

Earlysville Road Traffic Analysis

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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 placed 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 vehicle 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:

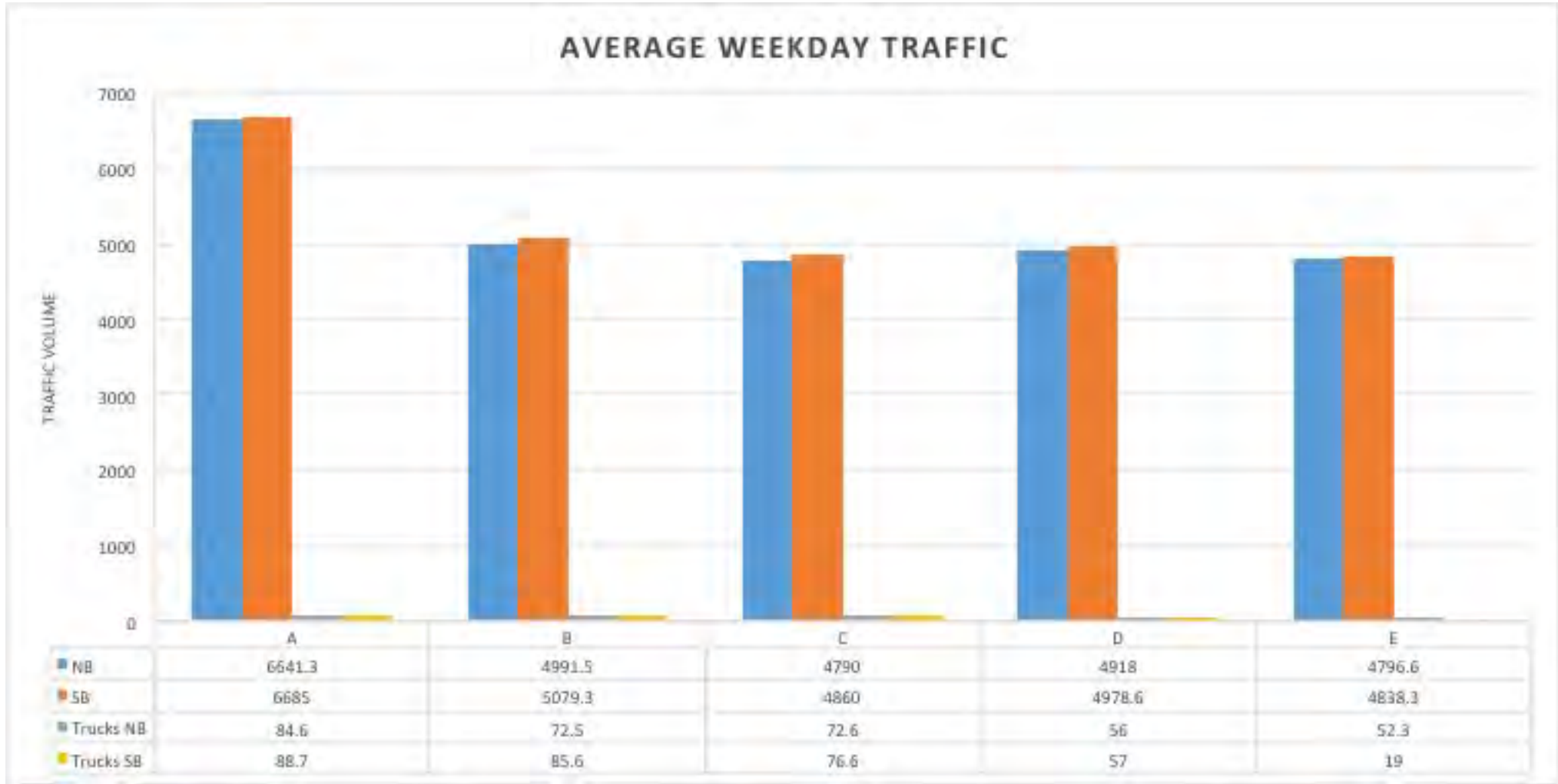
Three or More Axles	Two Axle Long
Monday – 1.16%	Monday – 16.31%
Tuesday – 1.49%	Tuesday – 16.81%
Wednesday – 1.38%	Wednesday – 13.48%
Thursday – 1.45%	Thursday – 16%
Friday – 1.22%	Friday – 15.91%
Saturday – .46%	Saturday – 13.96%
Sunday - .19%	Sunday – 12.72%

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

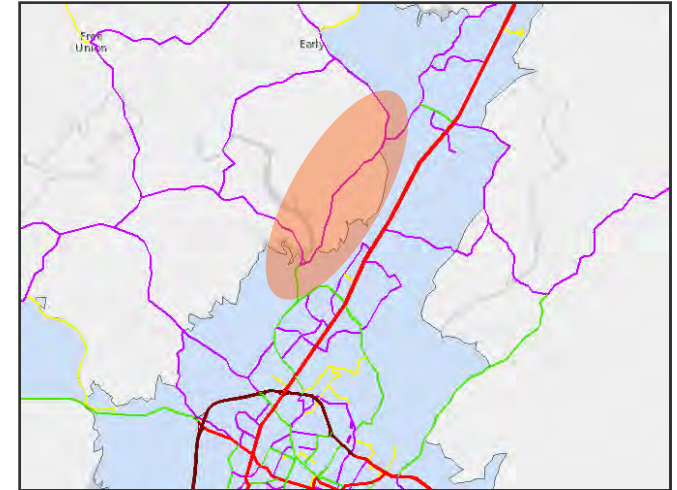


Road Conditions

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 foot.

