

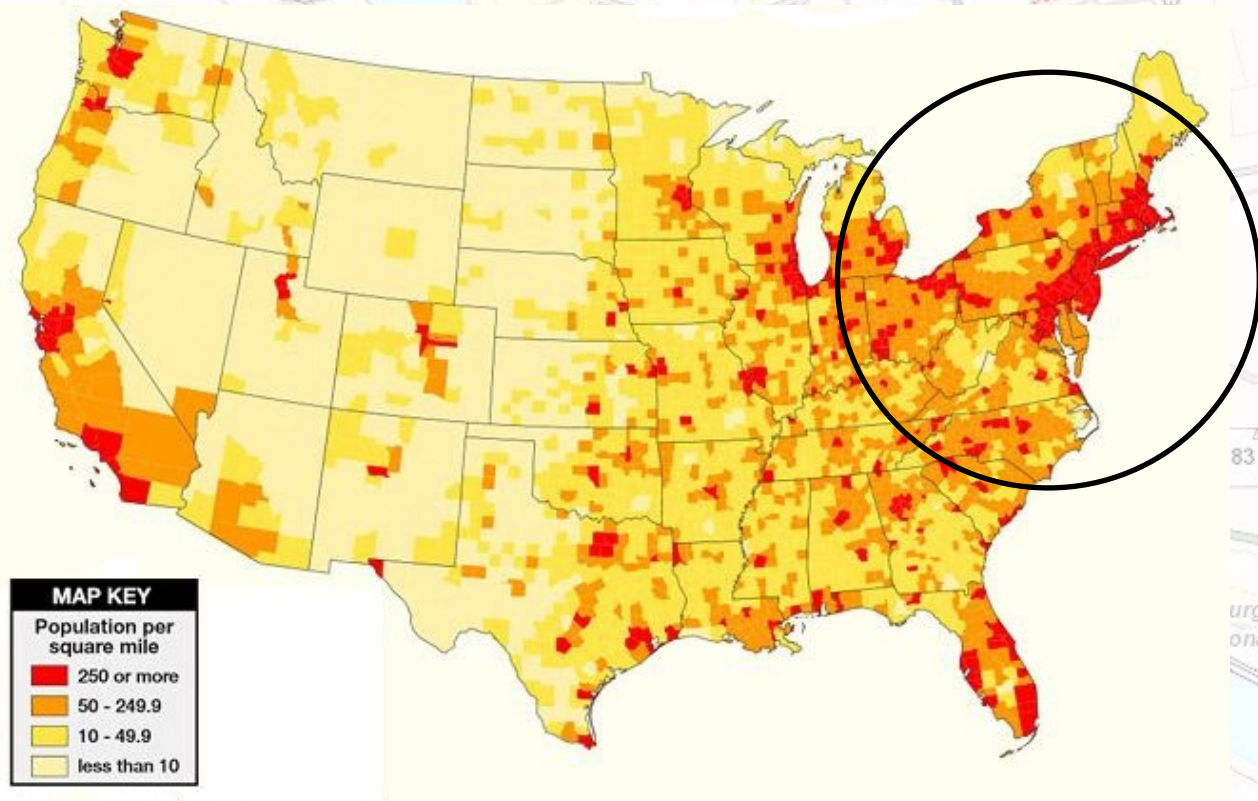
PennDOT's Traffic Data System

NATMEC 2016



▶ Did You Know...

- Central Pennsylvania is within less than a day's drive of 40 percent of the nations population.¹



1 – The Region's Most Expensive Commutes: Congested Corridors in the Harrisburg-York-Lancaster Area and Steps Needed to Relieve Traffic Congestion

Background

- PennDOT's Traffic Data System (TDS)
 - 101 permanent in-pavement locations (24/7/365)
 - Currently 4 different types of counters
 - 45,000 short term count locations
 - 270,000,000 records of data each month
 - Previous System
 - 9 disparate applications used to manage data
 - VB6 Desktop applications and several .NET Web applications
 - Difficult to maintain, several authors

