Earlysville Road Traffic Analysis

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EPRPC
Traffic • Transportation • Stormwater • Civil

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Introduction and Purpose

Earlysville/Hydraulic Road, Route 743, is a vital part of Albemarle County's transportation network. Classified as a minor arterial between West Rio Road and Woodlands Road, and then transitioning to a major collector road north of Woodlands Road, Earlysville Road provides access to northwest Albemarle County and serves as a parallel travel way to Route 29. Earlysville Road also intersects with Dickerson Road which continues to the north and provides access to the Charlottesville-Albemarle Airport.

The primary purpose of this study is to assemble and present data that will be used to inform the decision regarding the appropriateness of Earlysville Road to continue to serve truck traffic. For the purposes of this analysis, trucks are considered as vehicles having more than two axles. The data gathered in this effort includes:

1. Seven day bi-directional traffic classification counts at five locations between West Rio Road and Airport Road. Four were collected along Earlysville Road and one along Dickerson Road.
2. Crash analysis, as available from the VDOT database, for the most recent three year period.
3. General assessment of geometric conditions relative to current road design standards.

Traffic Counts

Bi-directional hourly traffic volumes were collected along Earlysville Road and Dickerson Road in five locations. (See attached Map – **Figure 1**). Four pneumatic tube counters were place on Earlysville Roads and the northern most counter was located on Dickerson Road. Data was collected from 3 PM Friday, May 15th through 2 PM Friday, May 22nd.

The traffic counters distinguish between vehicle types, including standard two axle vehicles (passenger cars and trucks), long wheelbase 2 axle vehicles (delivery vehicles and trucks) and vehicles with three, four, and five axles. For the purpose of this study, we examined and summarized three vehicles classifications: cars, two axle long vehicles (delivery trucks, flatbeds, buses, and vehicles of that nature) and trucks, which includes all other vehicles.

The peak hour for the entire study period within the study area was Monday May, 18th at 5 pm. The two-way traffic volume was 1,430 vehicle per hour (VPH) (933 northbound and 497 southbound) and of those 10 were classified as trucks with three or more axles.

The average daily weekday traffic volume, occurring on a Tuesday / Wednesday / Thursday, was 5,227.48 VPD northbound and 5,288.24 southbound. The average daily truck percentage was 1.29% NB and 1.50% SB.

The peak hour in the weekday is Tuesday, May 19 at 5 PM, and the peak hour volume was 1,391, with 1 truck with three or more axles, or .07 percentage of trucks.

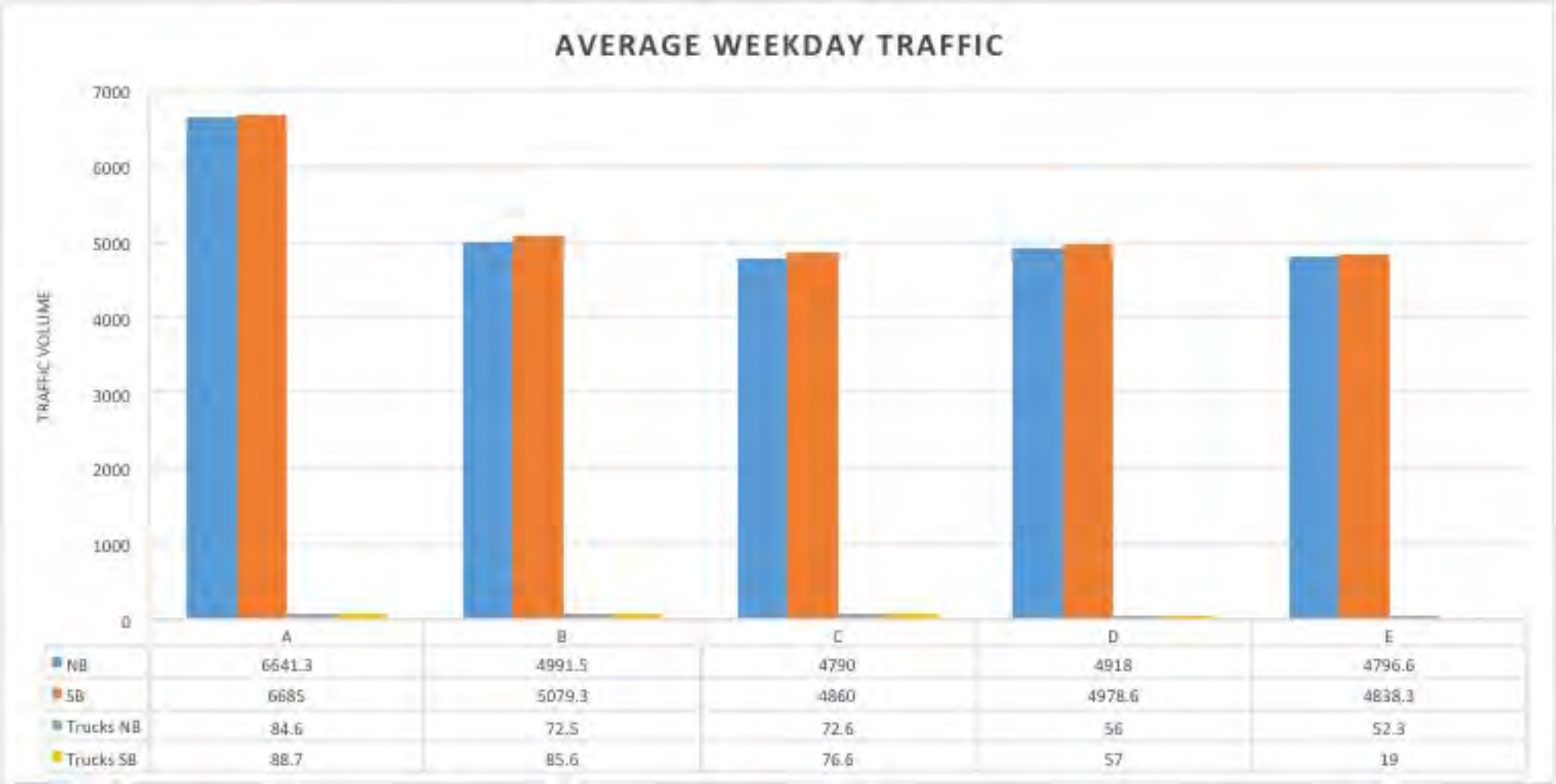
Per the collected data, the truck percentages for trucks with three axles or greater and two axle long trucks, on a daily basis, is as follows:

Three or More Axles	Two Axle Long
Monday – 1.16%	Monday – 16.31%
Tuesday – 1.49%	Tuesday – 16.81%
Wedensday- 1.38%	Wednesday – 13.48%
Thursday – 1.45%	Thursday – 16%
Friday – 1.22%	Friday – 15.91%
Saturday – .46%	Saturday – 13.96%
Sunday - .19%	Sunday – 12.72%

See the appendix for detailed graphs of the volume data by time period and approach. Also, the raw data is included in the appendix along with data summary tables.

Figure 1 - Project Location Map and Count Locations

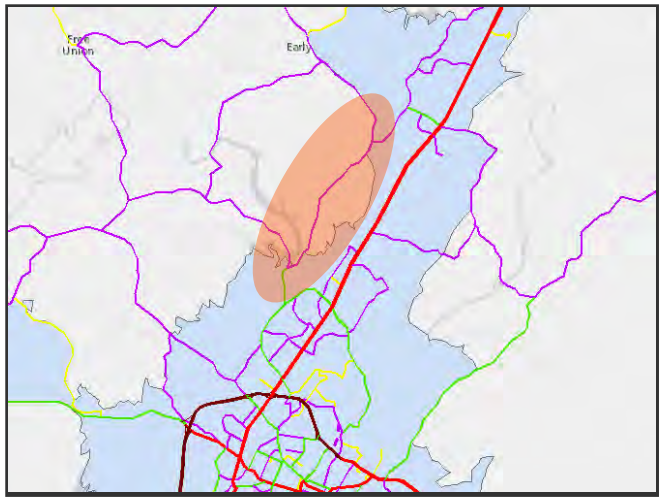
Figure 2 - Average Weekday Traffic



	A	B	C	D	E
NB	6641.3	4991.5	4790	4918	4796.6
SB	6685	5079.3	4860	4978.6	4838.3
Trucks NB	84.6	72.5	72.6	56	52.3
Trucks SB	88.7	85.6	76.6	57	19

Road Conditions

A comparison was made between the current VDOT Road Design Manual parameters for a rural collector, and actual prevailing conditions along Earlysville Road and Dickerson Road. It should be noted that the vast majority of the state's road system would not meet modern design standards, simply due to the evolution of the road system as Virginia has continued to grow through the years. However, it is interesting, and informative to know how the existing curve radii and lane widths, which are important relative to safely conveying large trucks, compare to the current standards.



According to the VDOT Functional Classification Maps (to the right), the study roadways are classified as Major Collector Facilities north of Woodlands Road (i.e. south side of the reservoir), and minor arterial south of Woodlands Rd.

The VDOT Road Design Manual (see the following excerpted table) provides the current design criteria for a Rural Collector facility. As noted, with an average daily traffic (ADT) count exceeding 2,000 vehicles per day (VPD), a design speed of 50 mph, and using the criteria for the rolling terrain, the minimum curve radii should be 760 feet, lane width should be 12 feet, and the shoulder should be 6 feet.

See **Figures 3 through 6** for an example measurement of four representative curve locations along the corridor. These locations were chosen based on observations of the road centerline file from the County's GIS. The goal was to identify what appeared to be the "sharpest" curves in the corridor. It was found, through an approximate measurement (using GIS for the measurement), that two of the four curves are substandard. This alone does not create an unsafe condition, though it is important that curve advisory speed warning signs are placed prior to entering the curves so all motorists can adjust their speed. However, if the corridor had an extensive number of substandard curves, then there would be a concern that this could impact crash experience. Also, the horizontal and vertical curvature impacts intersection and driveway sight distances. Note that crash history is discussed in the following section.

The design criteria also requires lane widths to be 12 feet. Several measurements along the corridor were performed and it was found that the northern portion of the study area, Dickerson Road, met these requirements. However, along Earlysville Road the lane widths varied between 10 and 11 feet and shoulders are generally non-existent and typically range in width from zero to one feet.

GEOMETRIC DESIGN STANDARDS FOR RURAL COLLECTOR ROAD SYSTEM (GS-3)

TRAFFIC VOLUME	TERRAIN	DESIGN SPEED (MPH)	MIN. RADIUS	(8) MINIMUM STOPPING SIGHT DISTANCE	(2) MIN. WIDTH OF LANE	(3) (4) MINIMUM WIDTH OF GRADED SHOULDERS		(5) MINIMUM WIDTH OF DITCH FRONT SLOPE	(6) SLOPE	NEW AND RECONSTRUCTED MINIMUM BRIDGE WIDTHS AND VERTICAL CLEARANCES
						FILL W/GR	CUT & FILL			
(1) ADT OVER 2000	LEVEL	60	1204’	570’	12’	11’	8’	10’	CS-4, CS-4A OR CS-4C	See Footnote (7)
	ROLLING	50	760’	425’				6’		
	MOUNTAINOUS	45	589’	360’					CS-3 / CS-3B	
		40	446’	305’						
(1) ADT 1500 TO 2000	LEVEL	50	760’	425’	11’	9’	6’	6’	CS-4, CS-4A OR CS-4C	
	ROLLING	45	589’	360’						
		40	446’	305’						
	MOUNTAINOUS	35	316’	250’				4’	CS-3/ CS-3B	
		30	215’	200’						
(1) ADT 400 TO 1500	LEVEL	50	760’	425’	11’	(9) 8’	(9) 5’	6’	CS-4, CS-4A OR CS-4C	
	ROLLING	45	589’	360’						
		40	446’	305’						
	MOUNTAINOUS	35	316’	250’				4’	CS-3/ CS-3B	
		30	215’	200’	10’					
CURRENT ADT UNDER 400	LEVEL	45	589’	360’	10’	7’	2’	6’	CS-1	
		40	446’	305’						
	ROLLING	35	316’	250’				4’		
		30	215’	200’						
	MOUNTAINOUS	25	135’	155’						
		20	77’	125’						

