	11.615	0		0	0	6
22	Point	174	115	1	12755	13284	1.2	2016	22	450-15-1-010	1.2	1.3	10	10	1	2	1
23	Point	175	116	1	12755	13284	1.2	2016	22	450-15-1-010	1.2	1.3	10	10	1	2	1
24	Point	176	117	1	12755	13284	1.2	2016	22	450-15-1-010	1.2	1.3	10	10	1	2	1
25	Point	177	118	1	12755	13284	1.2	2016	22	450-15-1-010	1.2	1.3	10	10	1	2	1
26	Point	178	119	1	12755	13284	1.2	2016	22	450-15-1-010	1.2	1.3	10	10	1	2	1
27	Point	179	120	1	12755	13284	1.2	2016	22	450-15-1-010	1.2	1.3	10	10	1	2	1
28	Point	180	121	1	12755	13284	1.2	2016	22	450-15-1-010	1.2	1.3	10	10	1	2	1
29	Point	181	122	1	12755	13284	1.2	2016	22	450-15-1-010	1.2	1.3	10	10	1	2	1
30	Point	182	123	1	12755	13284	1.2	2016	22	450-15-1-010	1.2	1.3	10	10	1	2	1
31	Point	183	124	1	12755	13284	1.2	2016	22	450-15-1-010	1.2	1.3	10	10	1	2	1
32	Point	184	125	1	12755	13284	1.2	2016	22	450-15-1-010	1.2	1.3	10	10	1	2	1
33	Point	185	126	1	12755	13284	1.2	2016	22	450-15-1-010	1.2	1.3	10	10	1	2	1
34	Point	166	213	1	13132	13682	12.5	2016	22	450-13-1-010	12.504	12.6	10	10	1	2	1
35	Point	167	214	1	13132	13682	12.5	2016	22	450-13-1-010	12.504	12.6	10	10	1	2	1
36	Point	168	215	1	13132	13682	12.5	2016	22	450-13-1-010	12.504	12.6	10	10	1	2	1
37	Point	169	216	1	13132	13682	12.5	2016	22	450-13-1-010	12.504	12.6	10	10	1	2	1
38	Point	170	217	1	13132	13682	12.5	2016	22	450-13-1-010	12.504	12.6	10	10	1	2	1
39	Point	171	218	1	13132	13682	12.5	2016	22	450-13-1-010	12.504	12.6	10	10	1	2	1

All HPMS data items (segment closest to a station) are transferred to the TMAS station data file.

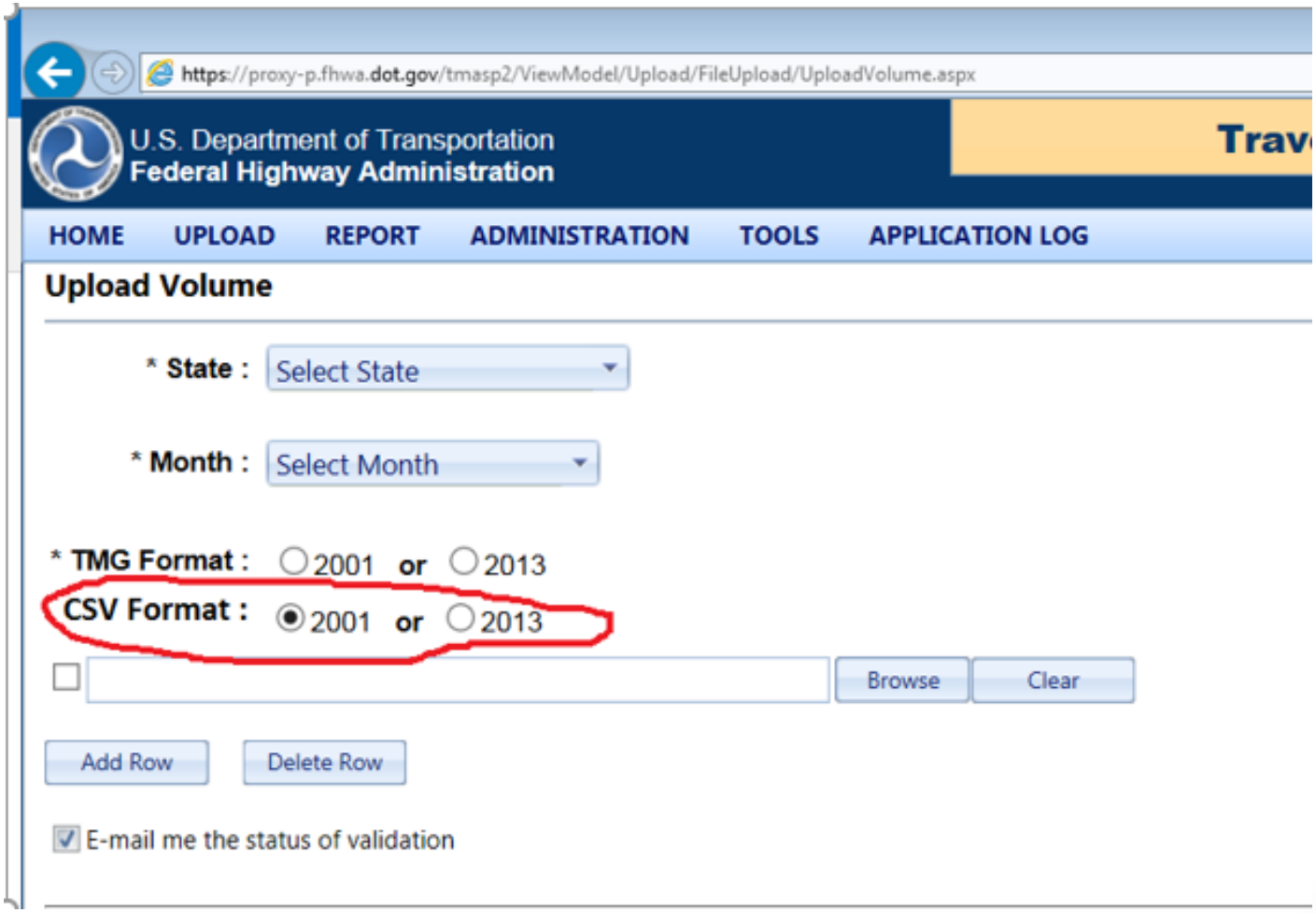
1 (0 out of 314 Selected)