TDS Solution

- Centralized Portal
- Streamlined Data
- Accessibility to Data
- Access to Changes



TDS Dashboard

TDS Dashboard



Add/Remove Widgets

Navigation

- Power Device File Manager
- Site Manager
- Enterprise Data Analysis System (EDAS)
- Statistical Analysis
- Traffic Monitoring System (TMS)
- Reports
- Utilities
- Traffic Volume Mapping
- Field Operations Manager (FOM)

Sites Processed

Counter Type	Mon 3/28	Tue 3/29	Wed 3/30	Thu 3/31	Fri 4/1	Sat 4/2	Sun 4/3	Average Run Time
Diamond (57)	57	57	55	55	28	29	30	9.98 min
iSINC (3)	3	3	3	3	3	3	3	23.9 min
iSINC Lite (7)	7	7	7	7	7	7	7	19.01 min
TRS (19)	19	18	17	18	18	18	18	17.04 min
Wavetronics (1)	1	1	1	1	1	1	1	4.53 min

Last Updated On: 4/4/2016 02:00 PM

File Processing

Processing (1) Queued (0) Status: Running Stop

Site	Processing Start Time	Data Start Time
826 / 401	4/4/2016 02:01PM	3/30/2016 04:00AM

Service Downtime: From 4pm until 12am.
Last Updated On: 4/4/2016 02:00 PM

Flag Processing Week At A Glance

User	Mon 3/28	Tue 3/29	Wed 3/30	Thu 3/31	Fri 4/1	Sat 4/2	Sun 4/3
brock	651/928	455/746	465/756	457/795	0/774	0/675	0/610
nraio	586/1143	507/952	465/867	537/943	0/840	0/702	0/698
ruthgraham	1295/1295	779/779	682/682	801/870	457/572	480/581	379/478
trotter	2230/2369	1569/1703	914/1899	924/1871	715/1172	560/749	333/826

Last Updated On: 4/4/2016 02:00 PM

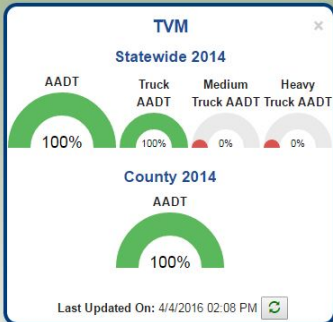
Message Board

Last Updated On: 4/4/2016 02:08 PM

TMS

Invalid Sites : 16
Limits Without Sites : 52
Multiple Sites Within a Limit : 37

Last Updated On: 4/4/2016 02:08 PM



FOM

Site	Open Ticket Count
24 / 4631	1
203 / 78	1
317 / 10340	1
334 / 4732	1
364 / 2618	1
370 / 4651	1
380 / 405	1
502 / 3658	1
874 / 1177	1

Last Updated On: 4/4/2016 02:00 PM

Permanent Counter Data



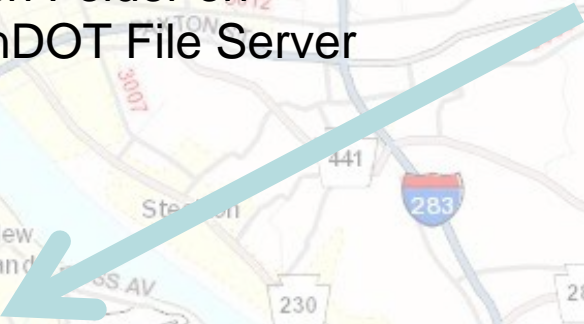
Nightly Polling Process



Watch Folder on PennDOT File Server



Windows Service



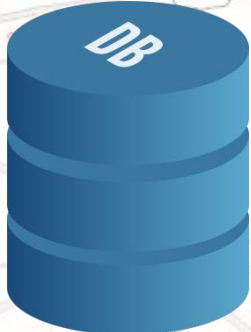
DPM - Device File Manager

- Create and Edit Permanent Counter Formats
- Map Counters to Database
- Changes are Instantaneous

Input Device File Manager



DPM - Device File Manager



DPM - Device File Manager

View Input File Definitions Edit File Definition Edit IO Map Check out Undo Checkout Check In Release

