Proposed Change in Delivery Format For Traffic Counts

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Summary

Typically, venders have provided Intersection and travel way count data most often in PDF document formats. Geographical information systems (GIS) and network modeling software use data in tabular and database formats. This then requires that PDF documents be restructured to create a format that is more readily used by automated analysis and processing, which is time consuming, and sometimes requires data to be manually input to form database records. A minor change in specification for delivery of traffic count products, involving how locations are referenced and guidelines on organization of traffic count spreadsheets, could be made available, and would introduce minimal, if any, additional work for venders. Online resources can be easily provided to facilitate a much improved, immediate incorporation of traffic count data into GIS and other analysis software. This memo discusses the issue and proposes new formats that may be used by vendors to deliver data in a more usable format, and touches on the importance of traffic movements as a fundamental element of transportation information systems.

Typical Traffic Count Document

Figure 1, below shows a screen shot of a typical intersection count stored in a PDF document. This is very much a document format, headers are included, there are often pictures and diagrams mixed in, columns and structure of tables varies from vendor to vendor. The data is all there but pulling just the data out, even with PDF conversion software, is time consuming just to extract the table. Once the table is extracted into an excel spreadsheet or other tabular format, there are still issues associated with how the location is specified, time formats, and general usability in automated systems for analysis and archiving.

Figure 1, Portion of a typical traffic count

RK&K
110 South Poplar Street
Wilmington, DE 19801

Loc: SR 300 at S. Rodney St/Artisan Dr
Weather: Clear
County: Kent
Counters: BML & GBP

File Name : SR300_SouthRodneySt_2021.03.11
Site Code : 00000000
Start Date : 3/10/2021
Page No : 1

Groups Printed- Passenger Cars - Heavy Vehicles

	South Rodney St From North					SR 300 (Wheatleys Pond Rd) From East					Artisan Dr From South					SR 300 (Wheatleys Pond Rd) From West					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
07:00 AM	2	2	0	0	4	13	37	0	0	50	0	0	8	0	8	2	107	6	0	115	177
07:15 AM	0	0	1	0	1	18	42	0	0	60	2	0	12	0	14	2	125	6	0	133	208
07:30 AM	0	0	1	0	1	11	57	0	0	68	4	0	5	0	9	3	118	4	0	125	203
07:45 AM	0	1	0	0	1	20	52	0	0	72	2	1	7	0	10	1	102	13	0	116	199
Total	2	3	2	0	7	62	188	0	0	250	8	1	32	0	41	8	452	29	0	489	787
*** BREAK ***																					
04:00 PM	4	0	6	0	10	22	127	1	0	150	6	0	18	2	26	1	95	9	0	105	291
04:15 PM	3	0	4	0	7	26	120	3	0	149	20	6	114	0	140	3	96	13	0	112	408
04:30 PM	0	0	5	0	5	63	115	5	0	183	22	1	76	0	99	2	64	30	0	96	383
04:45 PM	0	0	0	0	0	0	0	0	0	0	12	1	39	0	52	4	84	36	0	124	176
Total	7	0	15	0	22	111	362	9	0	482	60	8	247	2	317	10	339	88	0	437	1258
Grand Total	9	3	17	0	29	173	550	9	0	732	68	9	279	2	358	18	791	117	0	926	2045
Apprch %	31	10.3	58.6	0		23.6	75.1	1.2	0		19	2.5	77.9	0.6		1.9	85.4	12.6	0		
Total %	0.4	0.1	0.8	0	1.4	8.5	26.9	0.4	0	35.8	3.3	0.4	13.6	0.1	17.5	0.9	38.7	5.7	0	45.3	
Passenger Cars	9	3	17	0	29	169	512	9	0	690	68	9	274	2	353	18	754	115	0	887	1959
% Passenger Cars	100	100	100	0	100	97.7	93.1	100	0	94.3	100	100	98.2	100	98.6	100	95.3	98.3	0	95.8	95.8
Heavy Vehicles	0	0	0	0	0	4	38	0	0	42	0	0	5	0	5	0	37	2	0	39	86
% Heavy Vehicles	0	0	0	0	0	2.3	6.9	0	0	5.7	0	0	1.8	0	1.4	0	4.7	1.7	0	4.2	4.2

Storing Measures in a Database

Database formats require the various bits of data to be stored as records. Each cell of a particular count is itself one record taken for one directional flow for a particular road at a particular time, summarized over a particular time interval, measuring particular characteristics. A portion of a table like:

	South Rodney St From North				
Start Time	Left	Thru	Right	Peds	App. Total
07:00 AM	2	2	0	0	4
07:15 AM	0	0	1	0	1
07:30 AM	0	0	1	0	1
07:45 AM	0	1	0	0	1
Total	2	3	2	0	7

Represents 16 different measures, specified in record format as:

Figure 2, Sample record format for turning movement counts

Road	**direction/movement**	**date/Time**	**interval**	**count**	**type**
Southbound Rodney	left	2021:03:10 – 07:00	15	2	vehicle
Southbound Rodney	thru	2021:03:10 – 07:00	15	2	vehicle
Southbound Rodney	right	2021:03:10 – 07:00	15	0	vehicle
Southbound Rodney	locale	2021:03:10 – 07:00	15	0	ped
Southbound Rodney	left	2021:03:10 – 07:15	15	0	vehicle
Southbound Rodney	thru	2021:03:10 – 07:15	15	0	vehicle
Southbound Rodney	right	2021:03:10 – 07:15	15	1	vehicle
Southbound Rodney	locale	2021:03:10 – 07:15	15	0	ped

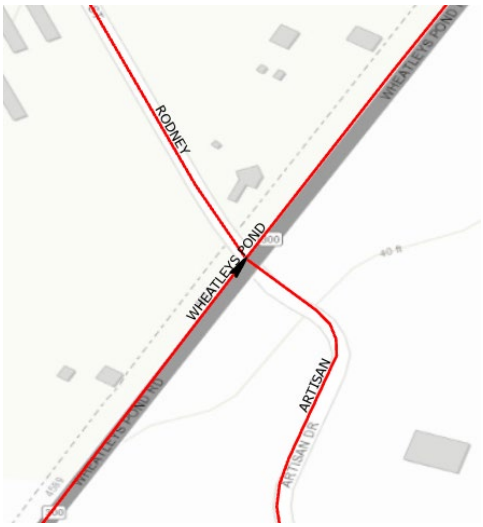
Etcetera ……..

The data and time should be in a consistent standard format in military time, such as shown. Information such as weather, counter type, and vendor could and should be added as additional columns so that all of the information is captured in this record format. Once in such a format, many types of analysis and display of information are possible, traffic counts for movements can be more readily related to a variety of transportation concerns such as with safety and routing applications. Totals and percentages aren't included in the records above because these can be automatically calculated once the information is in a database format.

Referencing Location and Direction

This section discusses referencing of roads. The point is that traffic count data should be referenced by standard road identifiers and position to support consistency and integration with other transportation data.

Referencing the traffic count measure by road name generally Is problematic. There are often different spellings, text cases, and inclusion/exclusion of road type (ave, rd, blvd), and sometimes I road is referenced by its route number. This problem is compounded by delineating the measure with reference to a cross street. Referencing by name impedes integration across transportation databases. DelDOT and GIS doesn't reference data that way, but rather using an approach based on the Delaware Linear Reference, using route identifier and milepoint. Route identifiers are the RDWAYID or MAINTENANCE ROAD ID. There is a one to one correspondence between RDWAYID and MAINTRD and lookup tables are available depending on choice at the time. RDWAYID was a numeric field more popular in the past, while now MAINTRD may be used more.



In the previous example, as shown in DelDOT's road centerline file, Rodney street has RDWAYID = 2503, MAINTRD = 10024, and meets Wheatleys Pond Road at MILEPOINT = 0 . Of course, a volume measurement would be different depending on the direction of travel. DelDOT handles direction by using a suffix (F = Forward or R=Reverse relative to the direction of mile pointing). Rodney Southbound is identified as 'KC-100240000000000-R ' . So a volume or speed measure along any road is referenced by a directional identifier and a milepoint. Portions of roads are specified by a route identifier and beginning and end milepoints.