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'				4'	CS-3/ CS-3B	
		40	446'	305'						
	MOUNTAINOUS	35	316'	250'						
		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'				4'	CS-3/ CS-3B	
		40	446'	305'						
	MOUNTAINOUS	35	316'	250'						
		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'						
		30	215'	200'						
	MOUNTAINOUS	25	135'	155'						
		20	77'	125'						

Figure 3 - Approximate Curve Radii Measurement 1

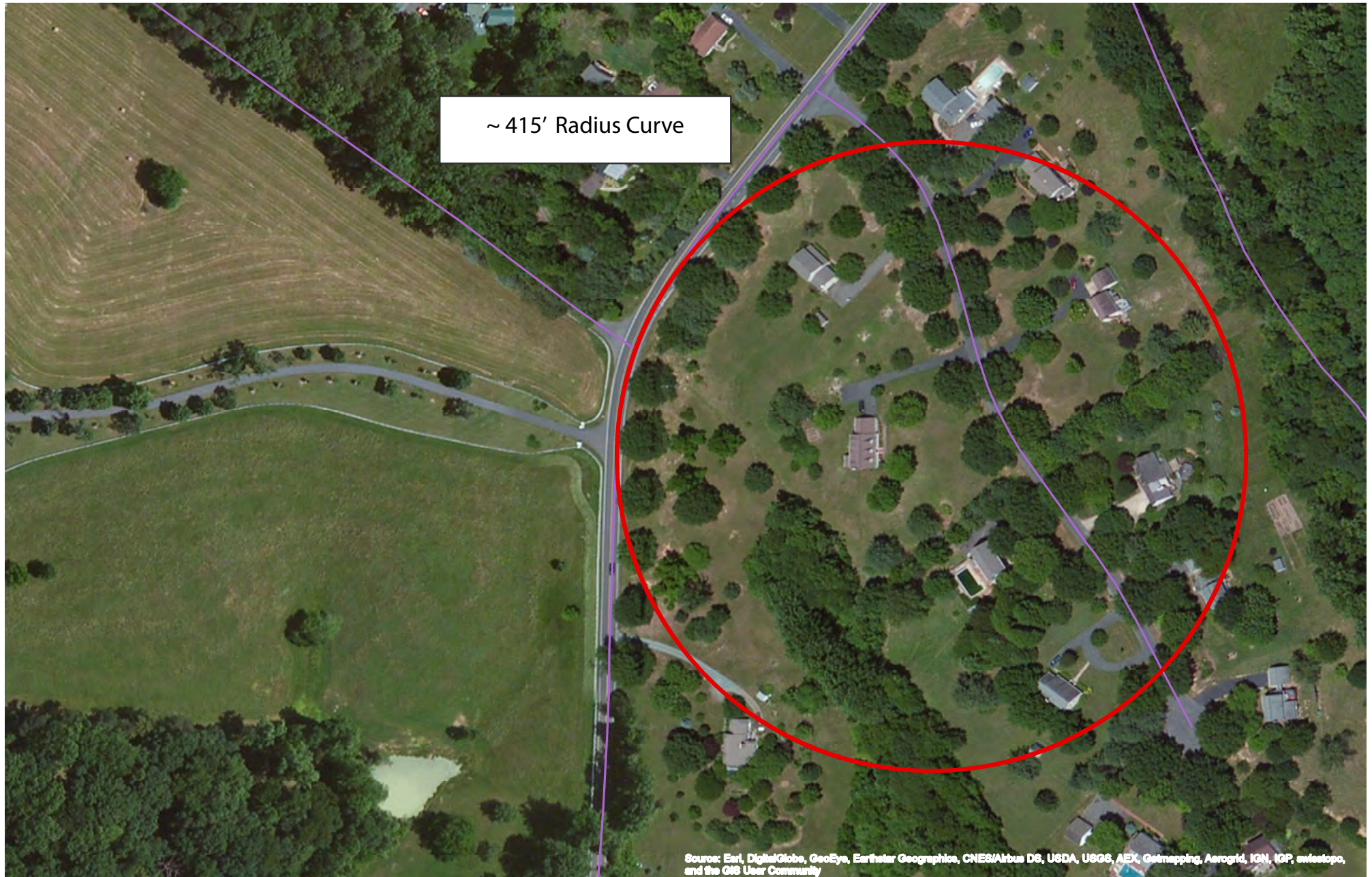


Figure 4 - Approximate Curve Radii Measurement 2

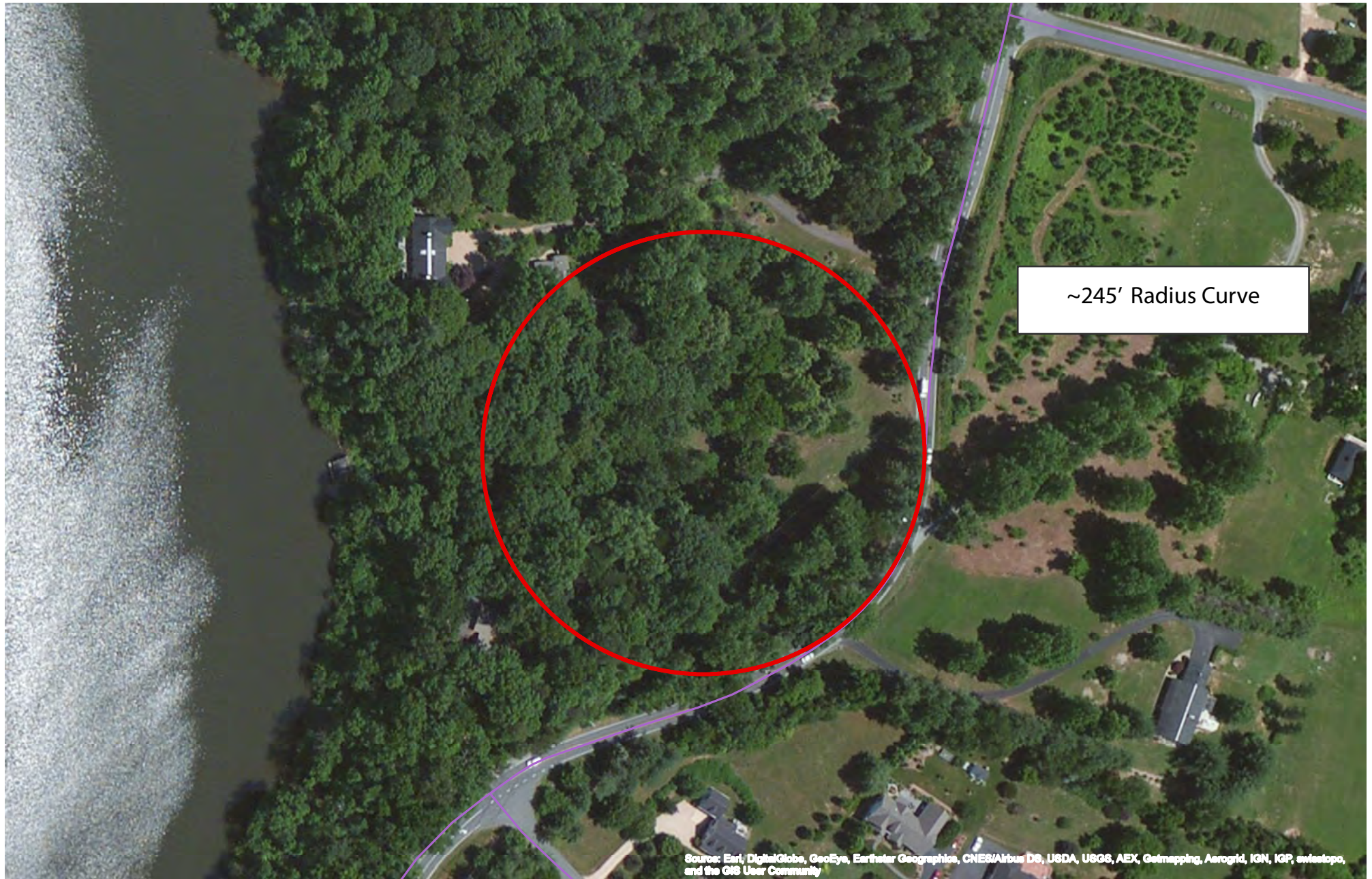
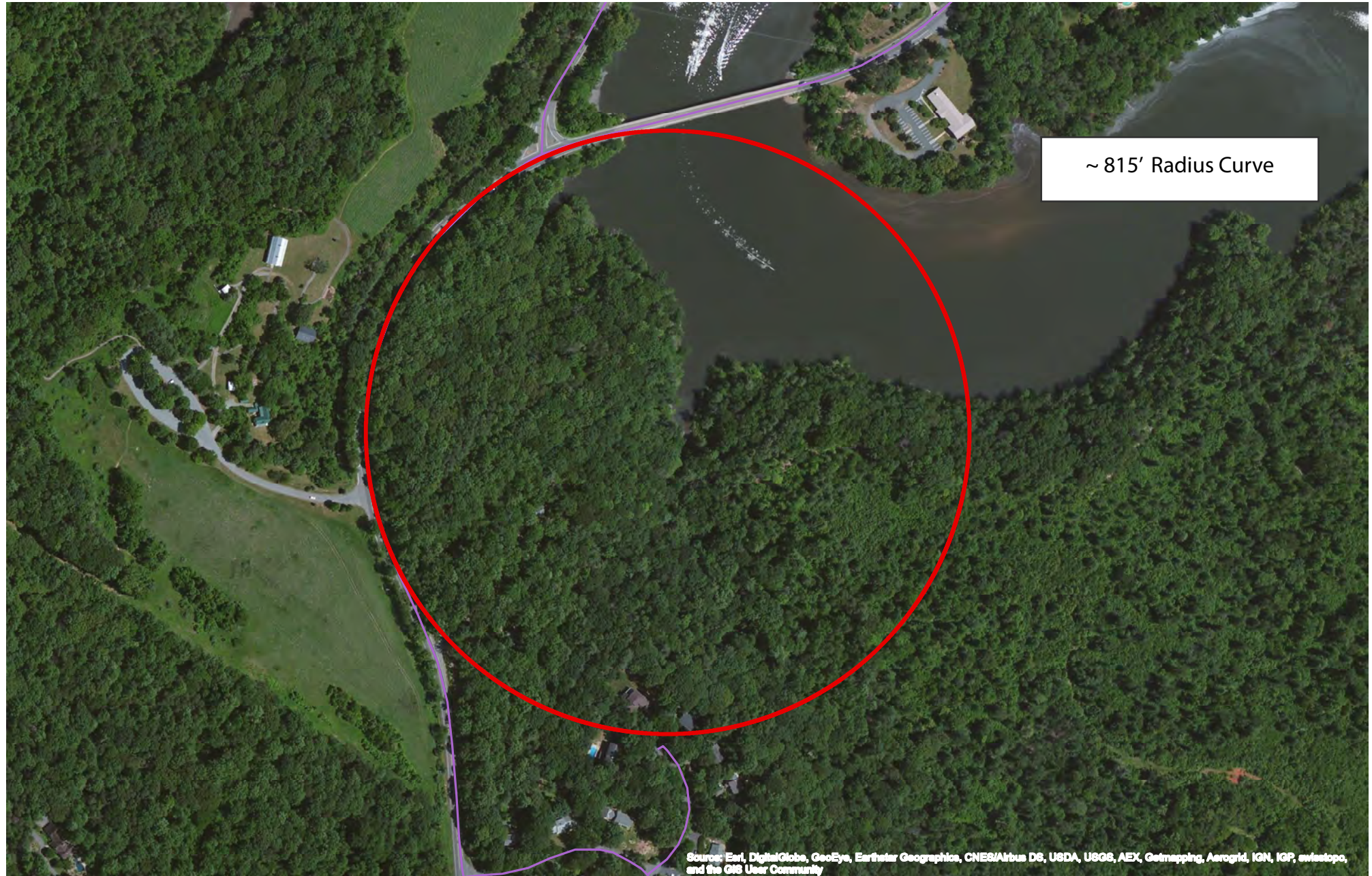