Click on a row to perform an action Add New Rename Upload Sample File View History

Disabled Items: Hide Show

Name	Latest Minor Version	Latest Major Version	Check Out Date	Checked Out By	Sample File Filename			
ISINC	54	54			000106_2014930_635477806922212577__000106_2014930_635477343009370442__20140930.106	Edit	Disable	Delete
Wavetronic Speed Bins	13	13				Edit	Disable	Delete
TRS	9	9				Edit	Disable	Delete
Diamond	9	9				Edit	Disable	Delete



DPM - File Definition Editor

TDS Download and Processing Module Edit File Definition pennsylvania DEPARTMENT OF TRANSPORTATION

View Input File Definitions Edit File Definition Edit IO Map Save Check out Undo Checkout Check In Release 54.00

Add New Block Add new Field Edit Folder Paths Set File Structure Type View Sample Data iSINC (read-only, latest)

Scope: Site

- Header**
 - System Type Data Type: Byte Size: 1 Bits Bytes Characters
 - Revision Number Data Type: Byte Size: 1 Bits Bytes Characters
 - Lanes Enabled Data Type: Byte Size: 1 Bits Bytes Characters
 - Number of Summaries Data Type: Byte Size: 1 Bits Bytes Characters
- Scope: None**
 - Not Used Field 1 Data Type: Byte Size: 1 Bits Bytes Characters
 - Number of Classes Data Type: Byte Size: 1 Bits Bytes Characters
- Scope: None**
 - Not Used Field 2 Data Type: Byte Size: 1 Bits Bytes Characters
- Scope: Summary**
 - Scope: None

DPM - Input/Output Map Editor

TDS Download and Processing Module Edit Input/Output Map

Impersonating c-bplumb **pennsylvania** DEPARTMENT OF TRANSPORTATION

View Input File Definitions | Edit File Definition | **Edit IO Map** | Save | Check out | Undo Checkout | Check In | Release | 53.00

Tools: Date | Math | Text | Misc | All

Sample File Filename: '20140508.158'

Input List

- Hide used inputs
- Filename
- Header **Site**
 - System Type
 - Revision Number
 - Lanes Enabled
 - Number of Summaries
- Not Used1
 - Iteration
 - Not Used Field 1
- Not Used2
 - Iteration
 - Not Used Field 2
- Summary **Summary**
 - Iteration
- Lane
 - Iteration
- Class Bins Block
 - Iteration
 - Class Bins
- Speed Bins Block
 - Iteration
 - Speed Bins

Vehicle × **Site** × **Axle** × **AxleSide** × **Vehicle** × +

Vehicle Invalid ×

Diagram showing data flow from inputs to outputs:

- Constant (1) and Lane (×) feed into Addition (sum).
- Addition (sum) feeds into Device Lane Number (×).
- Error (×) feeds into Error Code (×).
- Status (×) feeds into Status Code (×).
- Class (×) feeds into Class (×).
- Seconds (×) and Hundredths of Seconds (×) feed into Epoch Date (seconds since 01/01/1970) (date).
- Epoch Date (date) feeds into Date Timestamp (×).
- Length (×) feeds into Conversion (result) which outputs Length (×).
- Temperature (×) feeds into Conversion (result) which outputs Temperature (×).
- Speed (×) feeds into Conversion (result) which outputs Speed (×).

Output List

- Hide used outputs
- Site
 - Summary
 - Vehicle
 - Date Timestamp
 - Device Lane Number
 - Speed
 - Weight
 - Temperature
 - Class
 - Length
 - Violations
 - Spacing
 - Volume
 - Status Code
 - Error Code
 - Axle
 - Axle Side

Legend: ● Required ○ Optional

DPM - Rule Manager

- Create and Edit Flags for Permanent Sites
- Changes are Instantaneous

Rule Manager



DPM - Rule Manager

TDS Download and Processing Module Rule Manager



Rule Manager Rule Editor

Check out Undo Checkout Check In Release

Click on a row to perform an action

Add New Rename View History

Disabled Items: Hide Show

Name	Latest Minor Version	Latest Major Version	Check Out Date	Checked Out By	Sample File Filename			
Summary	24	24				Edit	Disable	Delete
Vehicle Weights	9	9				Edit	Disable	Delete