Figure 3 - Approximate Curve Radii Measurement 1

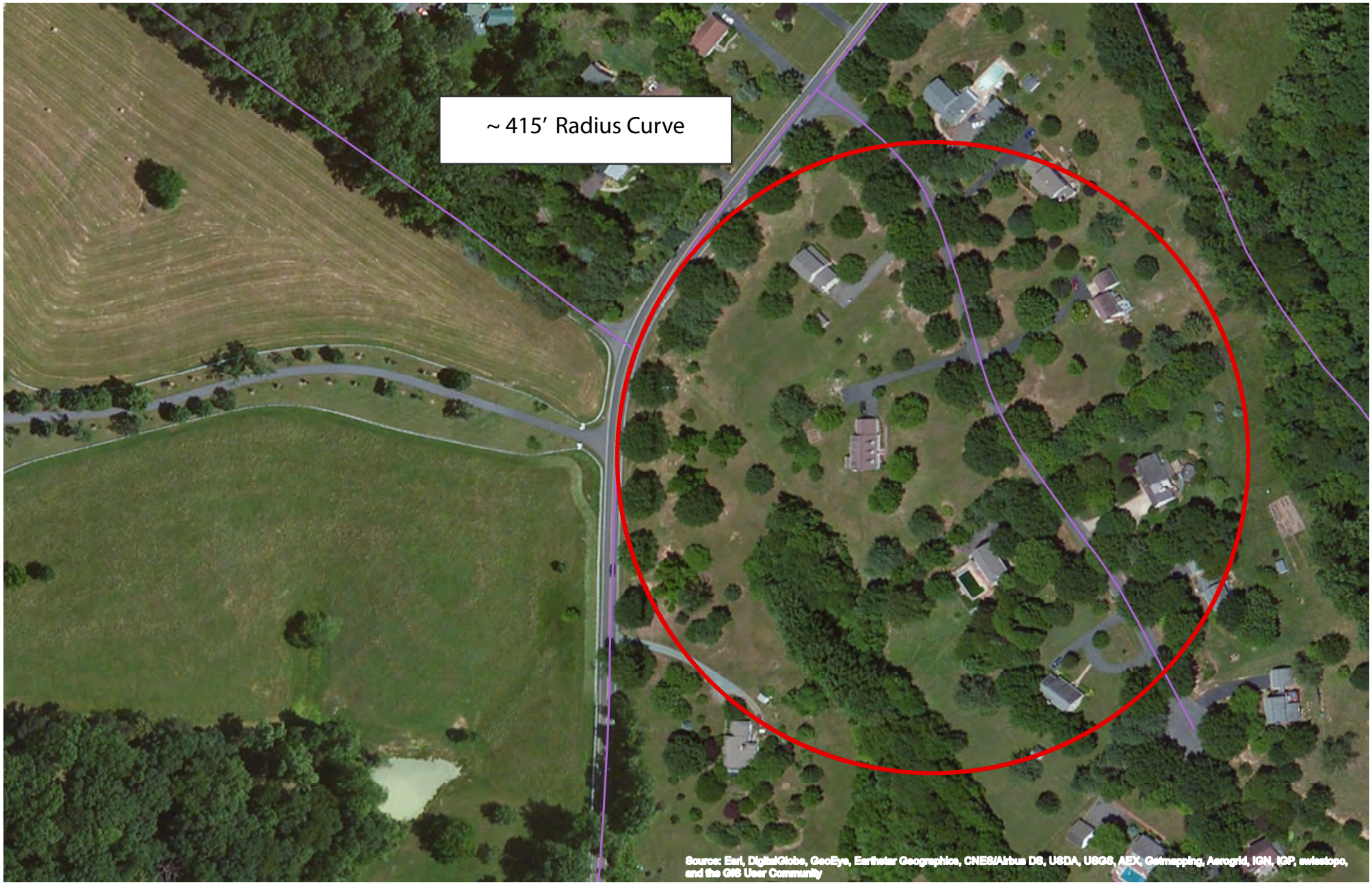


Figure 4 - Approximate Curve Radii Measurement 2

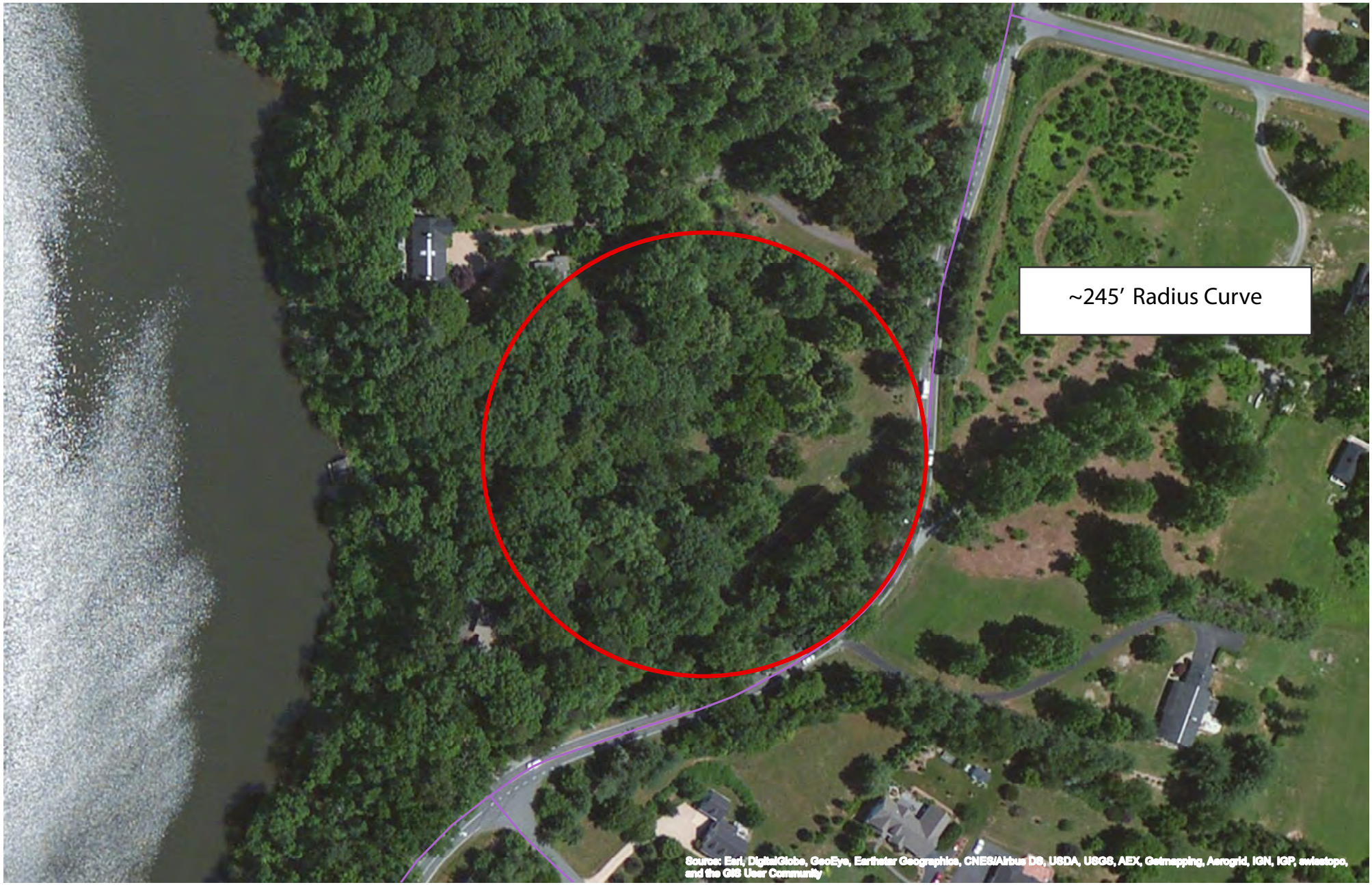


Figure 5 - Approximate Curve Radii Measurement 3

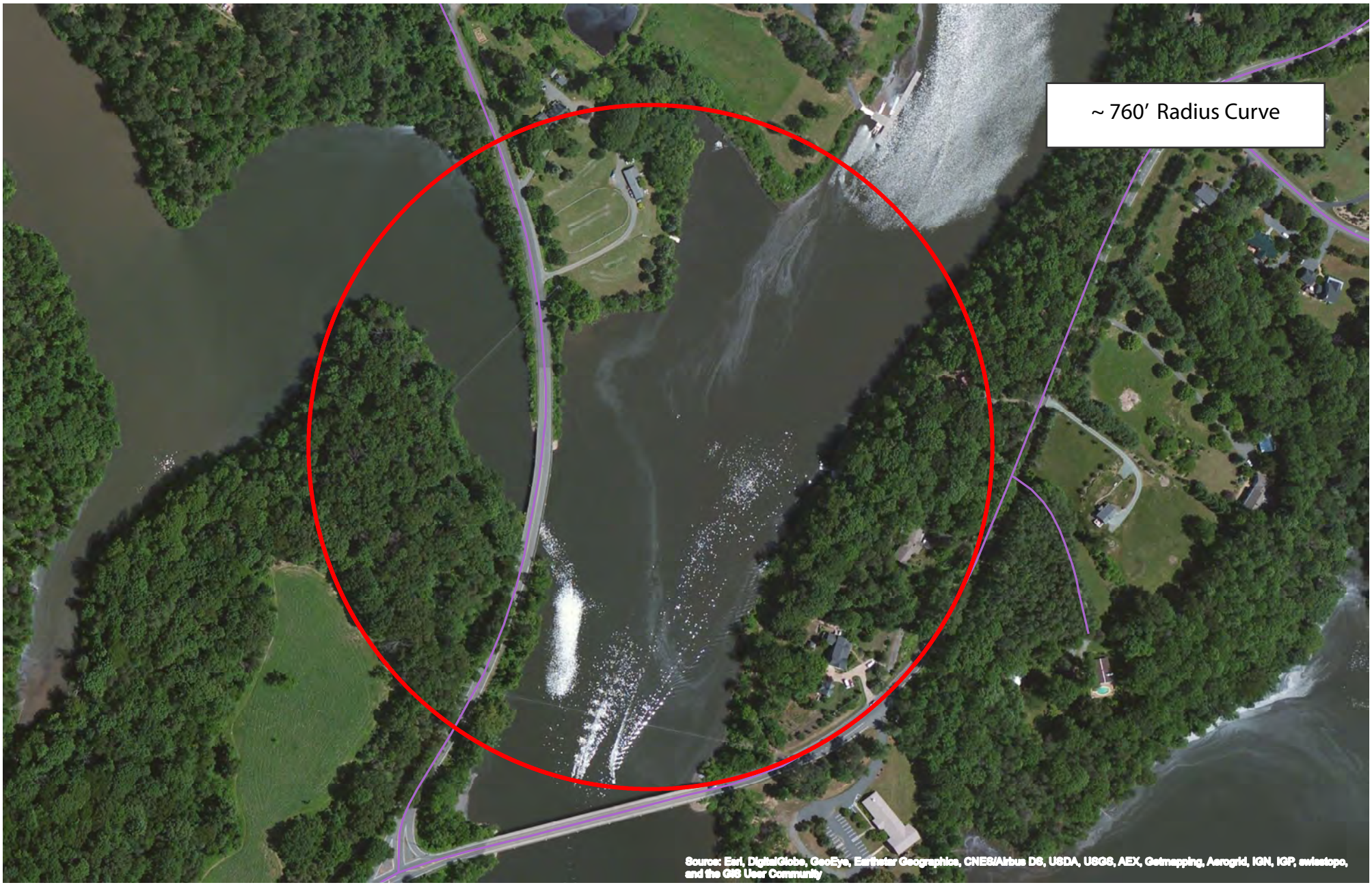
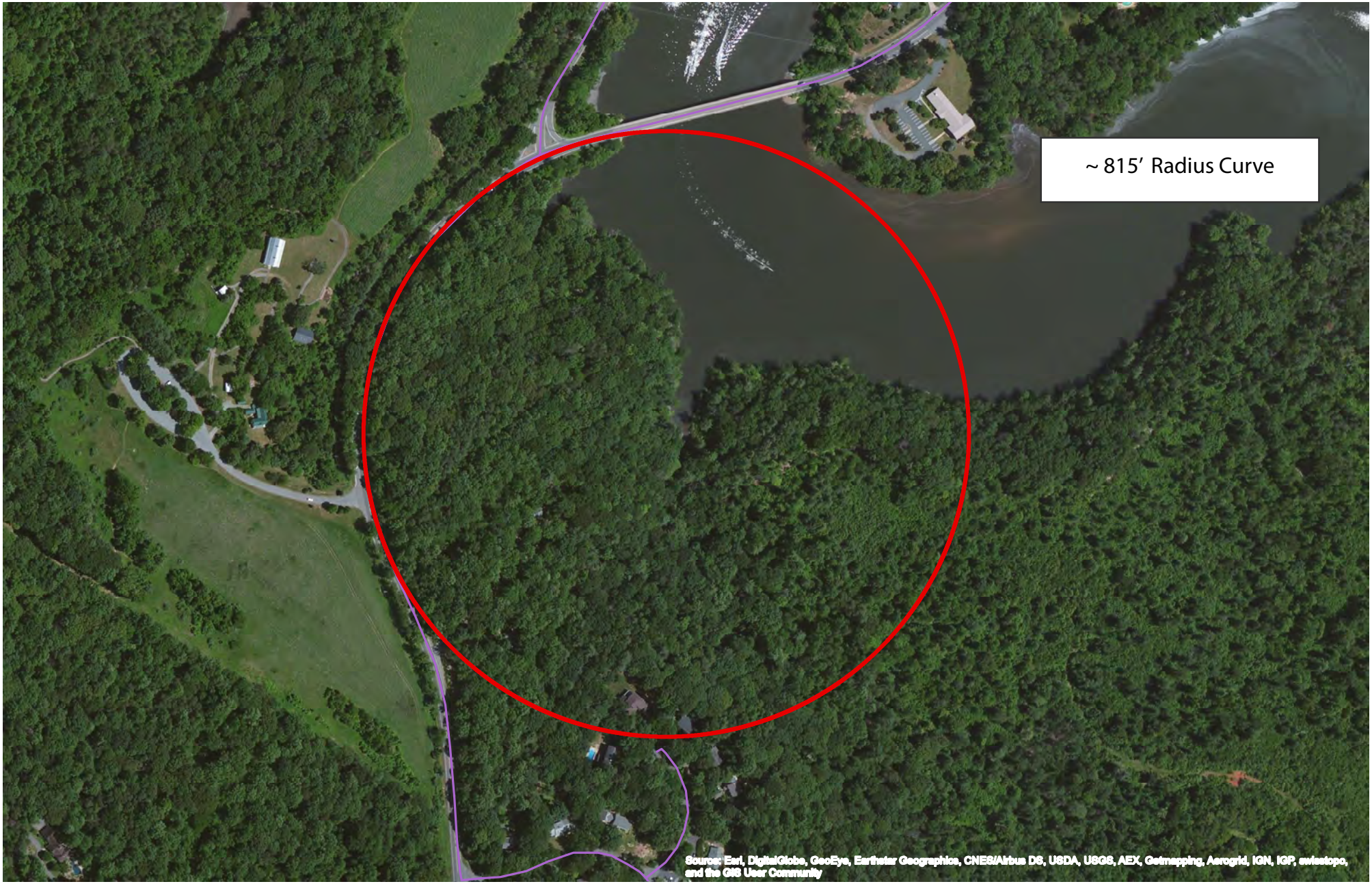


Figure 6 - Approximate Curve Radii Measurement 4



Documentation of Crash History

Crash history was recorded and visualized via aerial imagery as shown in **Figures 7 through 23.** The data for these maps was obtained from a VDOT database for the previous three years (2012-2015). This data includes location of the crash, the date of the accident, the time period it occurred, type of crash, and the type of vehicles involved in the crash.

Per the database, 60 crashes were recorded within the study area for the years 2012-2015. Of those crashes, 25 crashes were rear ends, accounting for 42% of all crashes. Only one truck was involved in any of the 60 crashes. This crash was a rear end incident involving the two-axle truck and two other cars. The vast majority of crashes occur traveling northbound, with just nine crashes occurring southbound.

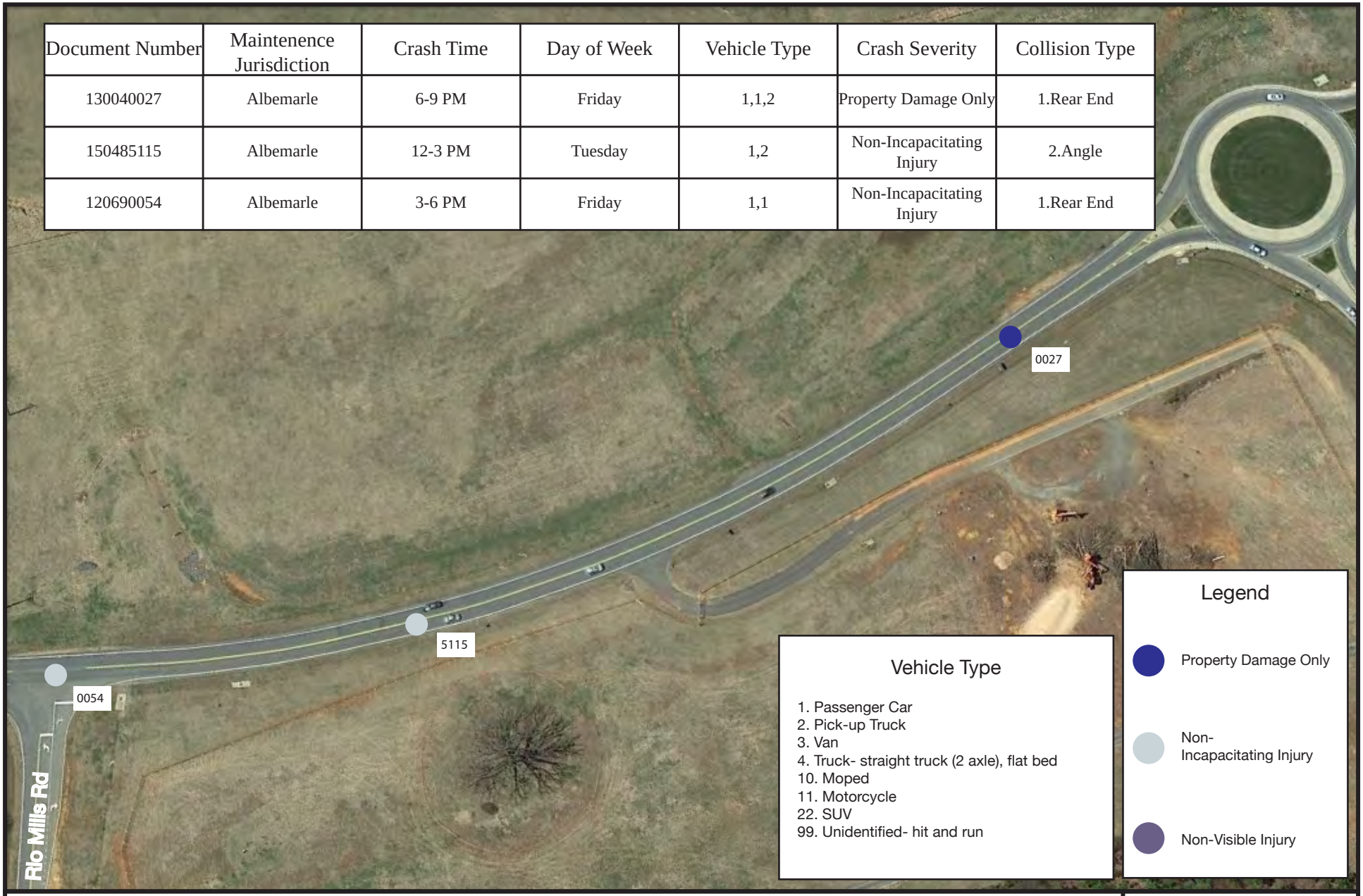
Crashes appear to be correlated to locations of entrances and sharper curves, and there is no apparent correlation with truck traffic. Particularly notable was the high concentration of crashes that occurred northbound at the Ivy Creek Natural Area. While a detailed analysis was not conducted, there could be a need to provide a destination sign in advance of the turn to warn motorists to slow and use their turn signal earlier in their approach. The theory being that many of the users of the facility are tourists or first time customers and the entrance can not be seen until the approaching vehicle is very close to the entrance. This could cause a quick breaking reaction resulting in rear end crashes. However, before any action is taken discussions with the law enforcement personnel who have responded to these crashes should be consulted to have benefit of their experience and perspectives.

Also, per inspection of the data there were numerous run-off the road crashes along the corridor. These could be the result of either a lack of shoulders, or they could be associated with avoidance maneuvers to avoid hitting another vehicle (rear end, side-swipe, and head-on). Additional study could be provided to include discussions with law enforcement officers who are responding to these incidents.

Finally, it should be noted that given the peak hour traffic volumes, left turn lanes could be warranted at numerous locations along the corridor. Right turn lanes may likely be warranted at locations experiencing 20 or more right turns in the primary peak hour of the day (by direction). Additional analysis on a location by location basis, for the peak periods of the day, would be required to more closely examine these needs.

Figure 7

Document Number	Maintenence Jurisdiction	Crash Time	Day of Week	Vehicle Type	Crash Severity	Collision Type
130040027	Albemarle	6-9 PM	Friday	1,1,2	Property Damage Only	1.Rear End
150485115	Albemarle	12-3 PM	Tuesday	1,2	Non-Incapacitating Injury	2.Angle
120690054	Albemarle	3-6 PM	Friday	1,1	Non-Incapacitating Injury	1.Rear End



Earlysville Road Study

Crash Locations and Frequencies

Crash Data Dates 2012-2015

Figure 8

Document Number	Maintenence Jurisdiction	Crash Time	Day of Week	Vehicle Type	Crash Severity	Collision Type
120440517	Albemarle	12-3 PM	Tuesday	1,3,22	Property Damage Only	1.Rear End
141925280	Albemarle	3-6 PM	Friday	22,22,22	Property Damage Only	1.Rear End
143335174	Albemarle	6-9 PM	Saturday	1,1	Property Damage Only	16.Other
1231920259	Albemarle	6-9 PM	Thursday	1	Property Damage Only	10.Deer
1243285293	Albemarle	9 AM-12 PM	Monday	2,1	Property Damage Only	28. Ran Off Road

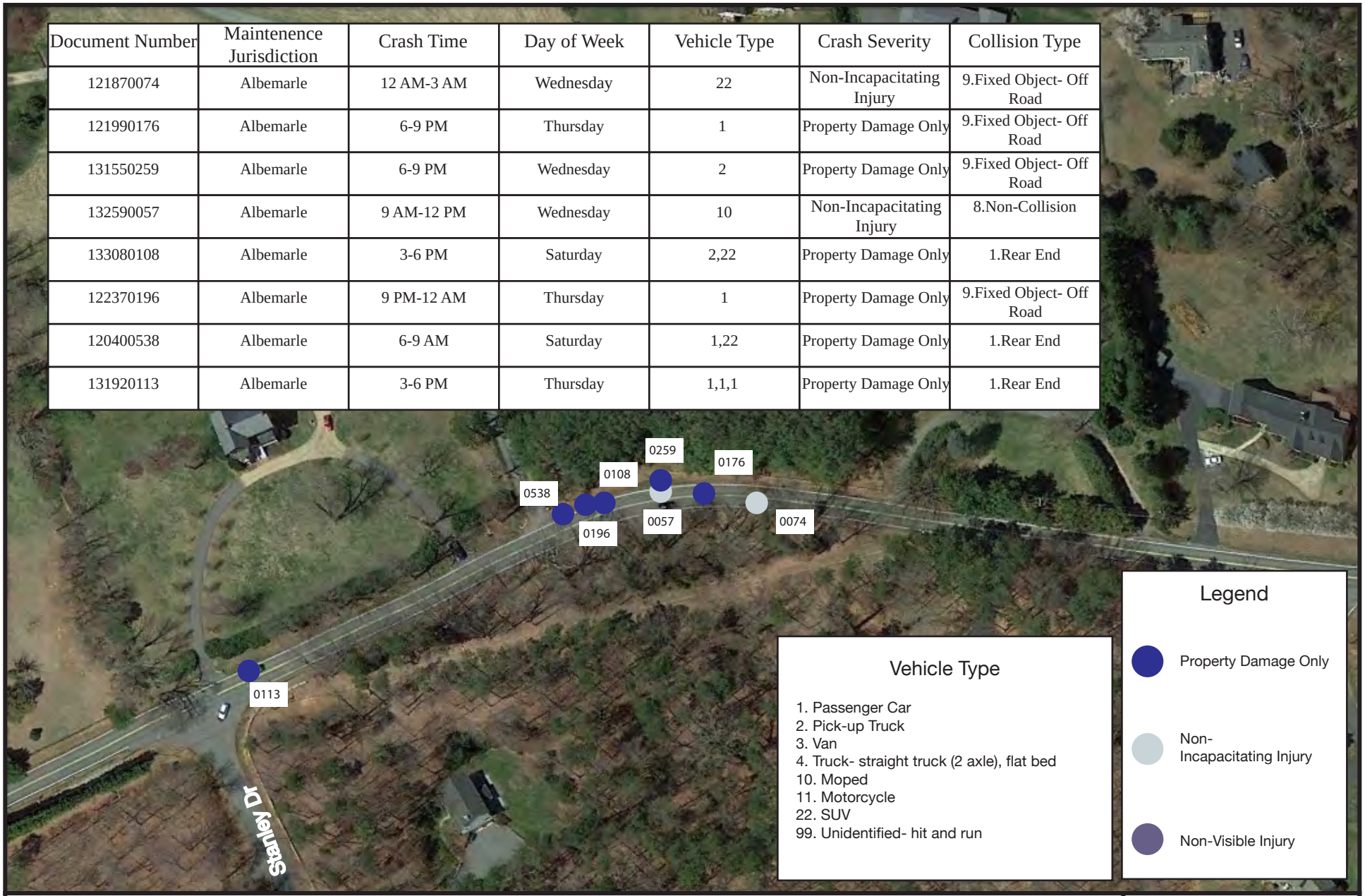
Earlysville Road Study

Crash Locations and Frequencies

Crash Data Dates 2012-2015

Figure 9

Document Number	Maintenence Jurisdiction	Crash Time	Day of Week	Vehicle Type	Crash Severity	Collision Type
121870074	Albemarle	12 AM-3 AM	Wednesday	22	Non-Incapacitating Injury	9.Fixed Object- Off Road
121990176	Albemarle	6-9 PM	Thursday	1	Property Damage Only	9.Fixed Object- Off Road
131550259	Albemarle	6-9 PM	Wednesday	2	Property Damage Only	9.Fixed Object- Off Road
132590057	Albemarle	9 AM-12 PM	Wednesday	10	Non-Incapacitating Injury	8.Non-Collision
133080108	Albemarle	3-6 PM	Saturday	2,22	Property Damage Only	1.Rear End
122370196	Albemarle	9 PM-12 AM	Thursday	1	Property Damage Only	9.Fixed Object- Off Road
120400538	Albemarle	6-9 AM	Saturday	1,22	Property Damage Only	1.Rear End
131920113	Albemarle	3-6 PM	Thursday	1,1,1	Property Damage Only	1.Rear End