Figure 5 - Approximate Curve Radii Measurement 3



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

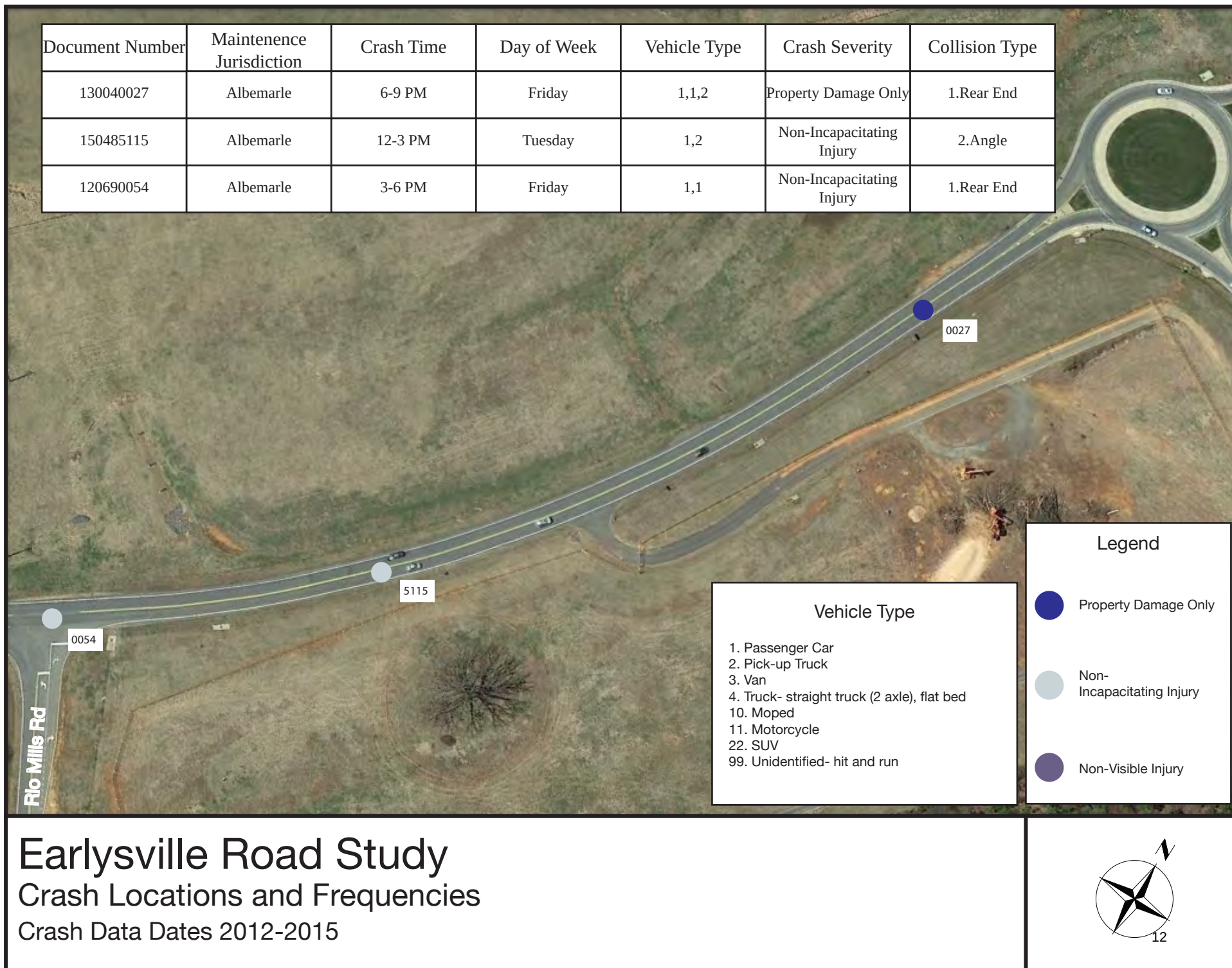


Figure 8

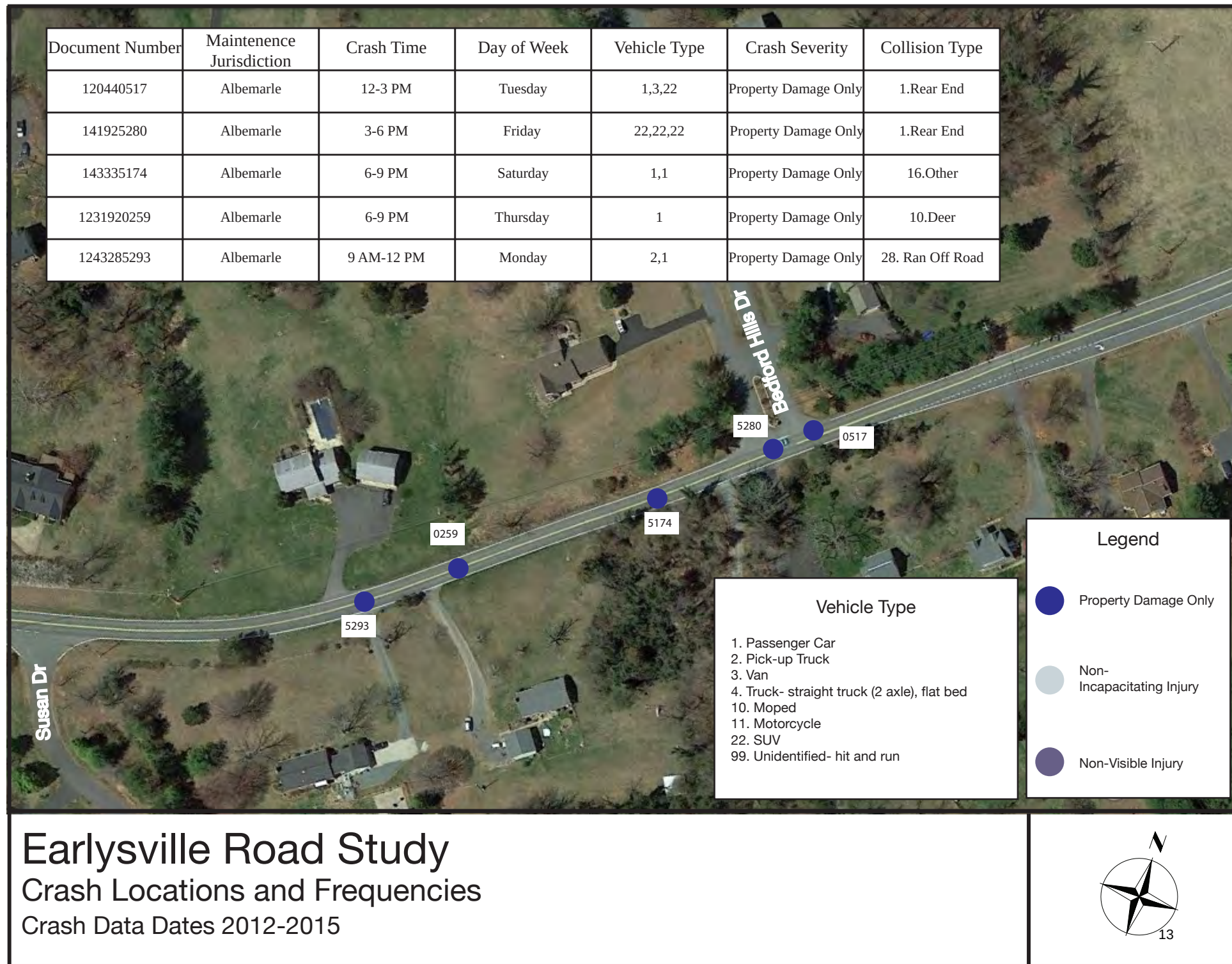