DPM - Rule Editor

TDS Download and Processing Module Edit Rule pennsylvania DEPARTMENT OF TRANSPORTATION

Rule Manager Rule Editor Save Check out Undo Checkout Check In Release 24.00

Input List

- Site
- Summary
- Class
- 1: Motorcycles
- 2: Passenger Cars
- 3: Pickup Van
- 4: Buses
- 5: 2-Axle, 6-Tire Single Unit Truck
- 6: 3-Axle Single Unit Trucks
- 7: 4 or more Axle, Singleunit Truck
- 8: 2 or 3 Axle w/Trailer
- 9: 3-Axle-Multi Axle Trailer Truck
- 10: 6-or more Axle, Single Trailer Truck
- 11: 5-or less Axle, Multi-Trailer Truck

Summary * Volume	Summary * Volume-Consecutive Zero	Summary * Maximum	Summary * Directional Split	Summary * Class 1	Summary * Class 2	Summary * Class 3	Summary * Class 4	Summary * Class 5	Summary * Class 6
Summary * Class 7	Summary * Class 8	Summary * Class 9	Summary * Class 10	Summary * Class 11	Summary * Class 12	Summary * Class 13			

✖ 1: Volume **Standard Deviation** ⚙️

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✖ 1: Volume **Standard Deviation** ⚙️

✖ 1: Volume **Standard Deviation** ⚙️

✖ 1: Volume **Standard Deviation** ⚙️

Flags List

- Average
- Consecutive Zero Hours
- Direction Split
- Maximum
- Minimum
- Next Hours
- Prior Hours
- Standard Deviation

DPM - Rule Editor

TDS Download and Processing Module Edit Rule

Impersonating c-bplumb

Save Check out Undo Checkout Check In Release

Input List

- Site
- Summary
- Class
- 1: Motorcycles
- 2: Passenger Cars
- 3: Pickup Van
- 4: Buses
- 5: 2-Axle, 6-Tire Single Unit Truck
- 6: 3-Axle Single Unit Trucks
- 7: 4 or more Axle, Singleunit Truck
- 8: 2 or 3 Axle w/Trailer
- 9: 3-Axle-Multi Axle Trailer Truck
- 10: 6-or more Axle, Single Trailer Truck

Summary x Volume

Summary x Volume-Consecutive Zero

Summary x Maximum

Summary x Directional Split

Summary x Class 1

Summary x Class 2

Summary x Class 3

Summary x Class 4

Summary x Class 5

Summary x Class 6

Summary x Class 7

Summary x Class 8

Summary x Class 9

Summary x Class 10

Summary x Class 11

Summary x Class 12

Summary x Class 13

Flags List

Average

Consecutive Zero Hours

Direction Split

Maximum

Minimum

Next Hours

Prior Hours

Standard Deviation

'Standard Deviation' Properties

Write a message that will be displayed if this flag is thrown.

Flag Message: Caution: Volume {VolumeValue} {CompareOperator}

You may reference {VolumeValue} and {CompareOperator} and {ThresholdValue} as values in the flag message.

Number of Weeks: 26

Threshold: 0

Tolerance (In Percent): 100

Included Sites List: 384

Excluded Sites List:

Cancel Apply

TDS Continuous Data Analysis System (CoDAS)

- Analyze Permanent Site Data
- Flagged Data for Potential Errors
- Customizable Features

Continuous Data Analysis System (CoDAS)