Join_Output_2

Data review focus for the upcoming year

- GIS - Site location review & mapping
- Comprehensive - Function classes review comparing to HPMS
- Historical trends of MADT and AADT for the last 5 years
- Comprehensive site down time analysis
- Detect new issues

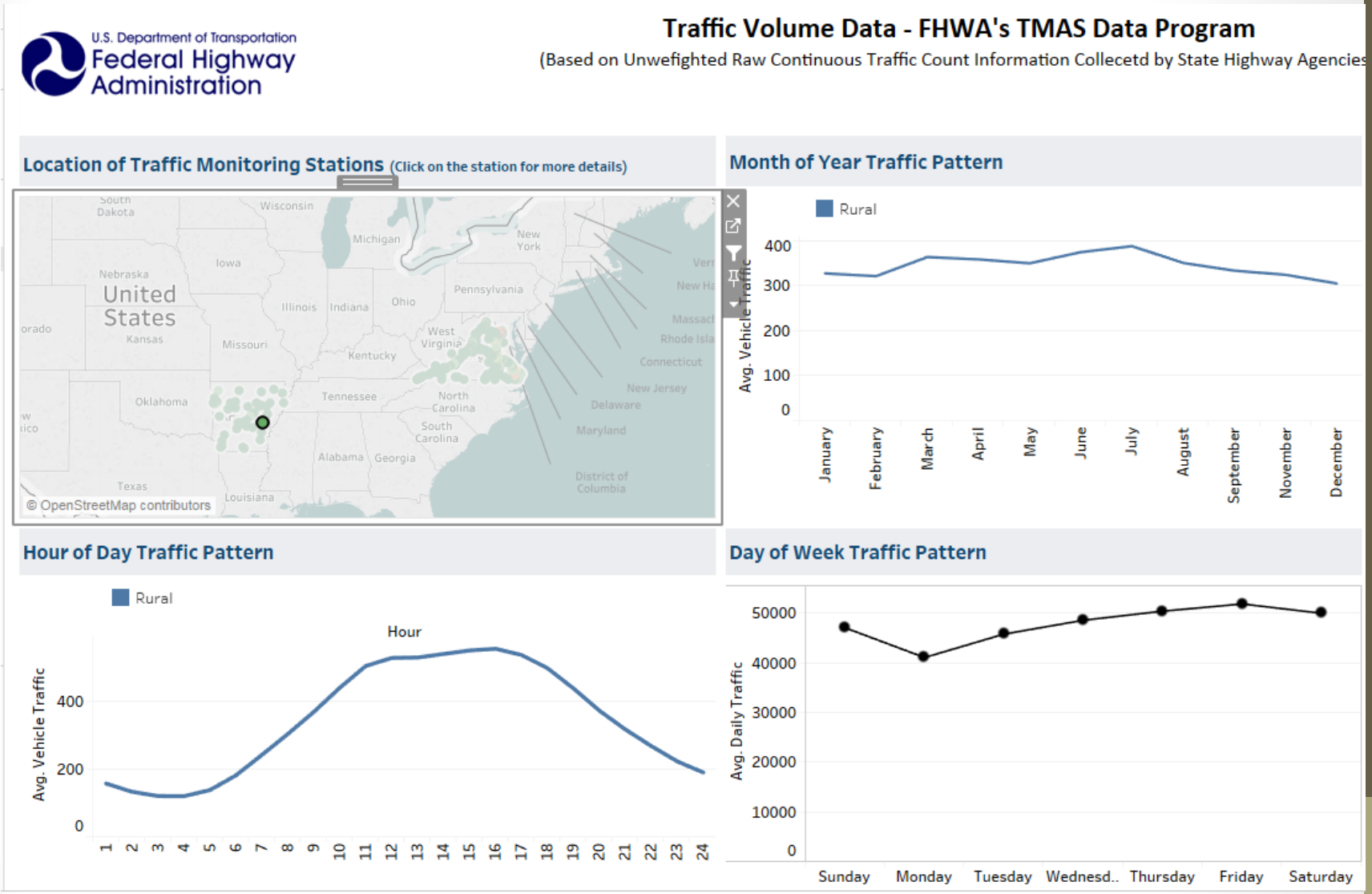
Software Improvements



Additional Improvements

- Simplify primary keys
- Defer # of vehicle class information to **Class** data
- Add email links to User ID on review page
- Retrieve a copy of data set with critical error for 6 months

Volume data dashboard



QUESTIONS?

Patrick Zhang, PE
1200 New Jersey Ave. SE
Washington DC 20590
202-366-1941
patrick.zhang@dot.gov