Figure 9

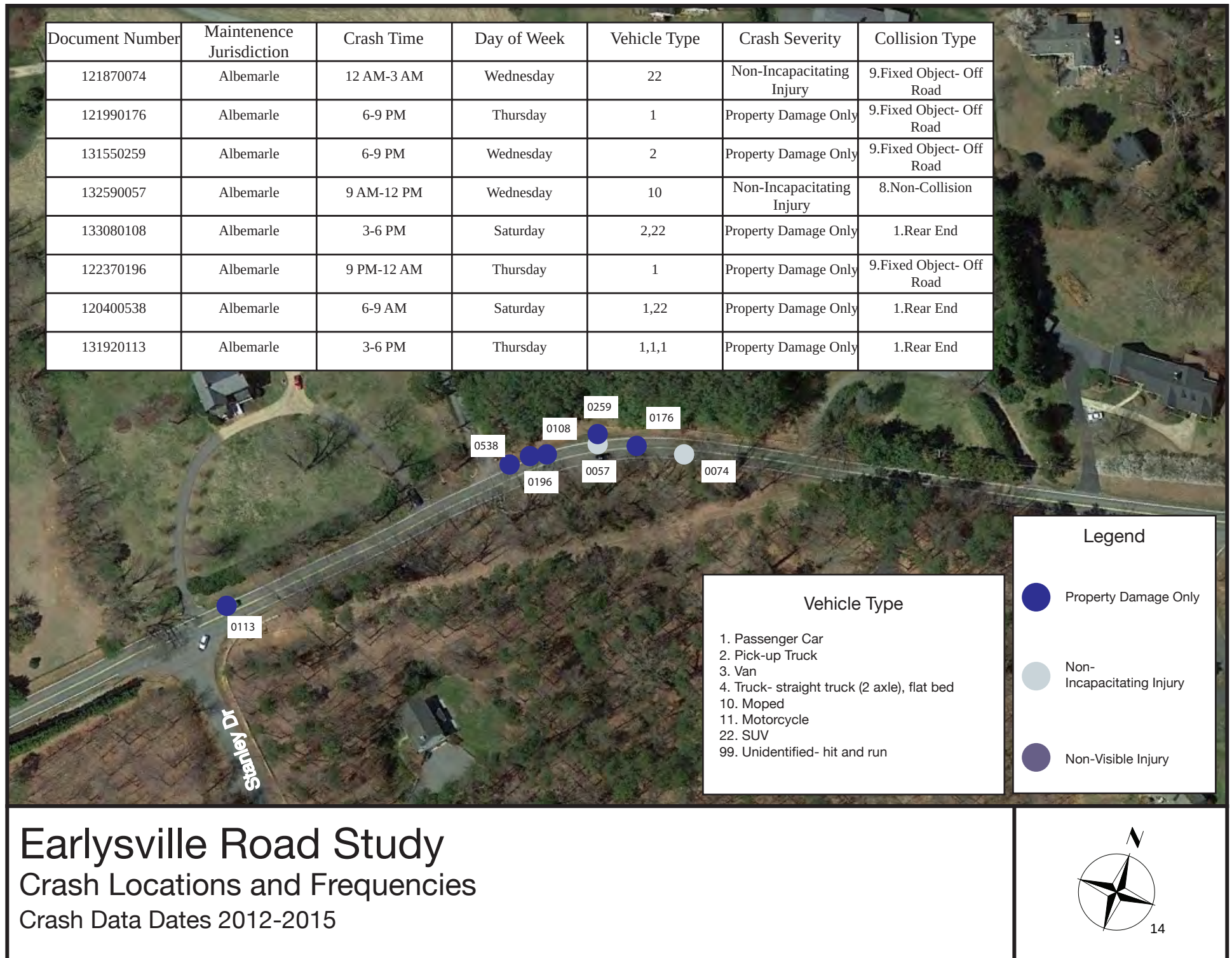


Figure 10



Figure 11



Earlysville Road Study
Crash Locations and Frequencies
Crash Data Dates 2012-2015