TDS CoDAS

Daily Site Flags

7 Site 1
 Previous Flag | Mark Record for future review | Next Flag | View | Volume Summary | Bin: 1: Volume

Apr 2014
 4/20/2014

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			

WComp Date: Sun Mar 31, 2013
 WComp Holiday: Easter

All Flags Viewed
 Unviewed Flags Exist
 Critical

Yesterday

Directional Split

E Raw 50% W 50%
 Accepted 50%

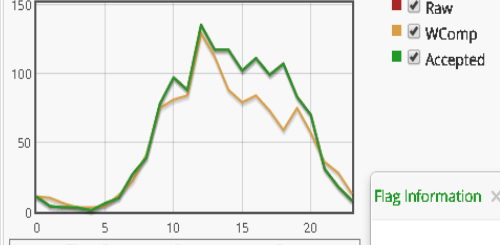
Site Summary

Site ID	1
TMS Site	1945
County	ERIE (25)
SR / Seg / Offset	0020 / 0010 / 2100
Monthly % Imported	57%
Functional Class	RURAL MINOR ARTERIAL (6)
TPG	7
Type	CAVC

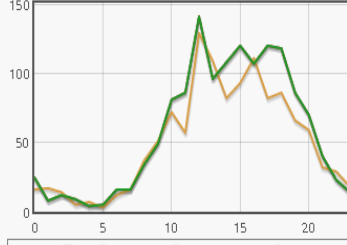
Daily Site Comments

5/09/2014	ruhgraham
Site is ok	
5/09/2014	ruhgraham
Site is ok	

Eastbound Volume All Lanes: Summary



Westbound Volume All Lanes: Summary



Hour	Raw	Wcomp	Accepted
0	11	11	11
1	4	10	4
2	3	6	3
3	3	3	3
4	1	3	1
5	6	4	6
6	10	12	10
7	27	22	27
8	39	41	39
9	78	75	78
10	97	81	97
11	88	84	88
12	135	129	135
13	117	112	117
14	117	88	117
15	102	79	102
16	111	84	111
17	99	73	99
18	107	59	107
19	83	75	83
20	70	57	70
21	31	36	31
22	18	28	18
23	8	13	8

Flag Information

Lane 1: 0 flags
 Lane 2: 1 flag
 0 Vehicle Flags

Hour	Raw	Wcomp	Accepted
0	25	16	25
1	8	17	8
2	12	14	12
3	9	5	9
4	4	7	4
5	5	3	5
6	16	12	16
7	16	16	16
8	34	37	34
9	49	51	49
10	81	72	81
11	86	57	86
12	141	129	141
13	96	109	96
14	108	82	108
15	120	93	120
16	107	111	107
17	120	82	120
18	118	86	118
19	86	66	86
20	70	59	70
21	40	32	40
22	23	29	23
23	14	18	14

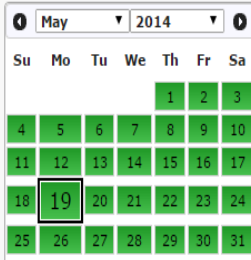
My Sites | All Sites | Batch Assignments

	Site ID	Volume	Volume	Assignee	Assignee
1	C a	86	57	ruhgraham	ruhgraham
2	A	41	20	ruhgraham	ruhgraham
3	A	34	15	ruhgraham	ruhgraham
4	A	31	10	ruhgraham	ruhgraham
5	C	38	14	ruhgraham	ruhgraham
8	A	15	15	trottet	trottet
15	A	13	13	trottet	trottet
18	C	26	26	ruhgraham	ruhgraham
19	A j	21	21	trottet	trottet
20	C	53	46	trottet	trottet
24	C	94	94	trottet	trottet
27	A	14	14	ruhgraham	ruhgraham
29	A	8	8	ruhgraham	ruhgraham
40	C	44	29	ruhgraham	ruhgraham
48	A j	0	0	ruhgraham	ruhgraham
51	A	13	13	ruhgraham	ruhgraham
106	W	0	0	andoneill	andoneill
126	C	0	0	trottet	trottet
158	W	368	57	andoneill	andoneill
203	C	346	280	trottet	trottet
205	A	21	21	trottet	trottet
206	A	20	20	trottet	trottet
207	A	83	47	ruhgraham	ruhgraham
208	A	0	0	trottet	trottet
210	A	0	0	trottet	trottet
216	A j	0	0	ruhgraham	ruhgraham