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Crash Locations and Frequencies

Crash Data Dates 2012-2015

Figure 10

Document Number	Maintenence Jurisdiction	Crash Time	Day of Week	Vehicle Type	Crash Severity	Collision Type
143055168	Albemarle	12-3 PM	Saturday	1	Property Damage Only	10.Deer
150075090	Albemarle	6-9 AM	Wednesday	3	Property Damage Only	10.Deer

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Crash Locations and Frequencies

Crash Data Dates 2012-2015

Figure 11

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Crash Locations and Frequencies

Crash Data Dates 2012-2015

Figure 12

Document Number	Maintenence Jurisdiction	Crash Time	Day of Week	Vehicle Type	Crash Severity	Collision Type
133115245	Albemarle	3-6 PM	Wednesday	1,11	Non-Incapacitating Injury	2.Angle
142925073	Albemarle	9 AM-12 PM	Sunday	1	Property Damage Only	10.Deer
132330192	Albemarle	6-9 AM	Wednesday	1,1	Property Damage Only	5. Sideswipe

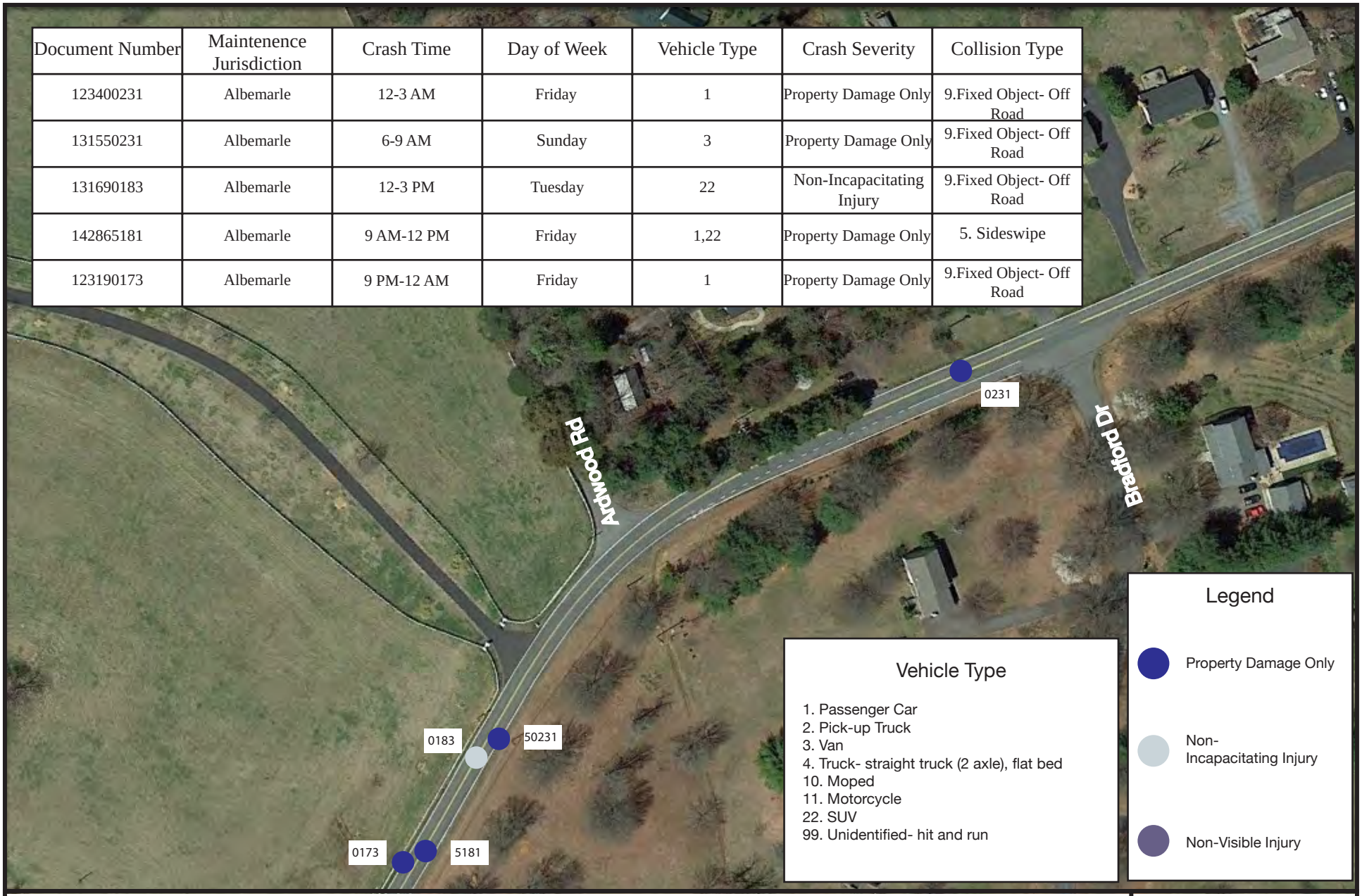
Earlysville Road Study

Crash Locations and Frequencies

Crash Data Dates 2012-2015

Figure 13

Document Number	Maintenence Jurisdiction	Crash Time	Day of Week	Vehicle Type	Crash Severity	Collision Type
123400231	Albemarle	12-3 AM	Friday	1	Property Damage Only	9.Fixed Object- Off Road
131550231	Albemarle	6-9 AM	Sunday	3	Property Damage Only	9.Fixed Object- Off Road
131690183	Albemarle	12-3 PM	Tuesday	22	Non-Incapacitating Injury	9.Fixed Object- Off Road
142865181	Albemarle	9 AM-12 PM	Friday	1,22	Property Damage Only	5. Sideswipe
123190173	Albemarle	9 PM-12 AM	Friday	1	Property Damage Only	9.Fixed Object- Off Road



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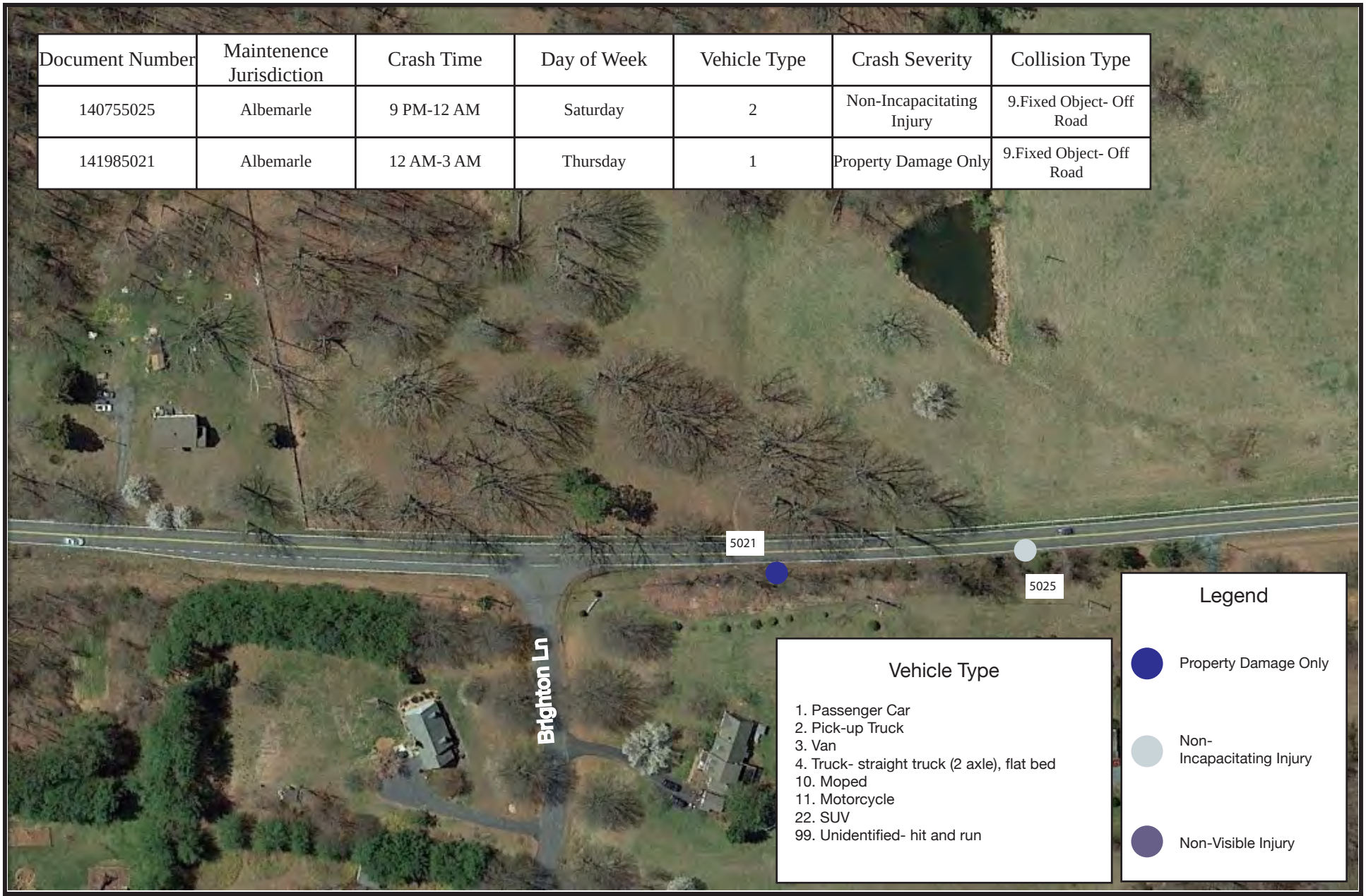
Crash Locations and Frequencies

Crash Data Dates 2012-2015

Figure 14

Document Number	Maintenence Jurisdiction	Crash Time	Day of Week	Vehicle Type	Crash Severity	Collision Type
140755025	Albemarle	9 PM-12 AM	Saturday	2	Non-Incapacitating Injury	9.Fixed Object- Off Road
141985021	Albemarle	12 AM-3 AM	Thursday	1	Property Damage Only	9.Fixed Object- Off Road



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Crash Locations and Frequencies

Crash Data Dates 2012-2015

N

Figure 15

Document Number	Maintenence Jurisdiction	Crash Time	Day of Week	Vehicle Type	Crash Severity	Collision Type
133180057	Albemarle	6 AM-9 AM	Wednesday	1,3	Property Damage Only	1.Rear End

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Crash Locations and Frequencies

Crash Data Dates 2012-2015

N

Figure 16

Document Number	Maintenence Jurisdiction	Crash Time	Day of Week	Vehicle Type	Crash Severity	Collision Type
142835309	Albemarle	12-3 PM	Thursday	1,2	Property Damage Only	5. Sideswipe

Earlysville Road Study

Crash Locations and Frequencies

Crash Data Dates 2012-2015

Figure 17

Document Number	Maintenence Jurisdiction	Crash Time	Day of Week	Vehicle Type	Crash Severity	Collision Type
130500020	Albemarle	6-9 PM	Wednesday	22,22	Property Damage Only	5. Sideswipe
120400437	Albemarle	9 PM-12 AM	Saturday	2	Property Damage Only	9.Fixed Object- Off Road
132330079	Albemarle	6-9 PM	Wednesday	1	Property Damage Only	9.Fixed Object- Off Road
121430084	Albemarle	12 AM-3 AM	Saturday	1	Property Damage Only	10.Deer

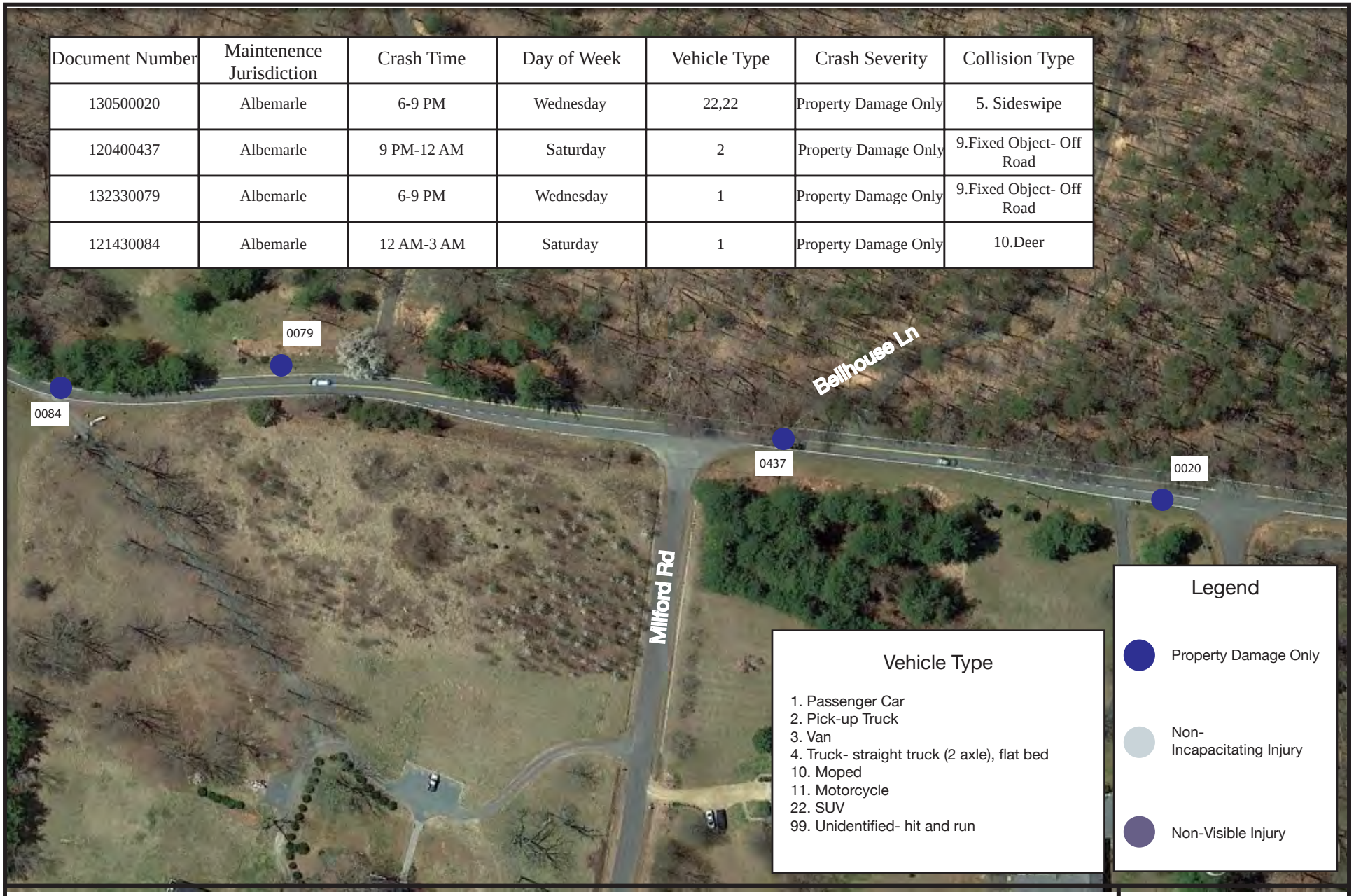

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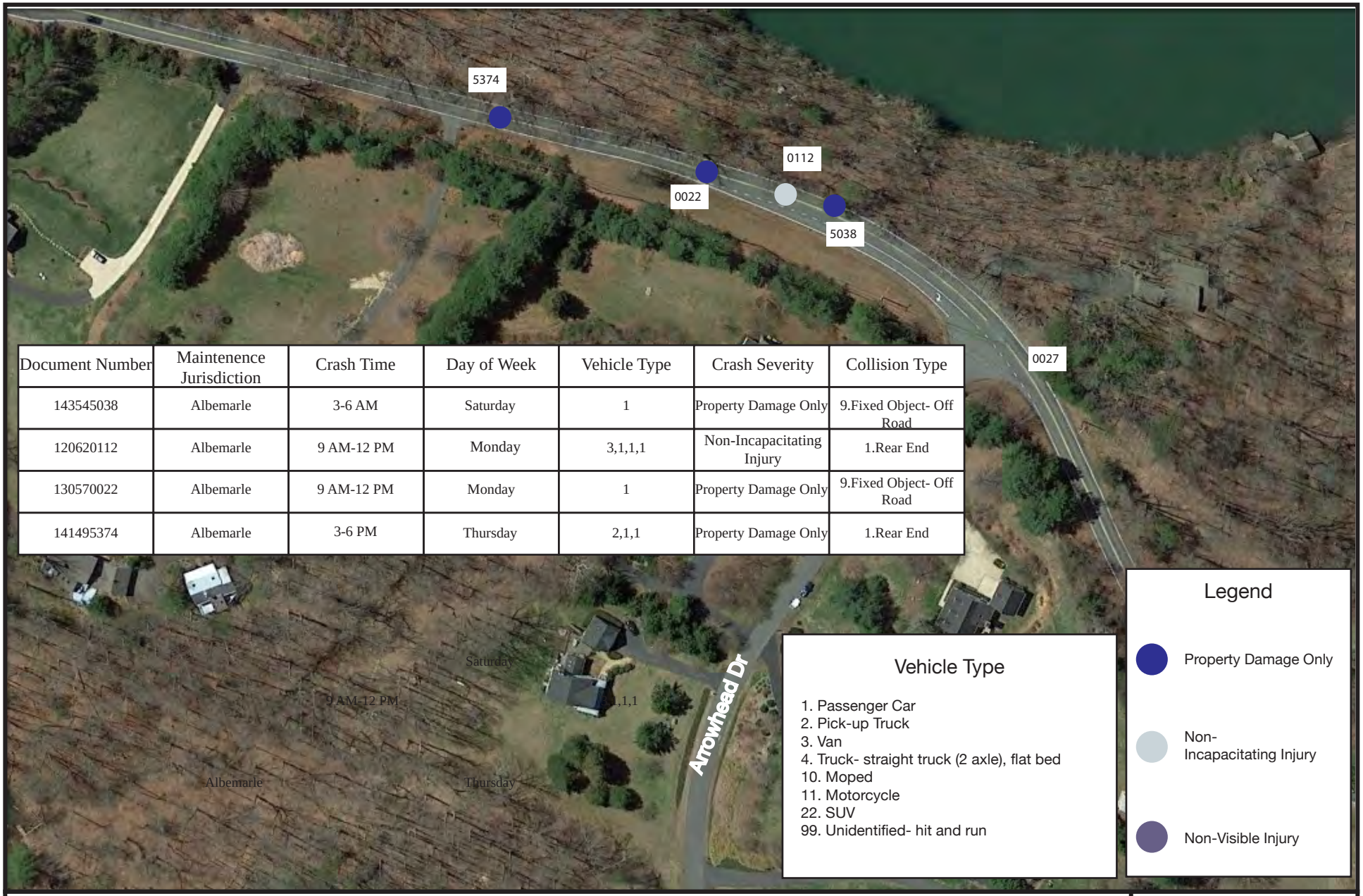
Figure 18