Figure 12

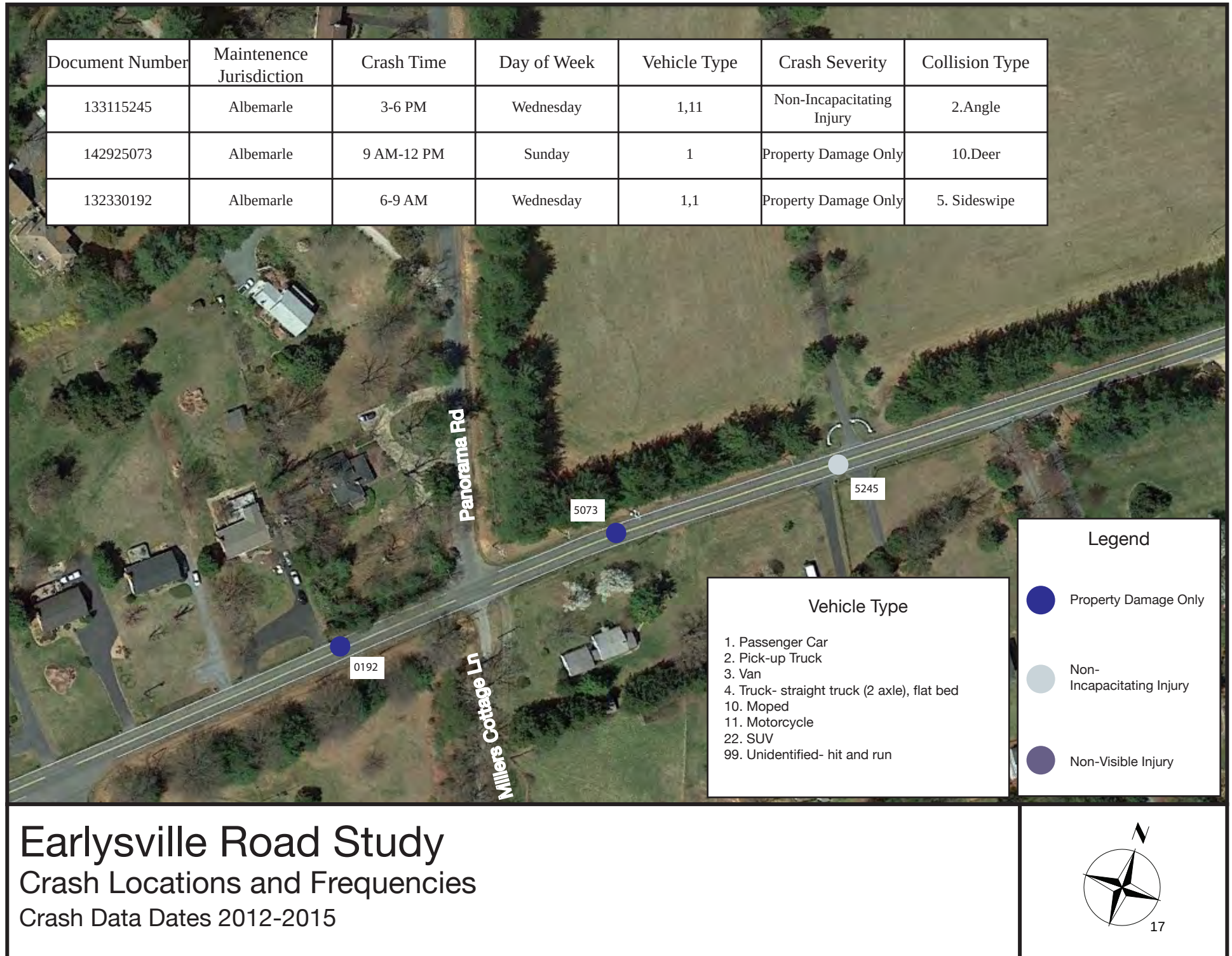


Figure 13

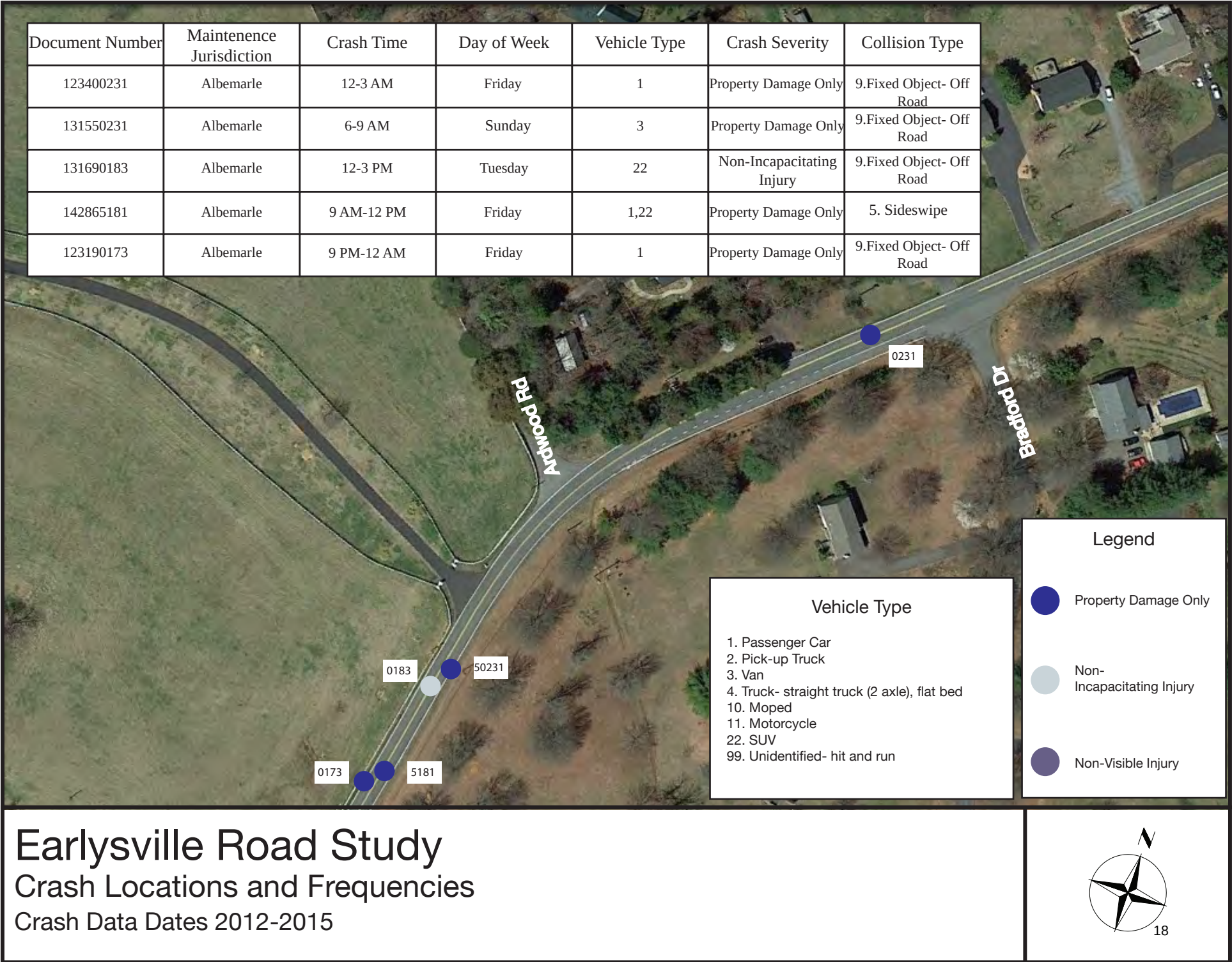