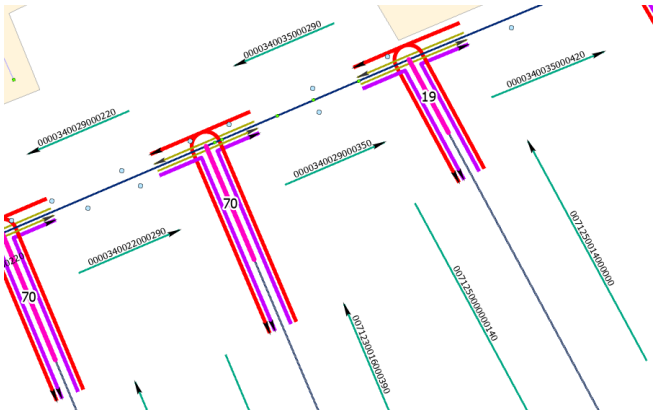
CADSR references road segments a bit different. A road segment is referenced by a text identifier that concatenates the DelDOT RDWAYID, a beginning milepoint and an end milepoint. This method is completely consistent and transferable with DelDOT methods and based on the same route milepoint designations.

	RDWAYID	BEGMP	ENDMP
Northbound	0002503	00.000	00.170
Southbound	0002503	00.170	00.000

Turning Movements

The example chosen previously is not a measure at a particular point in a road but is for turning movements at an intersection. To fully determine travel throughout a transportation network involves specifications of turning movements. A turning movement is defined as the movement from one road segment in the network to another. That movement could be described as a right or left turn, a movement thru or straight, or a U turn. Turning movements can completely describe the connectivity and the allowed travel through the network. Data about the use and performance of the transportation network is captured as turning movements. A consistent identification method for turning movements and a spatially located map graphic to display and reference data is needed.

Figure 2, An example of graphic elements for turning movements.

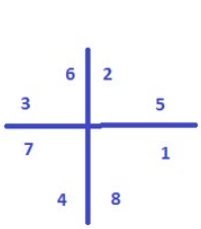


Of interest in this context is the identification of the turning movement that works within a database system. Someone who performs the traffic count and is tabulating the results would only need to know what we call a particular turn. We have a standard identification system for road segments that incorporates direction of travel. A turning movement from a database perspective can be defined by the standard identifier of the “from” road and the “to” road. CADSR has created a complete turning movement table for Delaware built on the DelDOT Road Centerline and the Delaware Linear Referencing System. . This includes graphic elements for selection and display of data as shown in Figure 2. We can identify turns by their from and to roads or also simply add a “R”, “L”, “S”, or “U” to

the identifier of the from road segment. But the identification of the turning movements is straightforward

Turning movements are useful geographic and database features to address and serve a number of applications in addition to reference of speed or volume data. Crashes or safety conditions can be associated with particular turning movements. A turn table can be used to trace through the network for emergency management and evacuation applications. For routing applications, impedances can not only be associated with portions of roads but also for turning movements. Performance at an intersection varies by turning movement. We are currently studying how various volume measures can be integrated and joined with estimates of turn movement percentages developed from high resolution land use, to develop an dynamic view of traffic flow throughout the network and provide estimates where data is sparse and prioritize measurements. Relationships in the network can be defined by turning movements. Easier usability of traffic studies data would support the research and various applications.

Figure 3, Turning Movement Algebra



5,6,7,8 are going in

1,2,3,4 are going out

U turns would be 6-2, 5-1, 7-3, 8-4

From	To	Direction
5	2	Eastbound Right (5r)
5	3	Eastbound Straight (5s)
5	4	Eastbound Left (5l)
8	1	NB right 8r
8	2	NB straight 8s
8	3	NB left 8l
7	4	EB right 7r
7	1	EB straight 7s
7	2	EB left 7l
6	3	SB right 6r
6	4	SB straight 6s
6	1	SB left 6l

Volume out 1 = 7s + 8r + 6l + 5u
2 = 8s + 5r + 7l + 6u
3 = 5s + 6r + 8l + 7u
4 = 6s + 7r + 5l + 8u

Volume in 7 = 7s + 7r + 7l + 7u
8 = 8s + 8r + 8l + 8u
5 = 5s + 5r + 5l + 5u
6 = 6s + 6r + 6l + 6u

Recommendation

I would recommend that a brief guideline be developed that vendors can use to provide traffic count data in a more usable manner for GIS and databases. Format would be as in Figure 1 above where each measure is on a record and fields include:

Date

Time

Standard Turning Movement Identifier

Time interval

Type (vehicles, pedestrians, trucks, etc)

Vendor

Weather

Day of week

Volume or Speed measure

Online resources could be easily created to assist in the identification of standard turning movements identifiers or they could be provided with the contract.

This can be discussed further and any comments or suggestions are very welcome.