Document Number	Maintenence Jurisdiction	Crash Time	Day of Week	Vehicle Type	Crash Severity	Collision Type
143545038	Albemarle	3-6 AM	Saturday	1	Property Damage Only	9.Fixed Object- Off Road
120620112	Albemarle	9 AM-12 PM	Monday	3,1,1,1	Non-Incapacitating Injury	1.Rear End
130570022	Albemarle	9 AM-12 PM	Monday	1	Property Damage Only	9.Fixed Object- Off Road
141495374	Albemarle	3-6 PM	Thursday	2,1,1	Property Damage Only	1.Rear End

Vehicle Type

1. Passenger Car
2. Pick-up Truck
3. Van
4. Truck- straight truck (2 axle), flat bed
10. Moped
11. Motorcycle
22. SUV
99. Unidentified- hit and run

Legend

- Property Damage Only
- Non-Incapacitating Injury
- Non-Visible Injury

Earlysville Road Study

Crash Locations and Frequencies

Crash Data Dates 2012-2015

Figure 19

Document Number	Maintenence Jurisdiction	Crash Time	Day of Week	Vehicle Type	Crash Severity	Collision Type

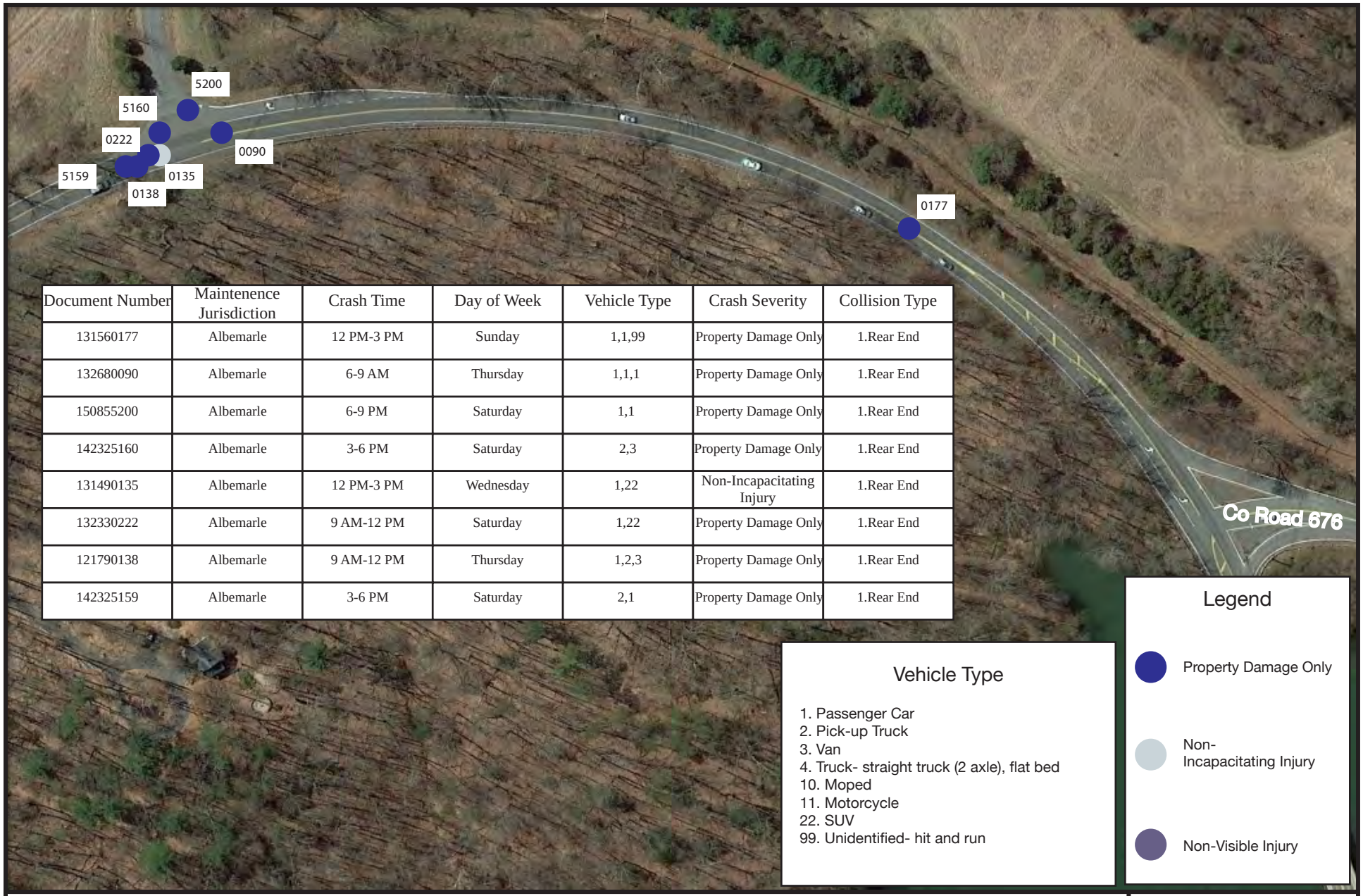
Earlysville Road Study

Crash Locations and Frequencies

Crash Data Dates 2012-2015

N

Figure 20



Document Number	Maintenence Jurisdiction	Crash Time	Day of Week	Vehicle Type	Crash Severity	Collision Type
131560177	Albemarle	12 PM-3 PM	Sunday	1,1,99	Property Damage Only	1.Rear End
132680090	Albemarle	6-9 AM	Thursday	1,1,1	Property Damage Only	1.Rear End
150855200	Albemarle	6-9 PM	Saturday	1,1	Property Damage Only	1.Rear End
142325160	Albemarle	3-6 PM	Saturday	2,3	Property Damage Only	1.Rear End
131490135	Albemarle	12 PM-3 PM	Wednesday	1,22	Non-Incapacitating Injury	1.Rear End
132330222	Albemarle	9 AM-12 PM	Saturday	1,22	Property Damage Only	1.Rear End
121790138	Albemarle	9 AM-12 PM	Thursday	1,2,3	Property Damage Only	1.Rear End
142325159	Albemarle	3-6 PM	Saturday	2,1	Property Damage Only	1.Rear End

Vehicle Type

1. Passenger Car
2. Pick-up Truck
3. Van
4. Truck- straight truck (2 axle), flat bed
10. Moped
11. Motorcycle
22. SUV
99. Unidentified- hit and run

Legend

- Property Damage Only
- Non-Incapacitating Injury
- Non-Visible Injury

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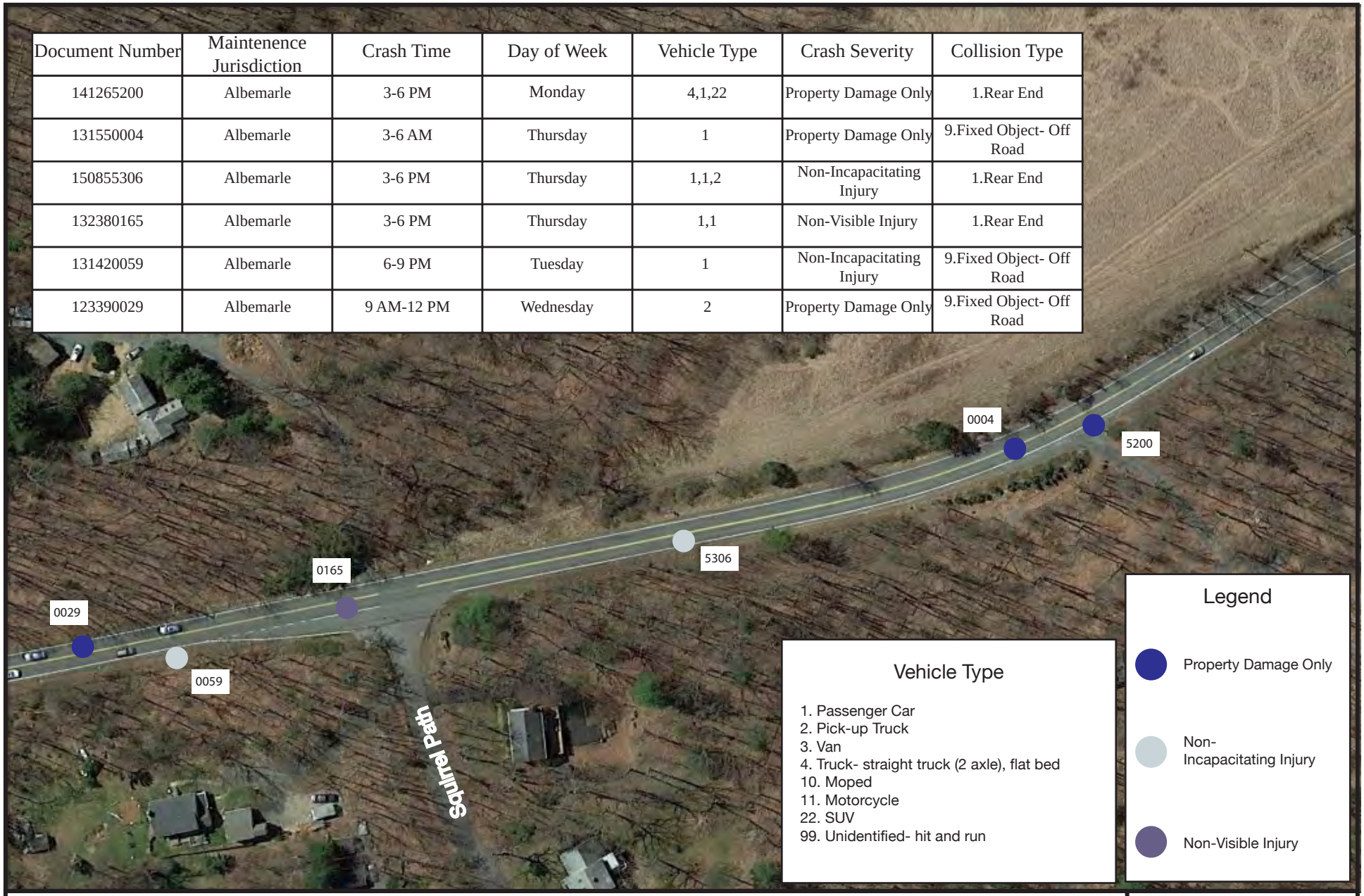
Figure 21

Document Number	Maintenence Jurisdiction	Crash Time	Day of Week	Vehicle Type	Crash Severity	Collision Type
141265200	Albemarle	3-6 PM	Monday	4,1,22	Property Damage Only	1.Rear End
131550004	Albemarle	3-6 AM	Thursday	1	Property Damage Only	9.Fixed Object- Off Road
150855306	Albemarle	3-6 PM	Thursday	1,1,2	Non-Incapacitating Injury	1.Rear End
132380165	Albemarle	3-6 PM	Thursday	1,1	Non-Visible Injury	1.Rear End
131420059	Albemarle	6-9 PM	Tuesday	1	Non-Incapacitating Injury	9.Fixed Object- Off Road
123390029	Albemarle	9 AM-12 PM	Wednesday	2	Property Damage Only	9.Fixed Object- Off Road



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Crash Locations and Frequencies

Crash Data Dates 2012-2015

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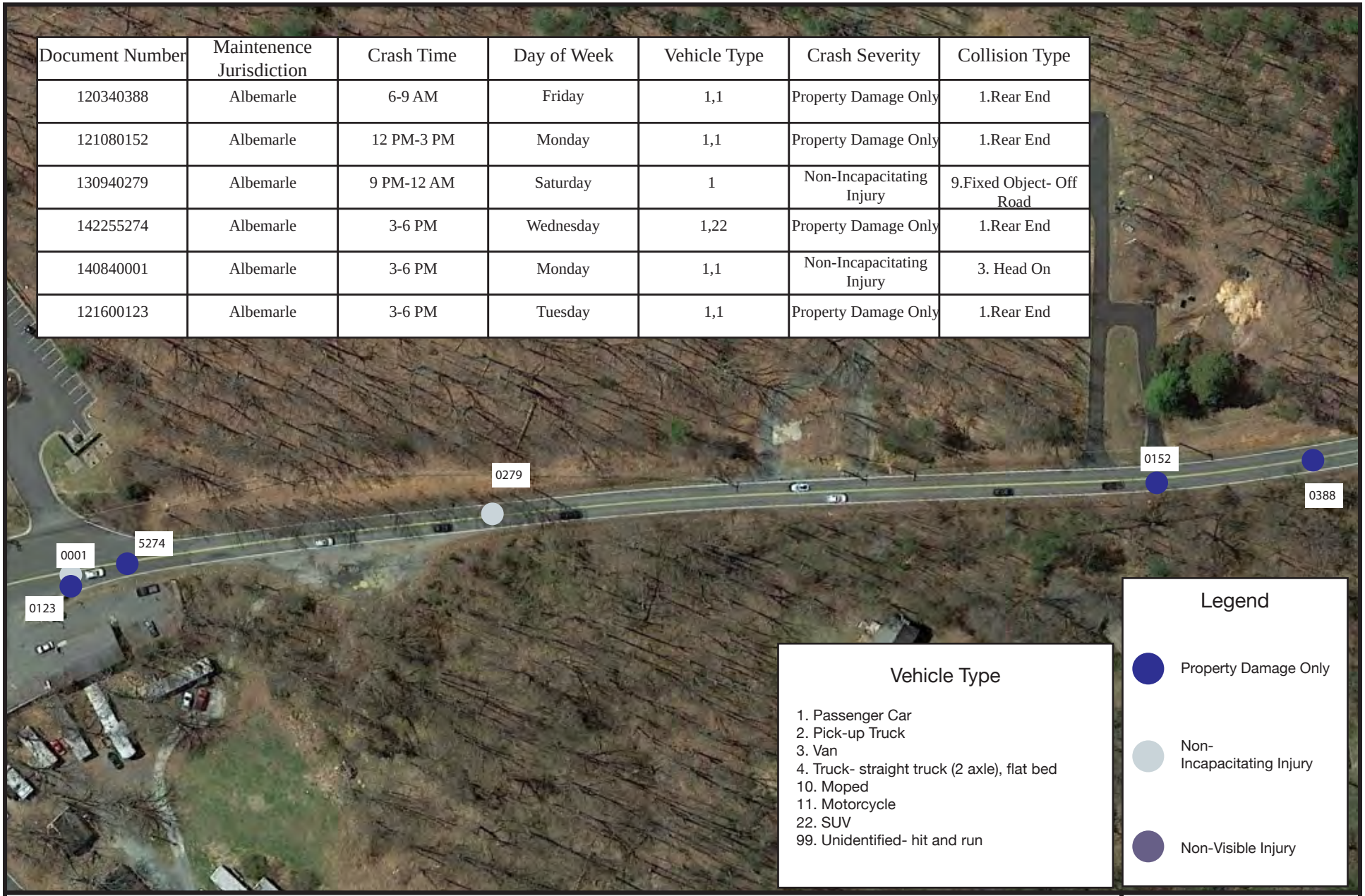
Figure 22

Document Number	Maintenence Jurisdiction	Crash Time	Day of Week	Vehicle Type	Crash Severity	Collision Type
120340388	Albemarle	6-9 AM	Friday	1,1	Property Damage Only	1.Rear End
121080152	Albemarle	12 PM-3 PM	Monday	1,1	Property Damage Only	1.Rear End
130940279	Albemarle	9 PM-12 AM	Saturday	1	Non-Incapacitating Injury	9.Fixed Object- Off Road
142255274	Albemarle	3-6 PM	Wednesday	1,22	Property Damage Only	1.Rear End
140840001	Albemarle	3-6 PM	Monday	1,1	Non-Incapacitating Injury	3. Head On
121600123	Albemarle	3-6 PM	Tuesday	1,1	Property Damage Only	1.Rear End



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Crash Locations and Frequencies

Crash Data Dates 2012-2015

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Figure 23

Document Number	Maintenence Jurisdiction	Crash Time	Day of Week	Vehicle Type	Crash Severity	Collision Type
140350019	Albemarle	3-6 PM	Sunday	1,22	Property Damage Only	4. Sideswipe
122680016	Albemarle	9 AM-12 PM	Monday	1,22	Non-Incapacitating Injury	1.Rear End

Earlysville Road Study

Crash Locations and Frequencies

Crash Data Dates 2012-2015

Conclusions

• Overall there seems to be a fairly typical number of multiple axle trucks (i.e. three or more axles) on the Earlysville Road corridor. The truck percentage does not generally exceed the typical value of 2% that is found across the state on similar facilities. Note that the 2% does not include long wheelbase two axle vehicles, such as delivery trucks including mulch trucks, fedex trucks, etc.