Figure 14

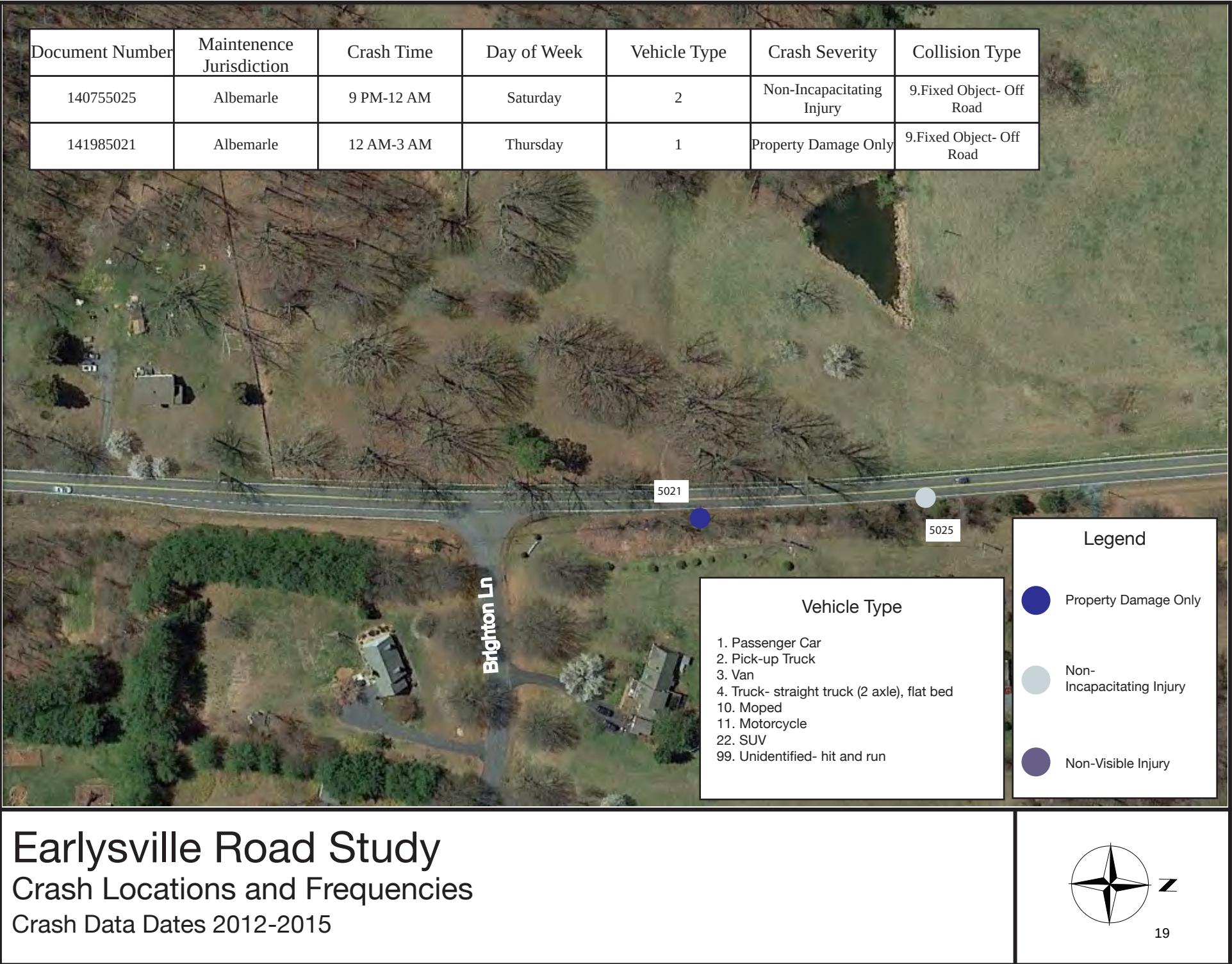


Figure 15