Site Active
 Site Inactive
 All Flags Viewed
 Unviewed Flags Exist

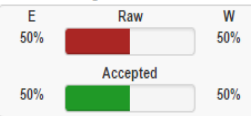
TDS CoDAS

Daily Site Flags



WComp Date: Mon May 20, 2013
 WComp Holiday: Not a holiday
 All Flags Viewed
 Unviewed Flags Exist
 Critical
 Yesterday

Directional Split



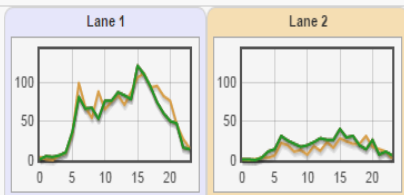
Site Summary

Site ID 1
 TMS Site 1945
 County ERIE (25)
 SR / Seg / 0020 / 0010 / 2100
 Offset
 Monthly % Imported 97%

Daily Site Comments

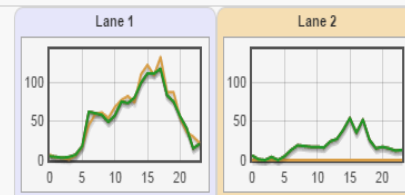
4 Site 1
 5/19/2014
 Previous Flag | Mark Record for future review | Next Flag | View
 Volume Detail | Bin 1: Volume

Eastbound Lane Details



Hour	Lane 1			Lane 2		
	Raw	WComp	Accepted	Raw	WComp	Accepted
0	1	4	1	1	1	1
1	5	1	5	1	0	1
2	4	0	4	0	1	0
3	6	6	6	3	3	3
4	10	9	10	11	3	11
5	36	33	36	14	6	14
6	81	99	81	31	22	31
7	66	68	66	25	19	25
8	67	54	67	21	11	21
9	53	88	53	17	13	17
10	76	65	76	19	7	19
11	76	75	76	23	18	23
12	87	83	87	28	12	28
13	83	71	83	26	23	26
14	78	87	78	26	16	26
15	121	106	121	40	28	40
16	110	111	110	29	24	29
17	94	93	94	31	21	31
18	74	95	74	19	21	19
19	60	82	60	14	31	14
20	50	76	50	26	17	26
21	47	46	47	7	14	7

Westbound Lane Details



Hour	Lane 1			Lane 2		
	Raw	WComp	Accepted	Raw	WComp	Accepted
0	5	7	5	6	0	6
1	4	3	4	1	0	1
2	3	3	3	0	0	0
3	4	1	4	4	0	4
4	7	6	7	0	0	0
5	18	17	18	5	0	5
6	62	45	62	13	0	13
7	60	59	60	19	0	19
8	58	61	58	18	0	18
9	49	54	49	17	0	17
10	57	68	57	17	0	17
11	75	77	75	16	0	16
12	73	82	73	24	0	24
13	80	74	80	27	0	27
14	99	110	99	39	0	39
15	111	122	111	54	0	54
16	111	109	111	35	0	35
17	117	132	117	52	0	52
18	83	87	83	26	0	26
19	75	87	75	15	0	15
20	56	54	56	17	0	17
21	41	36	41	15	0	15

TDS Traffic Monitoring System (TMS)

- View and Track All Sites (State and Local)
- Scheduling of Sites
- Easy Access to Multiple Data Sources

Traffic Monitoring System (TMS)



TDS Traffic Monitoring System (TMS)



Impersonating jfreeland



TMS Site No. Perm. Site ID County Route Segment Lanes FSC TPG Juris NHS HPMS Sample No.