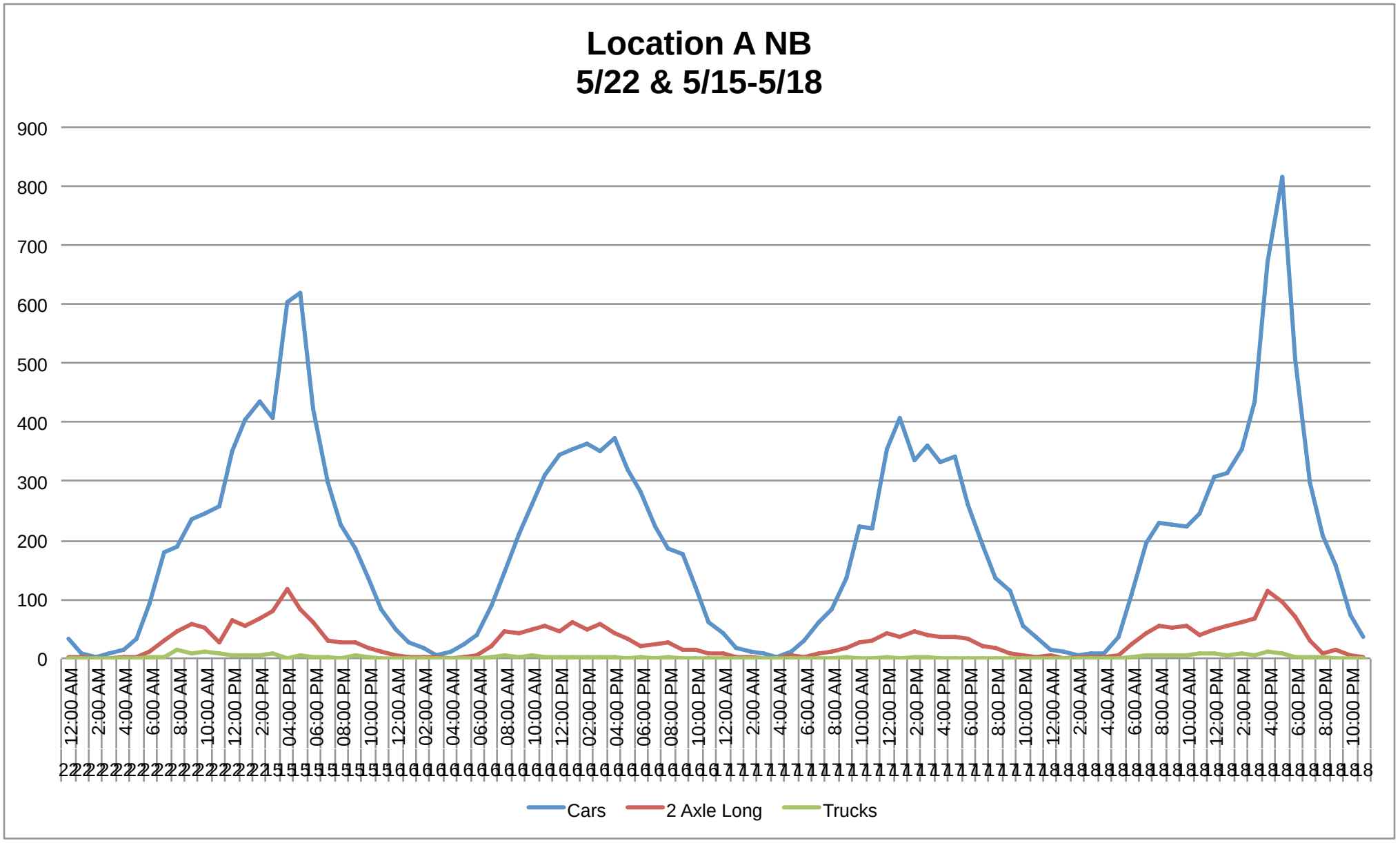
• The study corridor has features that do not meet current design standards, though we would look for a correlation with crash data before identifying road design as a major concern relative to truck traffic.

• The crash data does not appear to indicate that trucks are causing crashes along the corridor.

Additional – in considering the pending Route 29 Solutions Project, there may be some need to consider and anticipate increased traffic, and truck traffic, resulting from detours when traffic avoiding the construction zone. That will be a temporary condition for a situation that is beyond the scope of analysis in this study.

Appendices

Appendix A Graphed Traffic Data 5/18-5/22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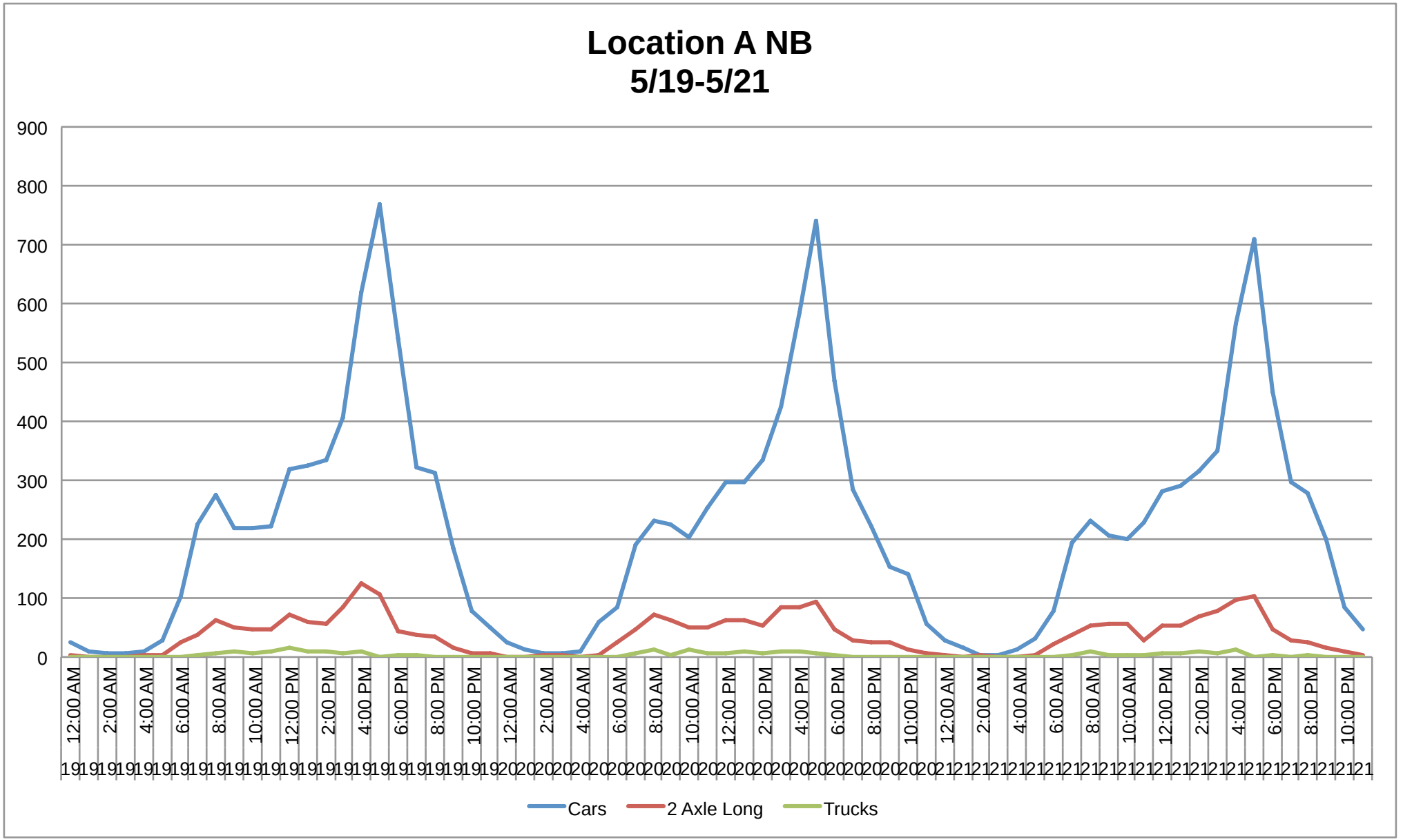
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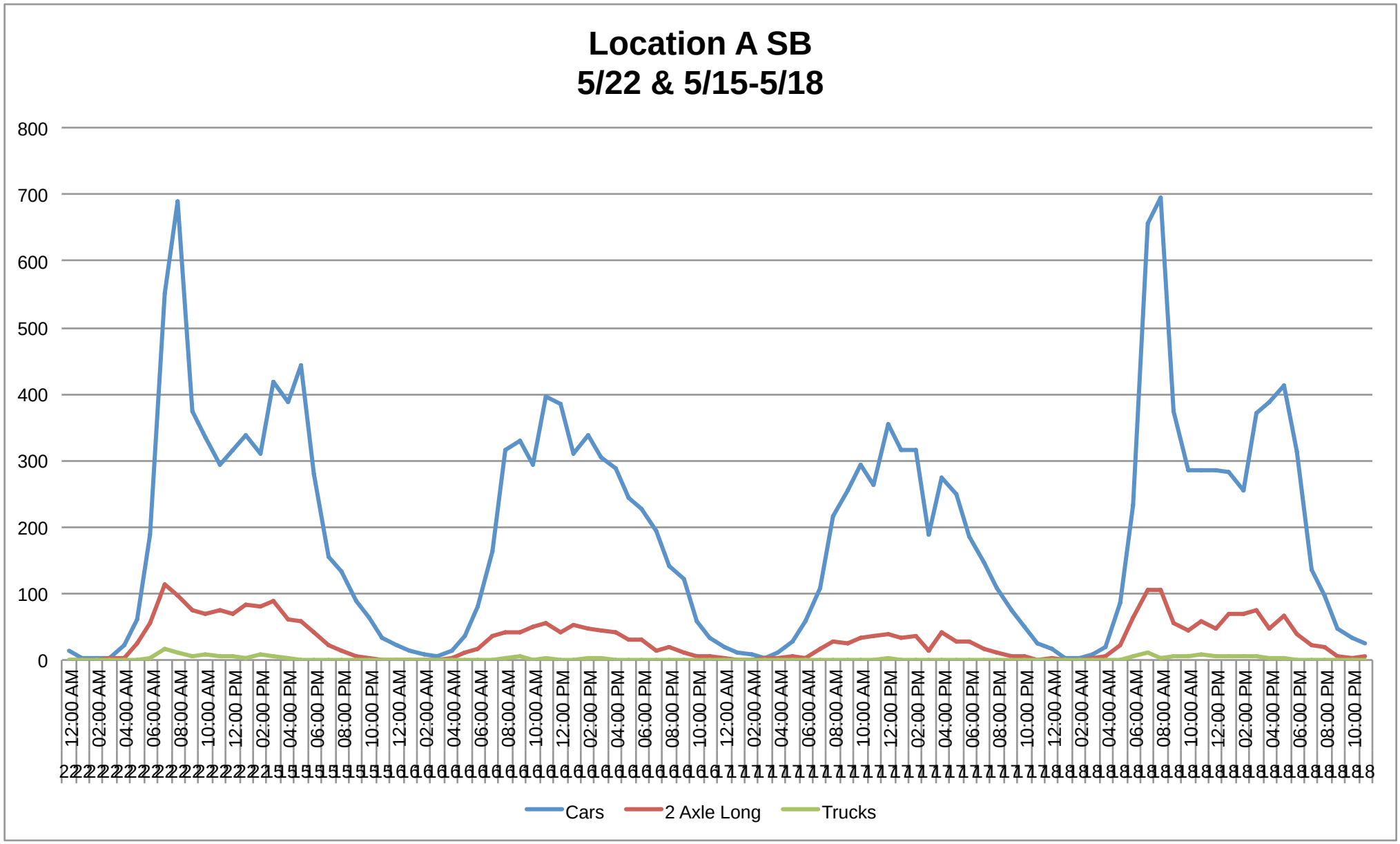
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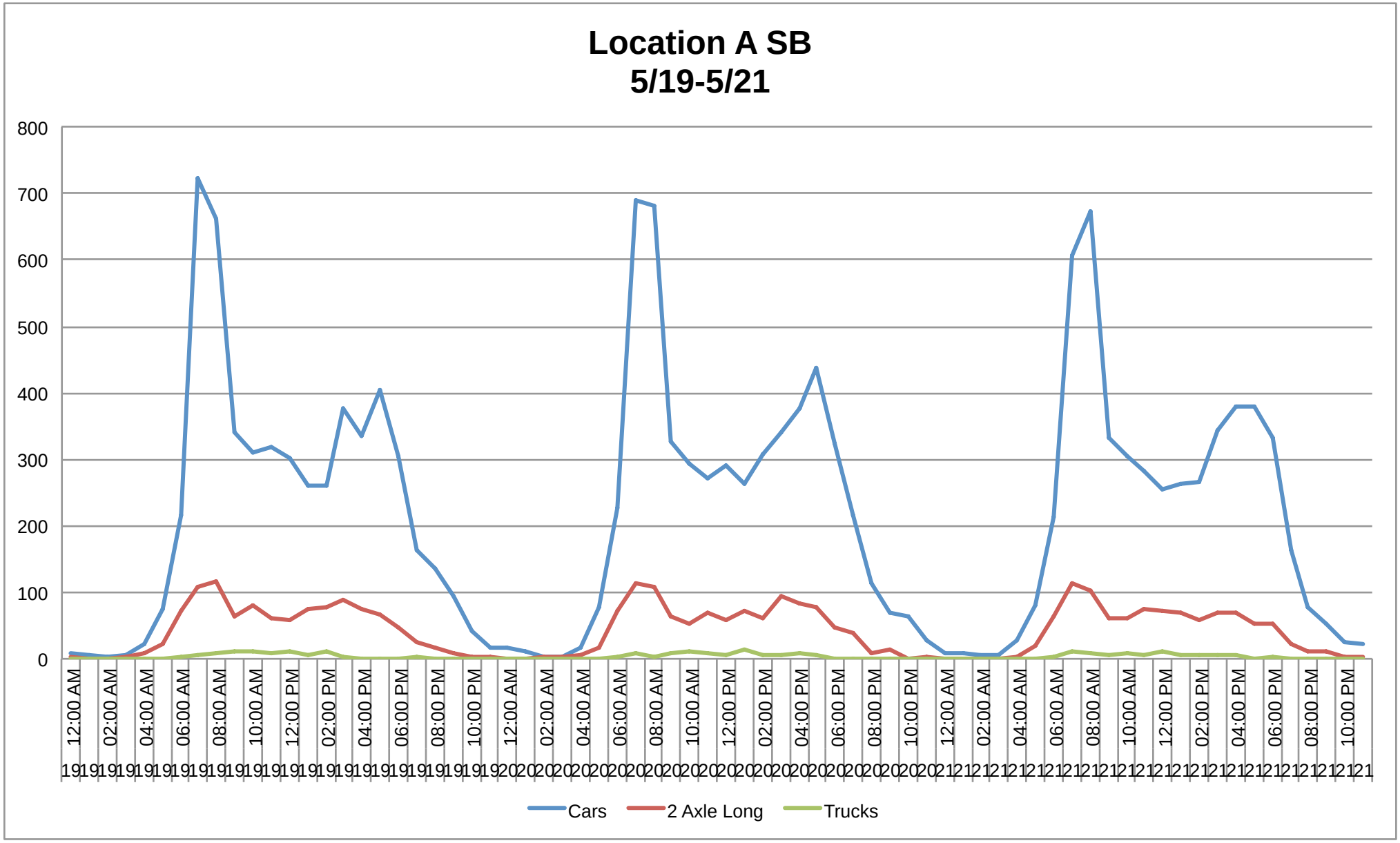
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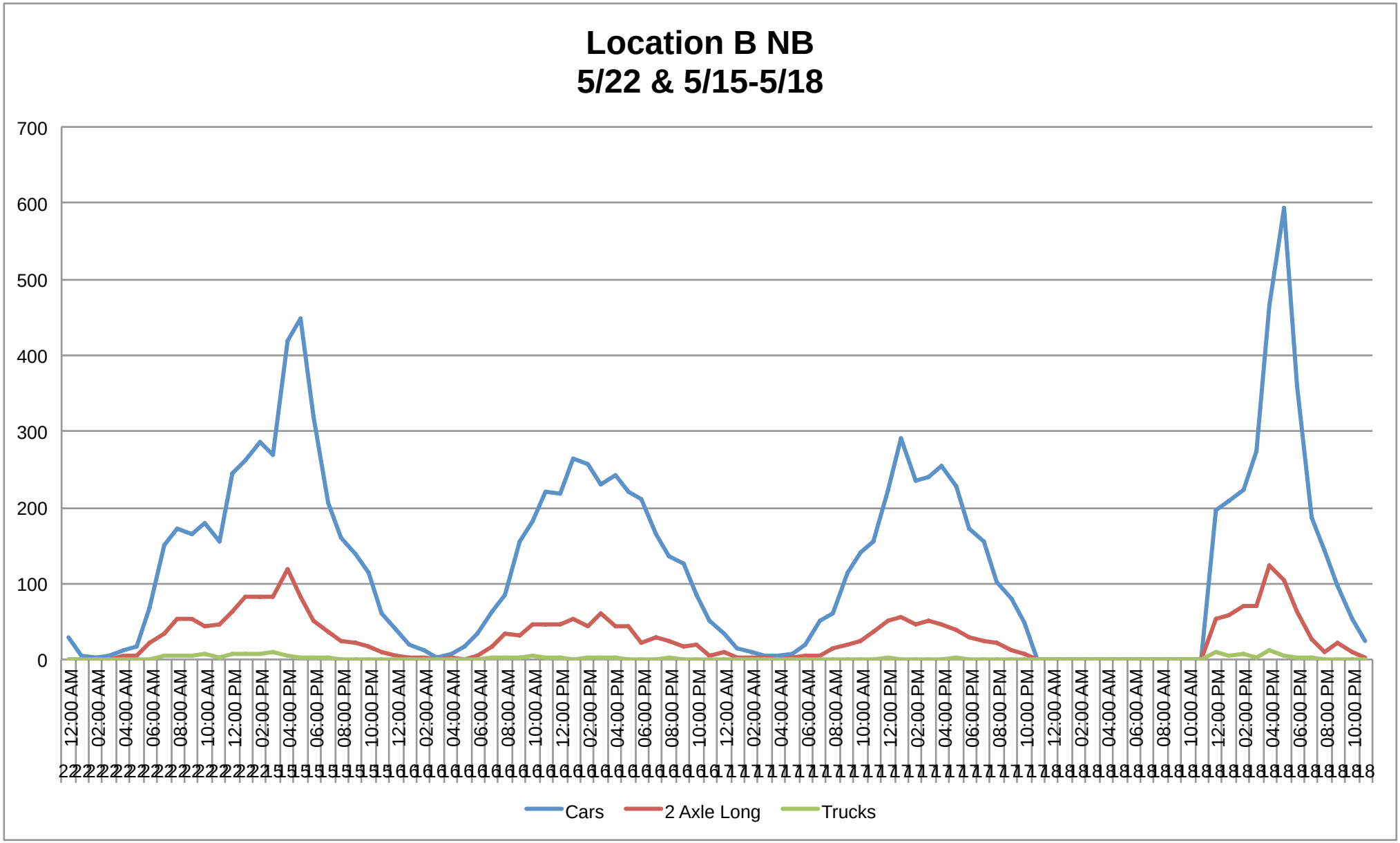

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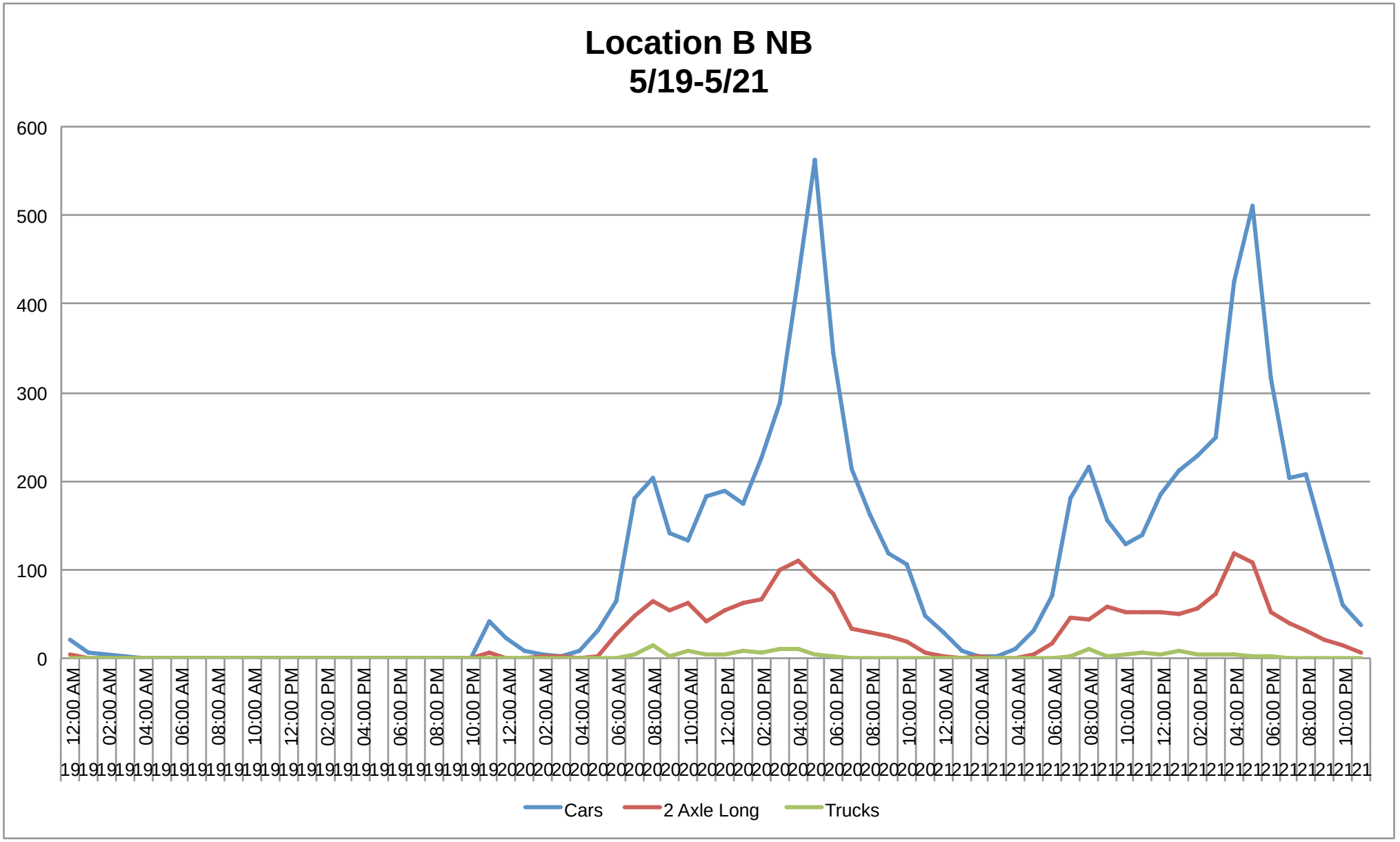