1600 --Select a county-- --Sel-- --Sel-- 2 12 3 1 Y

Limits

BEGIN						END					
Limit	County	Route	Segment	Offset	Intersecting Street	County	Route	Segment	Offset	Intersecting Street	Limit ID
North	66	0015	0140	0	SR 4040	21	0015	0030	50	SR 8047	38598
South	66	0015	0141	0	SR 0074	21	0015	0031	50	SR 8047	38598

TMS Site Number 1600

General

Permanent

Equipment

Administration

HPMS

Network

Pavement

RawCount

Traffic

Traffic History

Chart

Audit History

Stations

Total AADT: 31,968

Direction	County	Route	Seg	Offset	Lat, Long	Last Count Date	AADT	HPMS Sample No.	Plot Station
North	21	0015	0010	5	40.14959, -77.00907	05/26/2011	19,466		Y <input type="button" value=""/>
South	21	0015	0011	5	40.14960, -77.00918	05/26/2011	12,502		Y <input type="button" value=""/>

Permanent Site ID:

Agency: Harrisburg

Temporary Agency:

Municipality: UPPER ALLEN

Counter Location: At Cumberland / York County Line.

Comments: MANUAL REQUIRED -- SAFETY -- JERSEY BARRIERS.

Internal Notes: MAN-2011

Cycle Frequency: Three (3) year cycle

Cycle Year:

Function Type:

Count Type: Manual Class

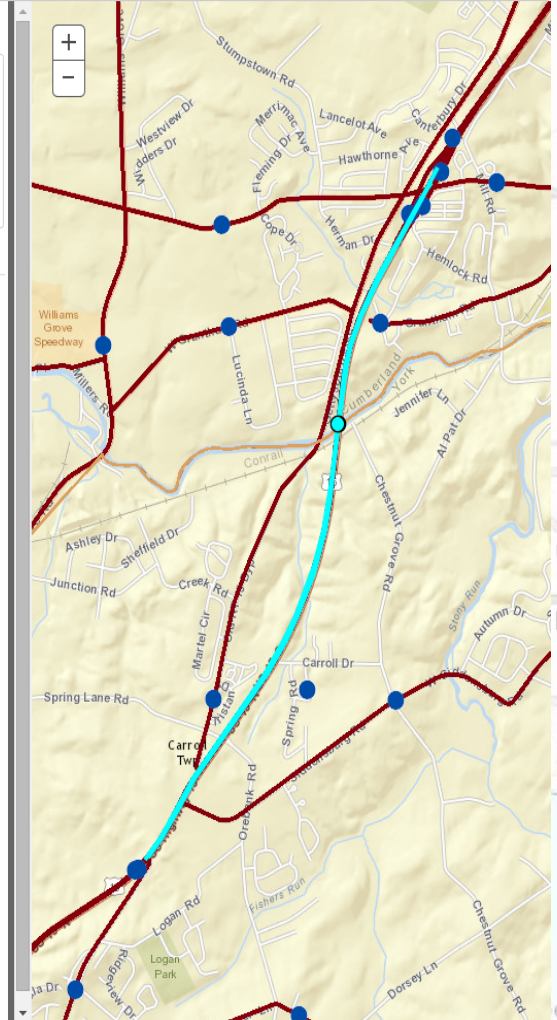
Schedule: 1 Time per Year

Duration: 24 Hours

TMS Program: 3-YR NHS/NON-HPMS

Reporting Status:

Site Notes



TDS Reports

- Portable and Permanent Reports
- Customized Filters
- Map Creation



Reports/FHWA Extracts

Report SITE LOCATION

SITE LOCATION REPORT

Format PDF

Generate Generate Map
Site ID Type: TMS Permanent

* Must select District, Agency or County
* Must select either Cycle Frequency, Cycle Year or Years
* Must select a single District or County to generate map

District Select District	Agency Select Agency	County Select County	Municipality (map only) Select Municipality	Years Select Years
Field Report <input type="checkbox"/>	Cycle Frequency Select Cycle Frequency	Cycle Year Select Cycle Year	Locals Only <input type="checkbox"/>	Additional Counts <input type="checkbox"/>
Status 2 checked	Function Type Select Function Type	Equipment Select Equipment	Data Type Select Data Type	Sort By State Route

Group By

Available	Selected
Data Type	Agency
Frequency	County



TDS Technologies

- ASP.net
- Javascript
- Angular JS
- Crystal Reports
- Nhibernate
- Esri ArcGIS server 10.2.2
- Oracle 11g
 - Oracle Partitioning for archiving



Questions?