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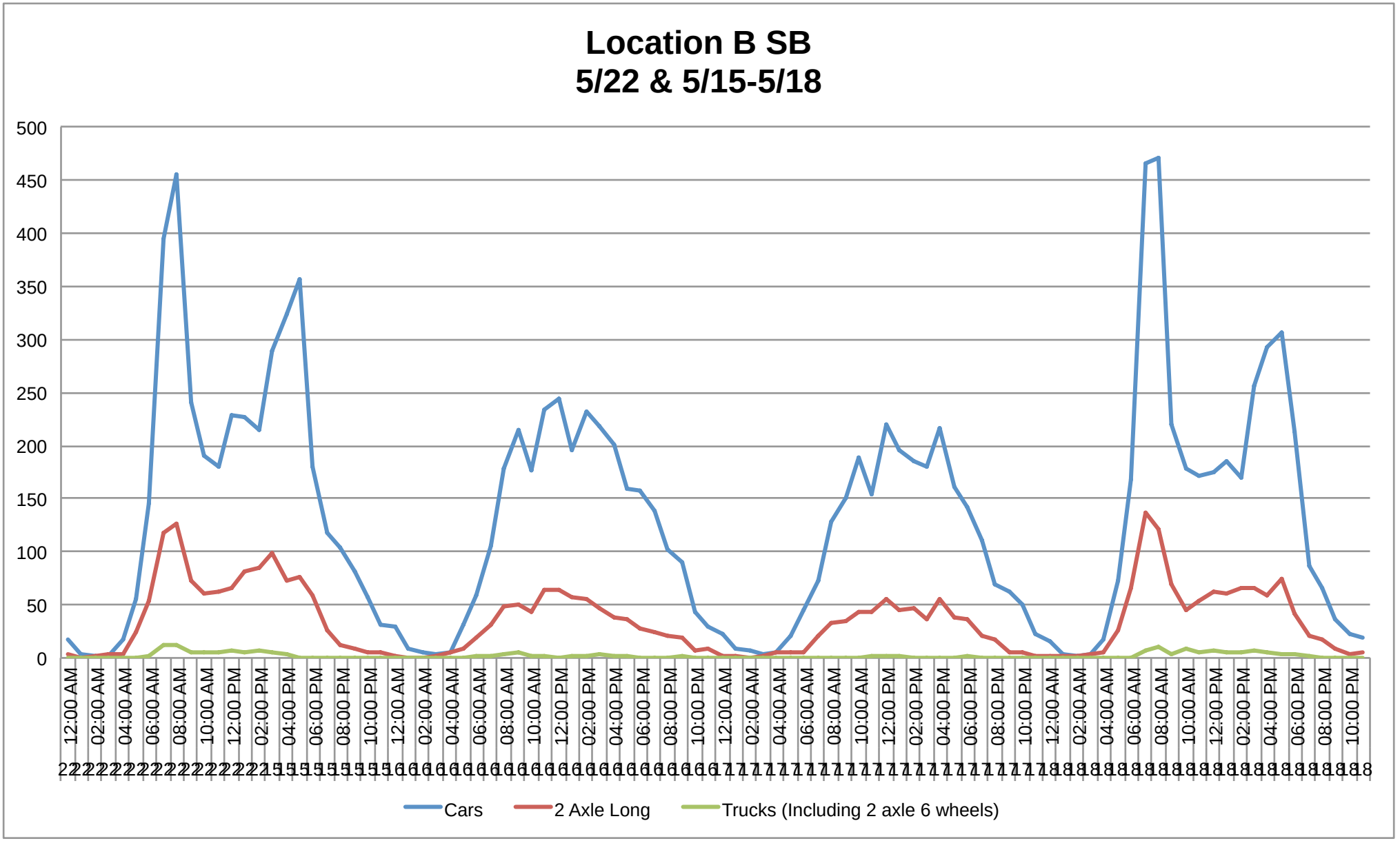
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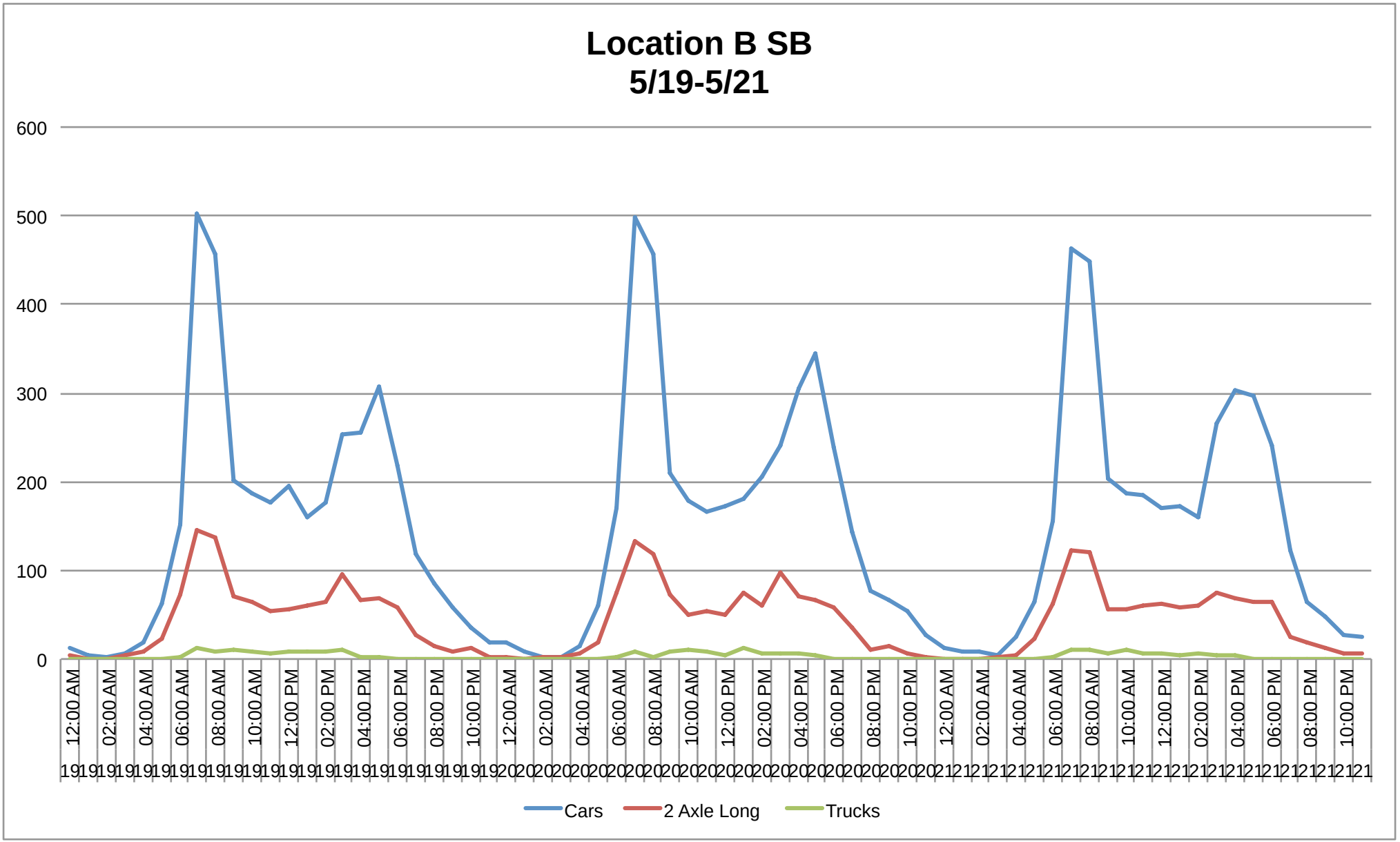
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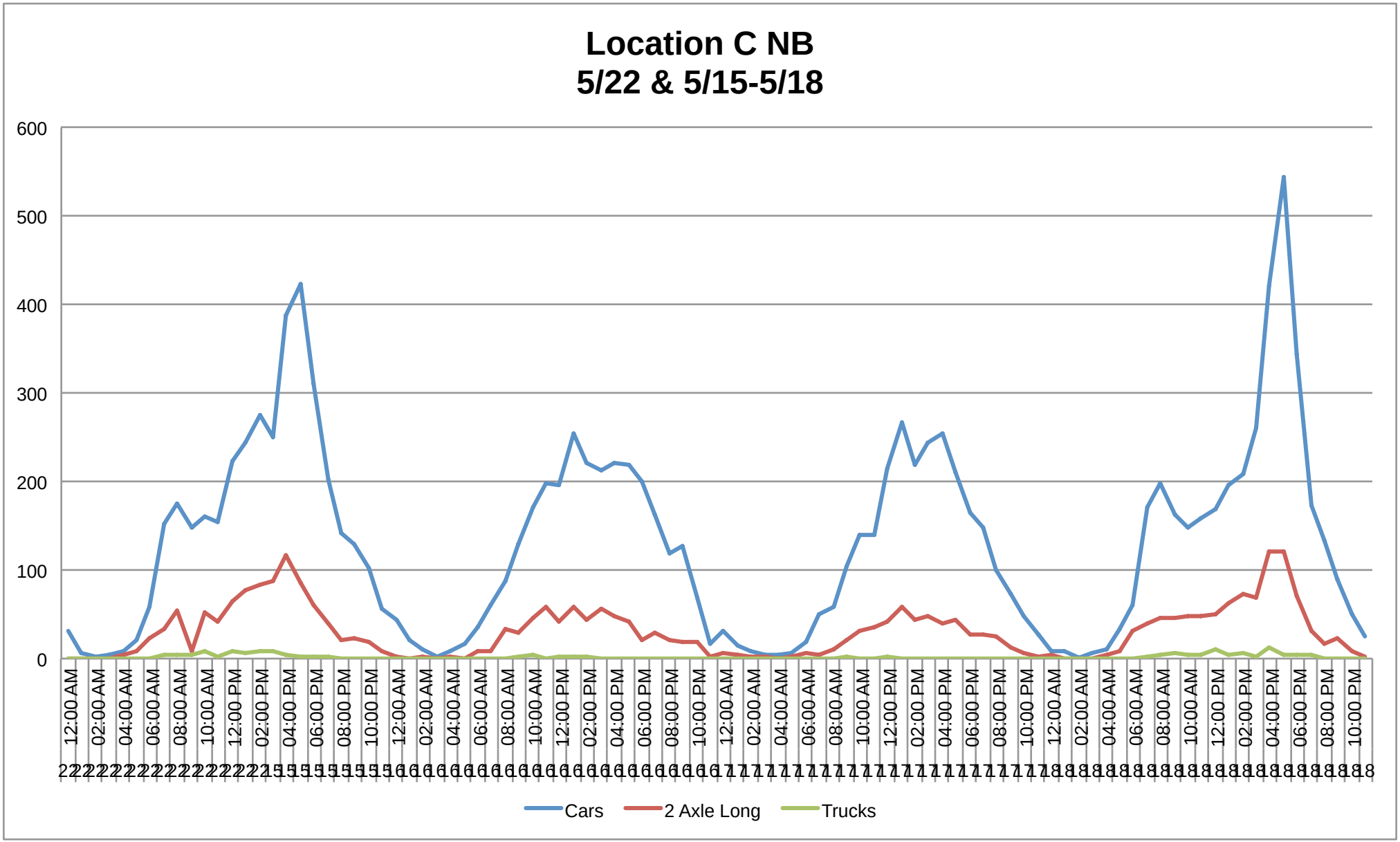
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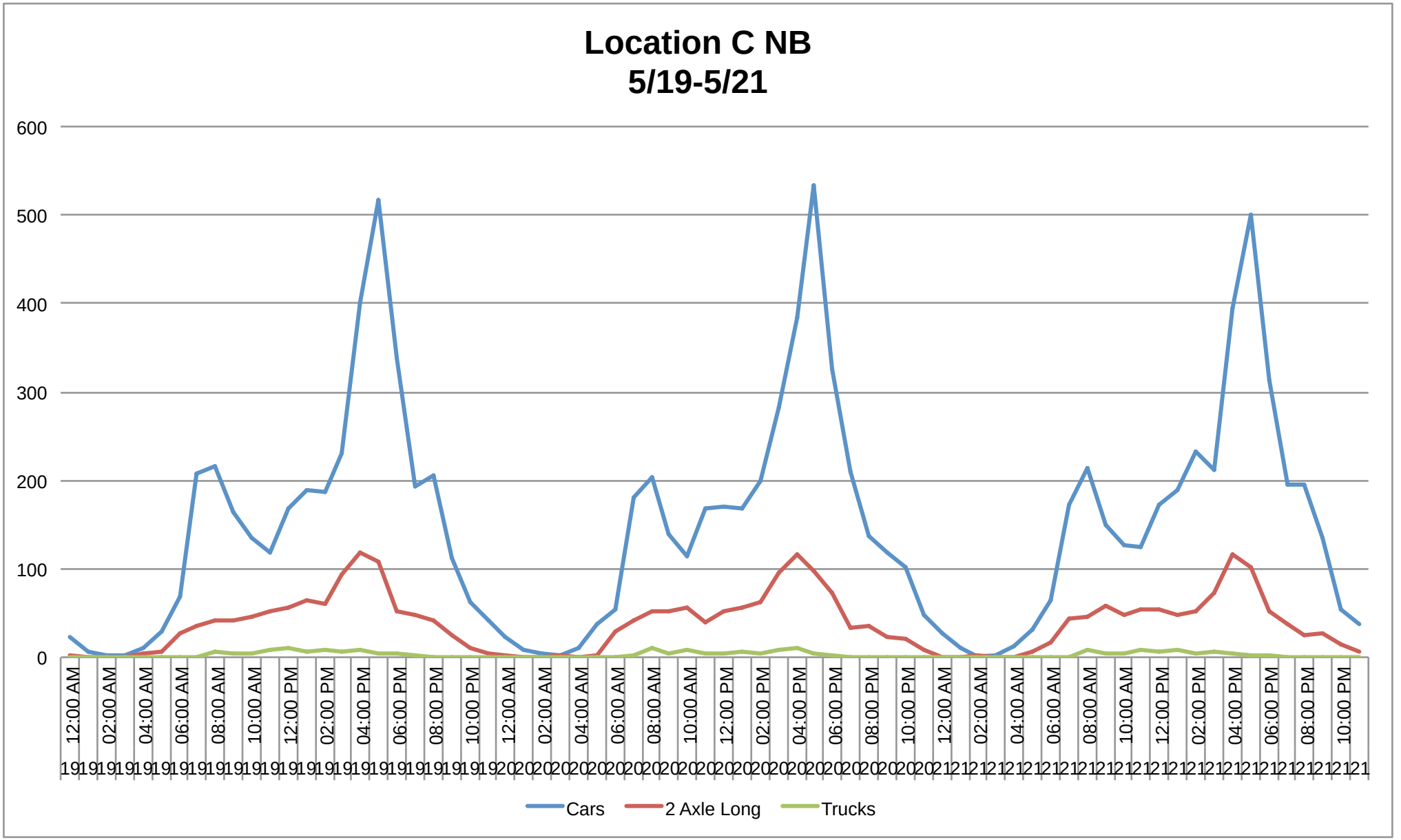
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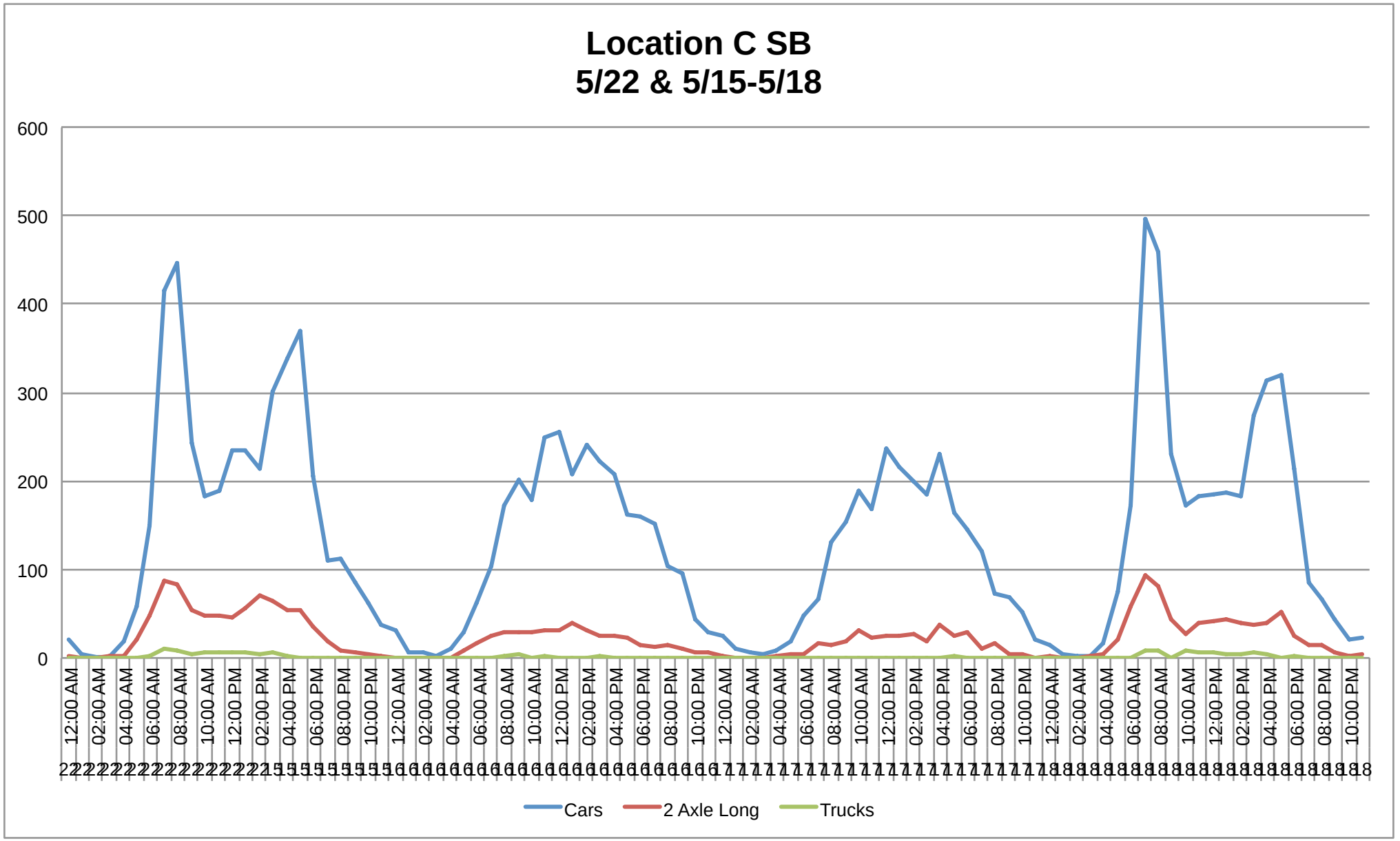
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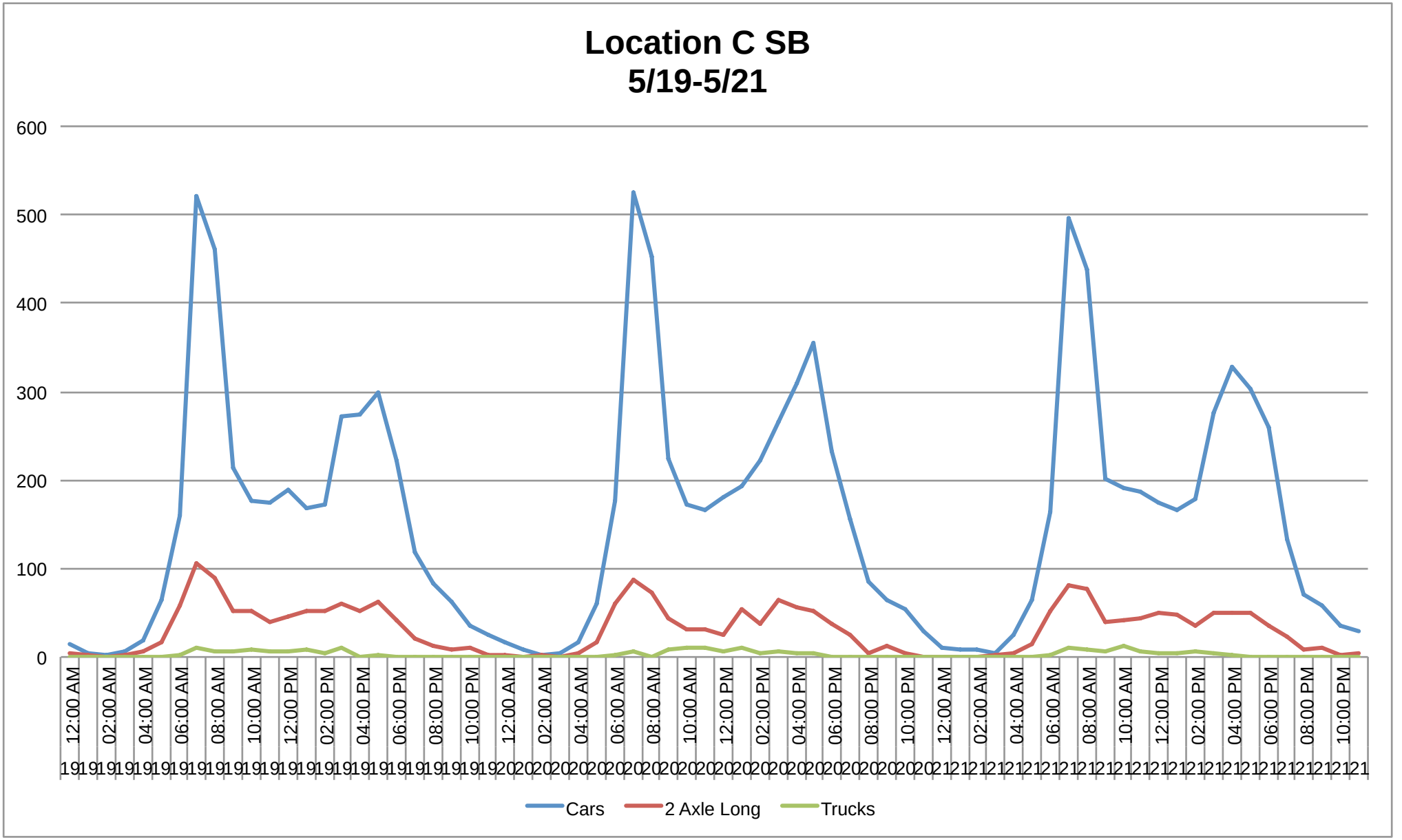
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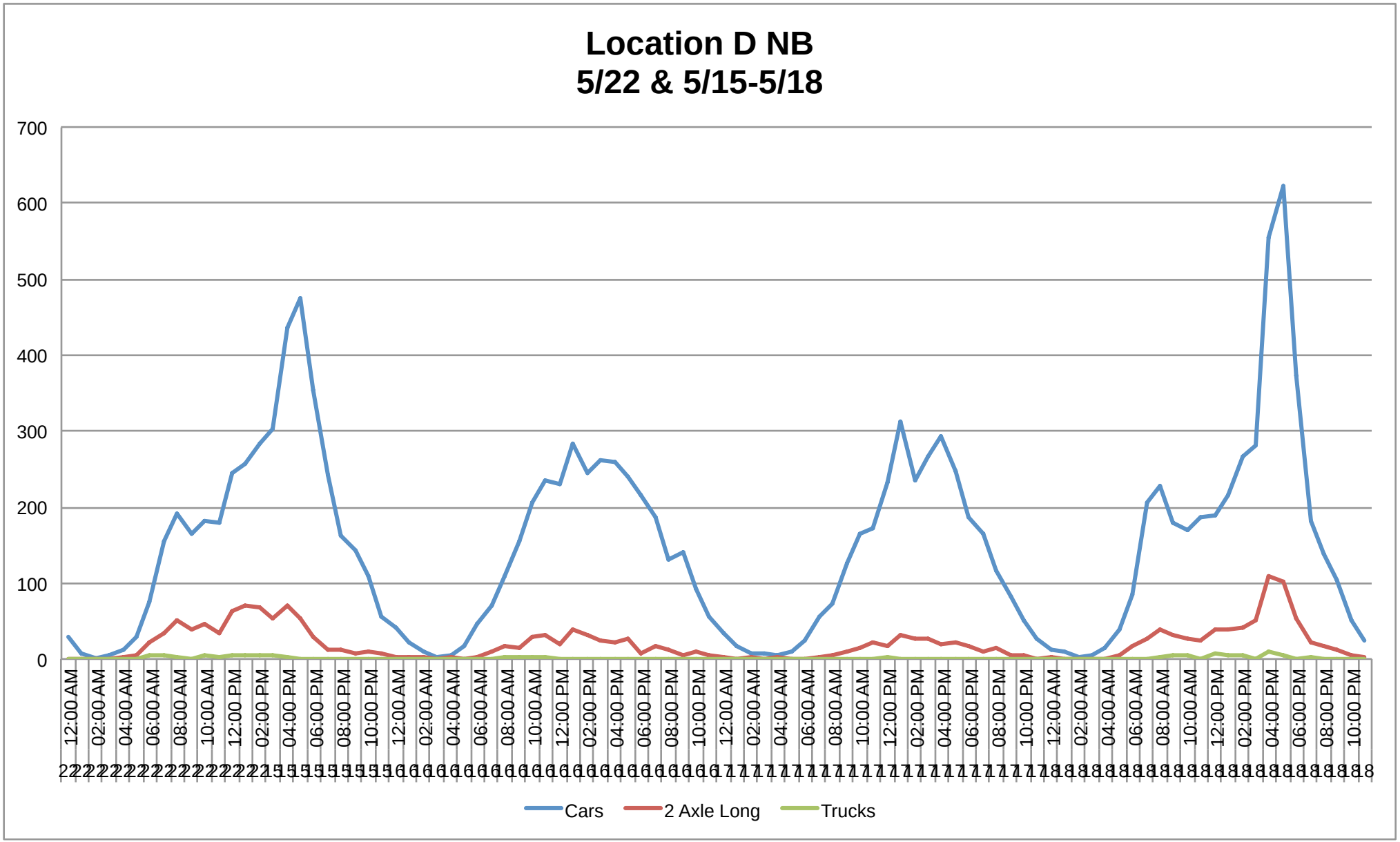
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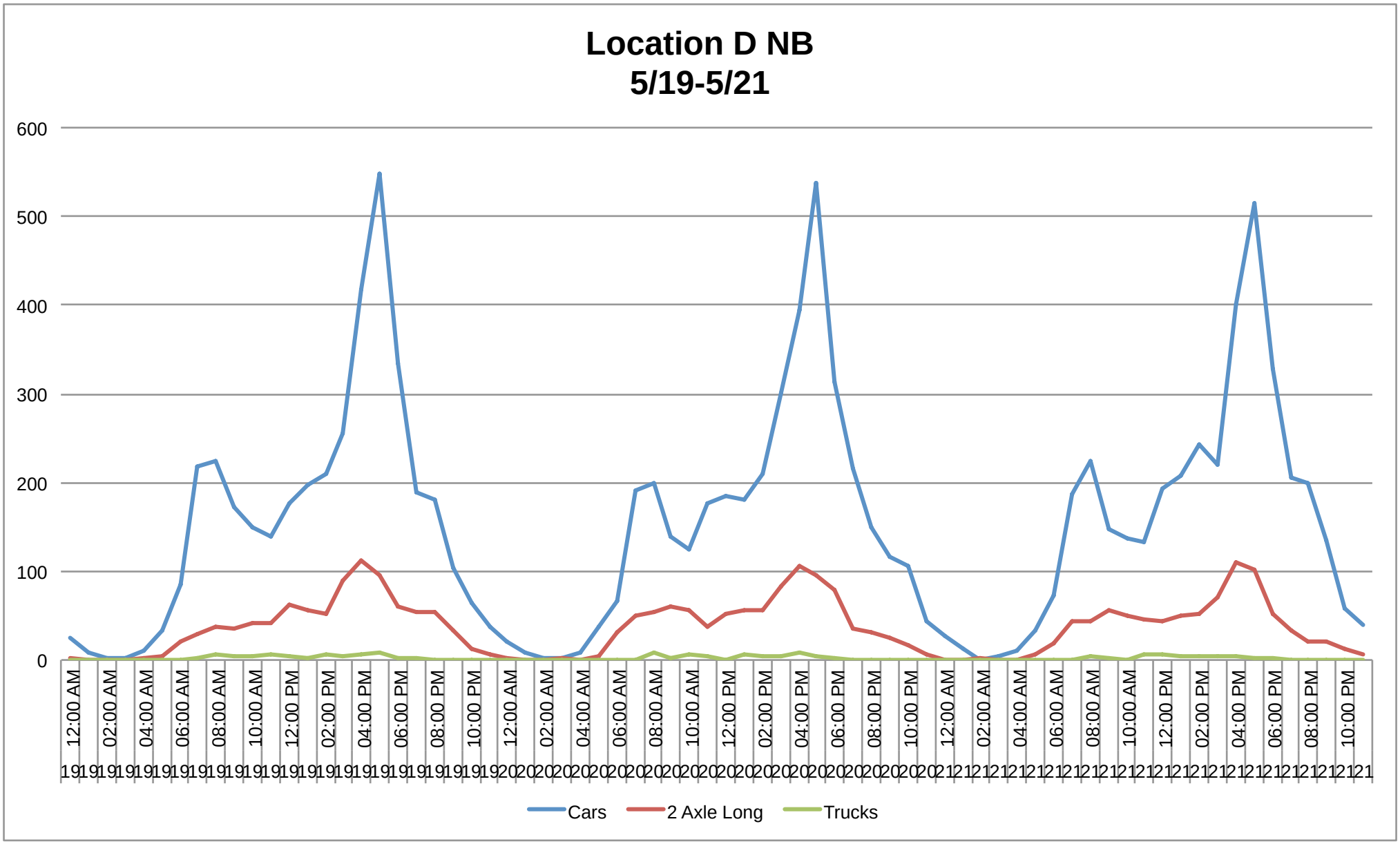
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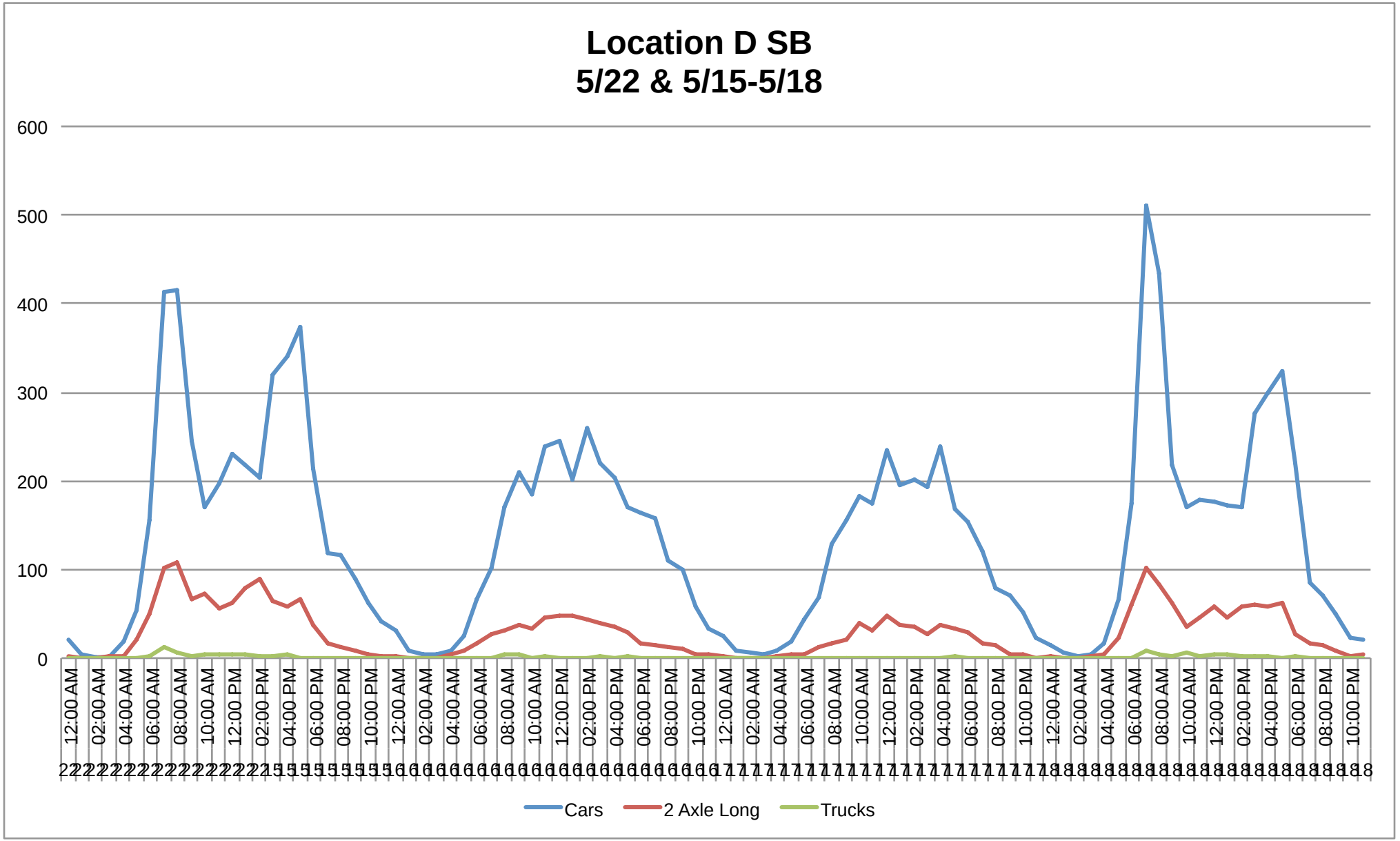
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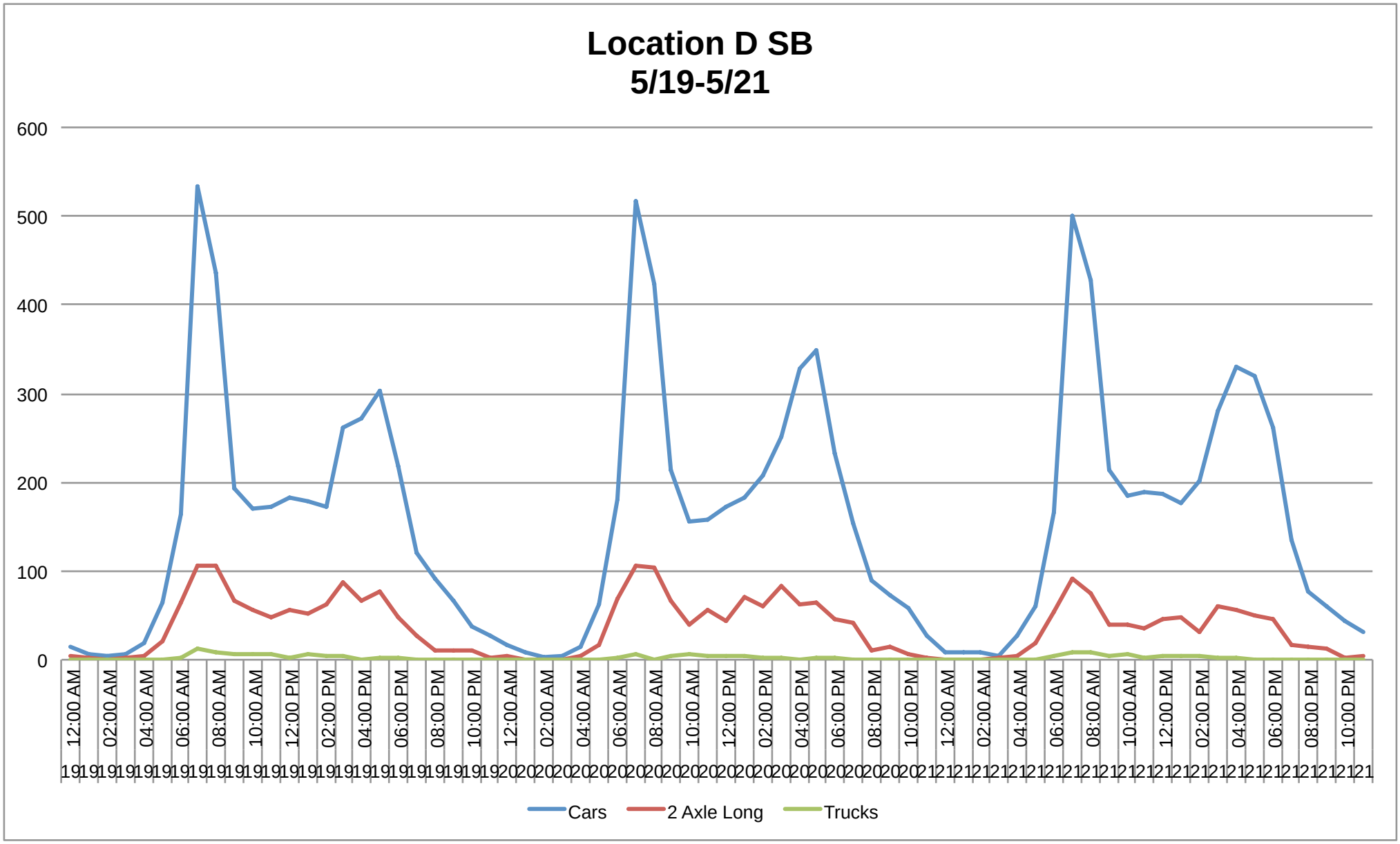
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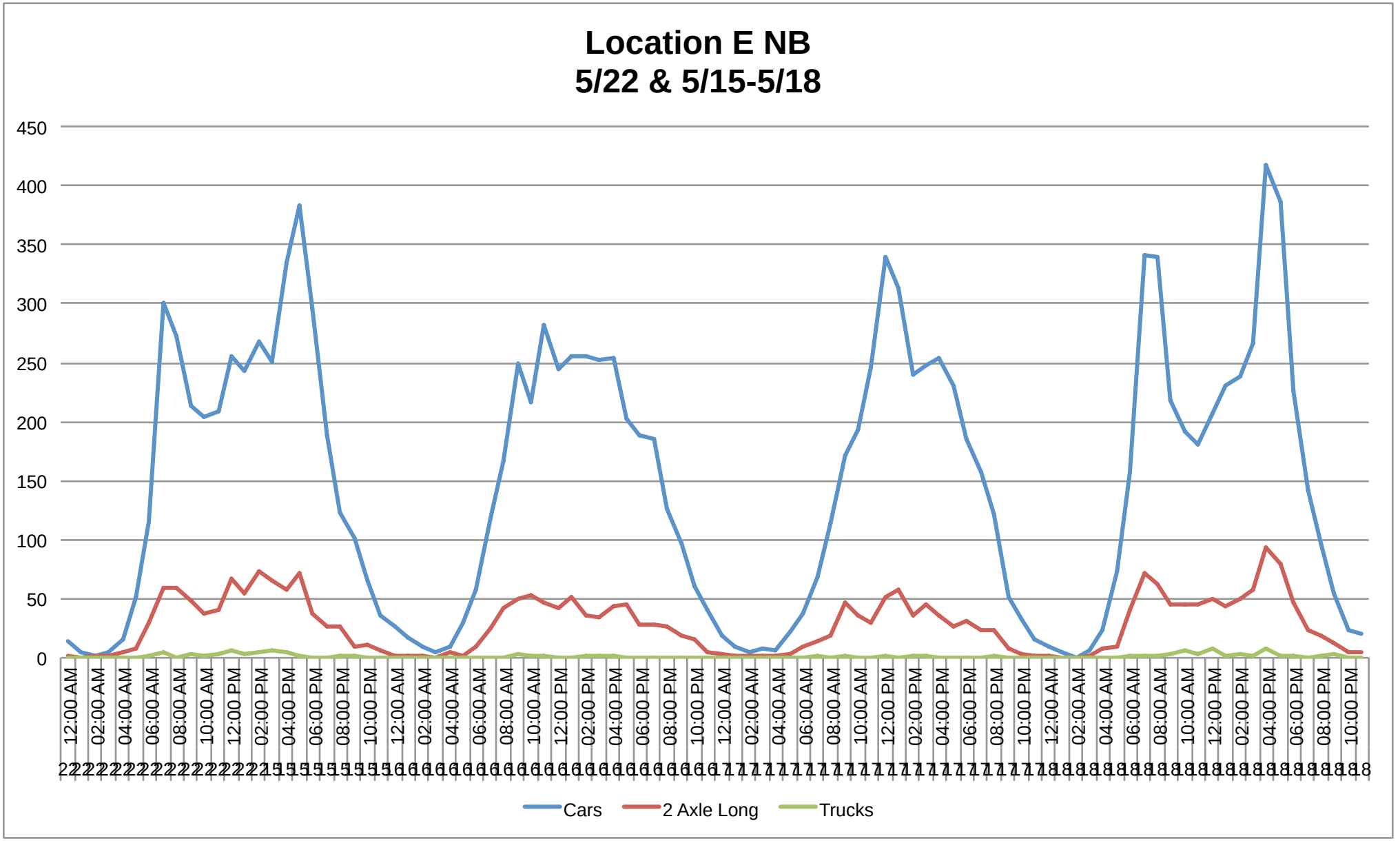
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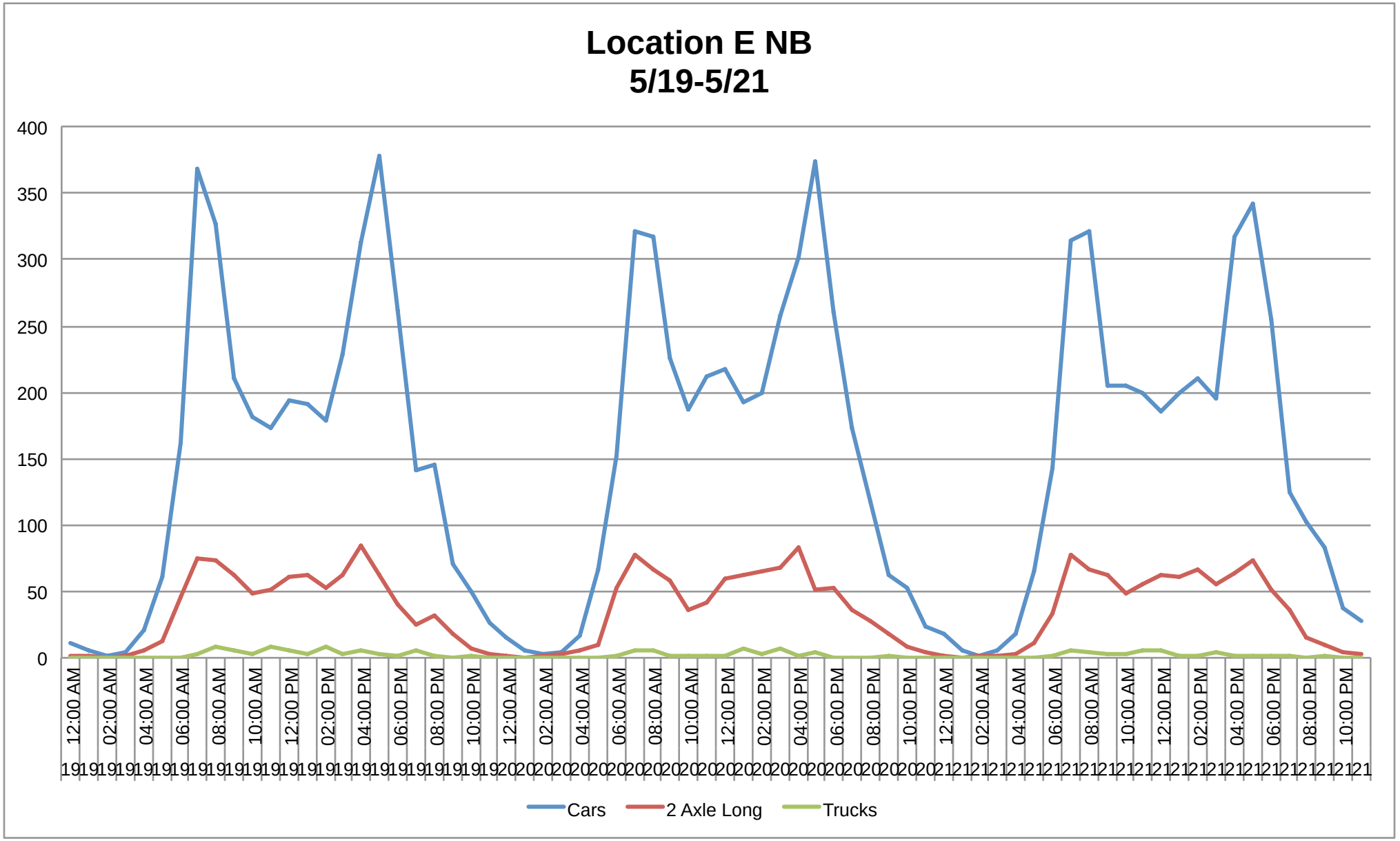
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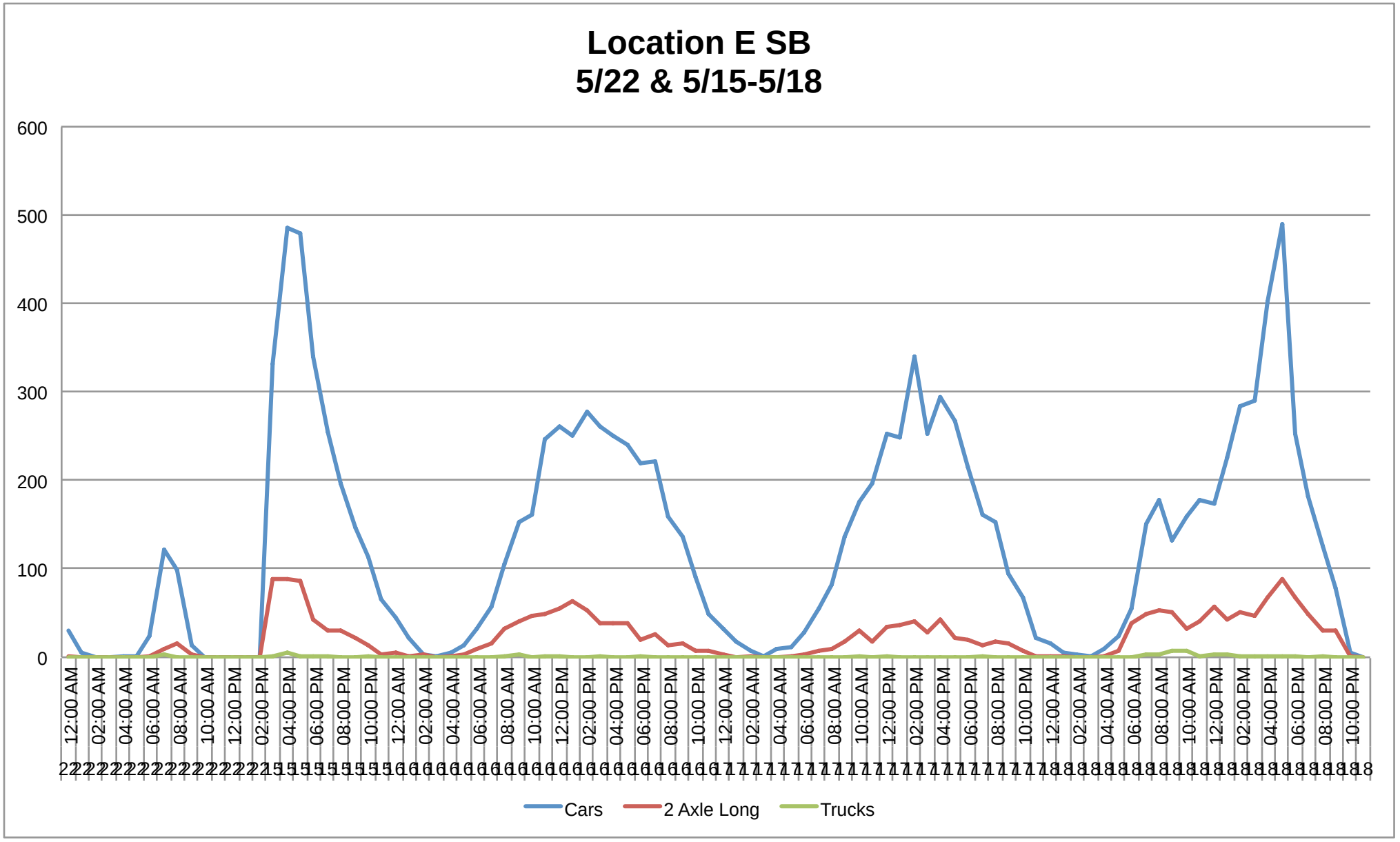
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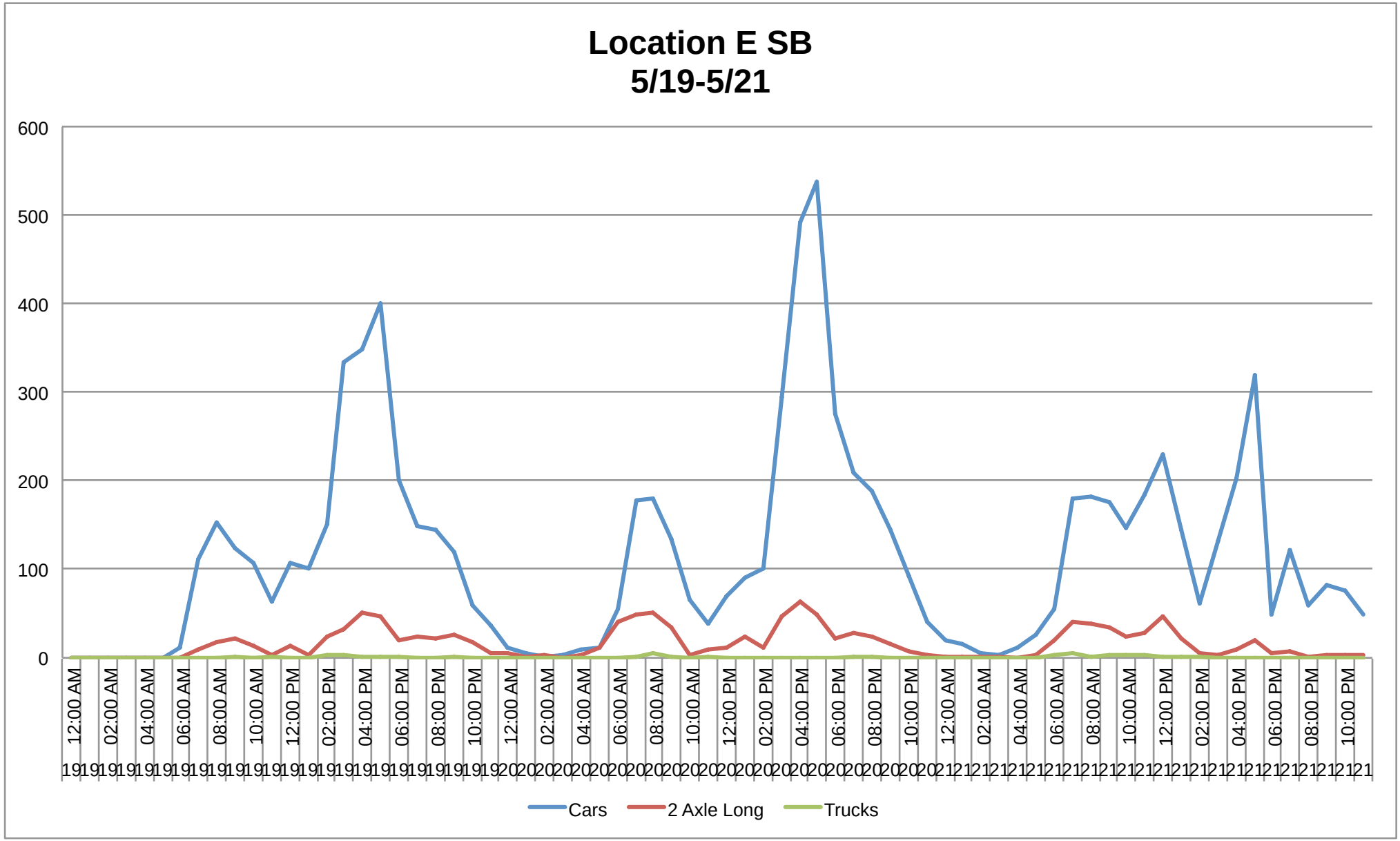
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Cars
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Trucks

Appendix B Raw Traffic Counts

Truck Percentages by Day

	2 Axle 6 Tires	2 Axle 6 Tires and Bigger
Sunday	1.08	1.27
Monday	2.74	3.9
Tuesday	2.86	4.21
Wednesday	2.91	4.14
Thursday	2.85	4.3
Friday	2.31	3.31
Saturday	1.69	2.18