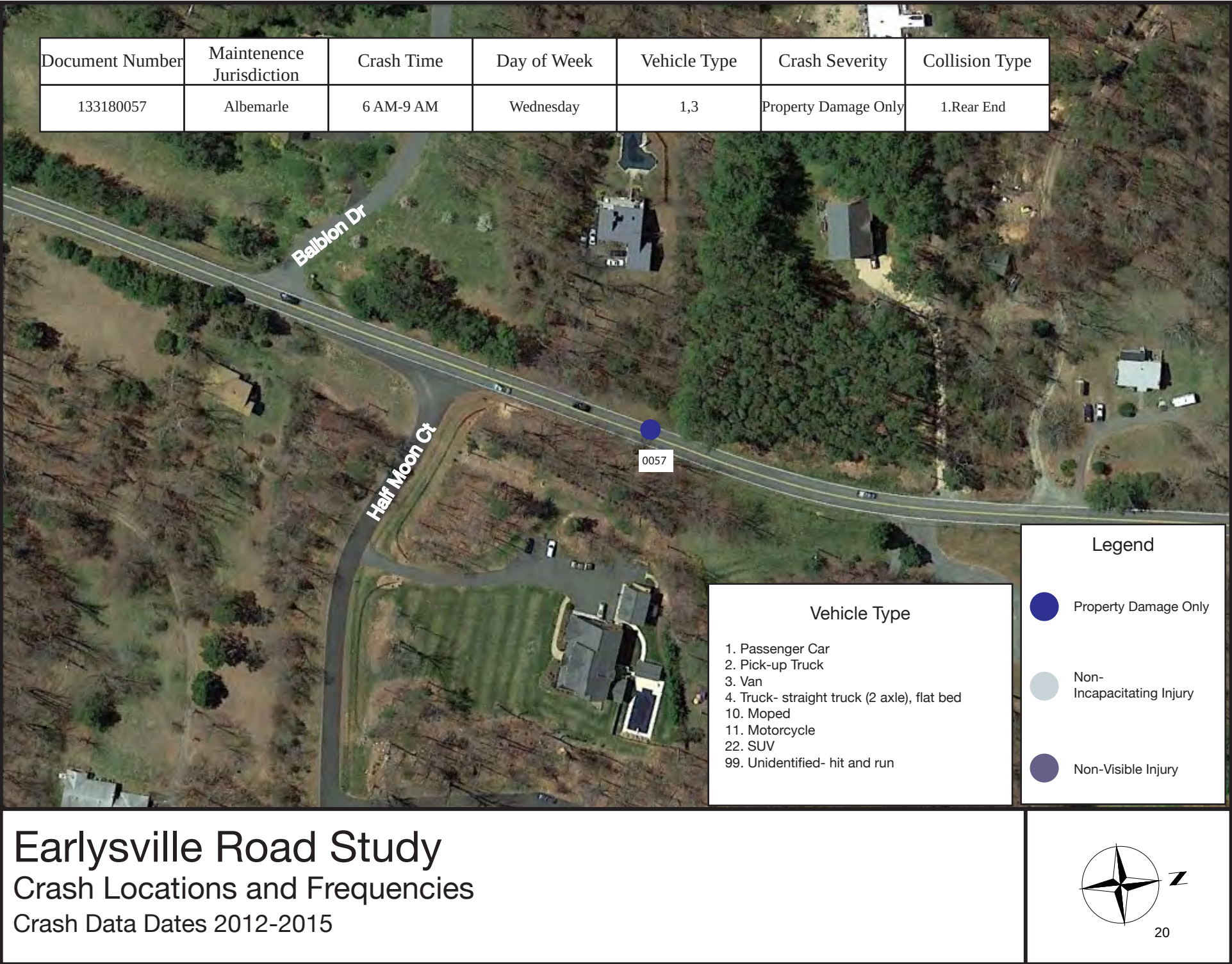


Figure 16

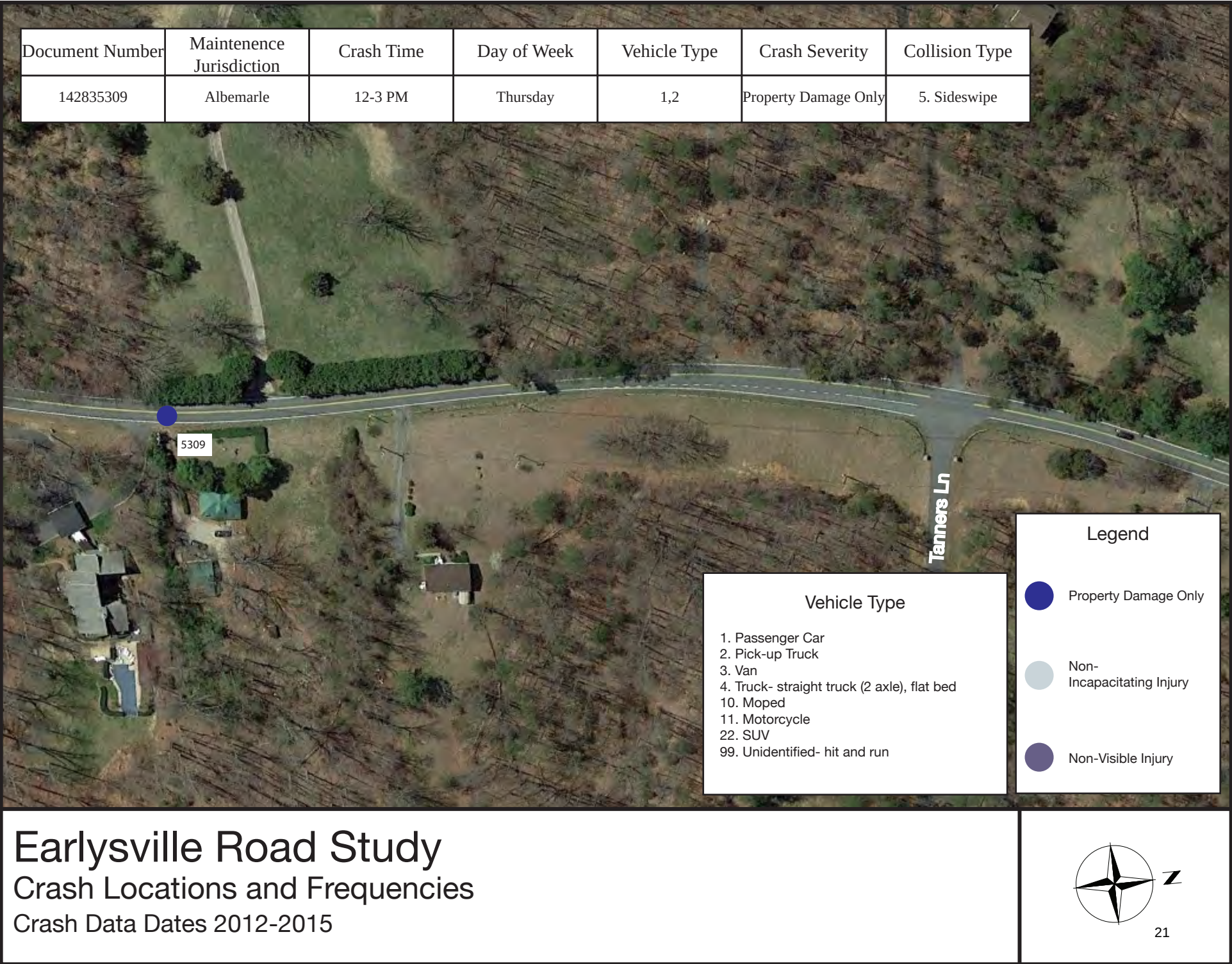


Figure 17

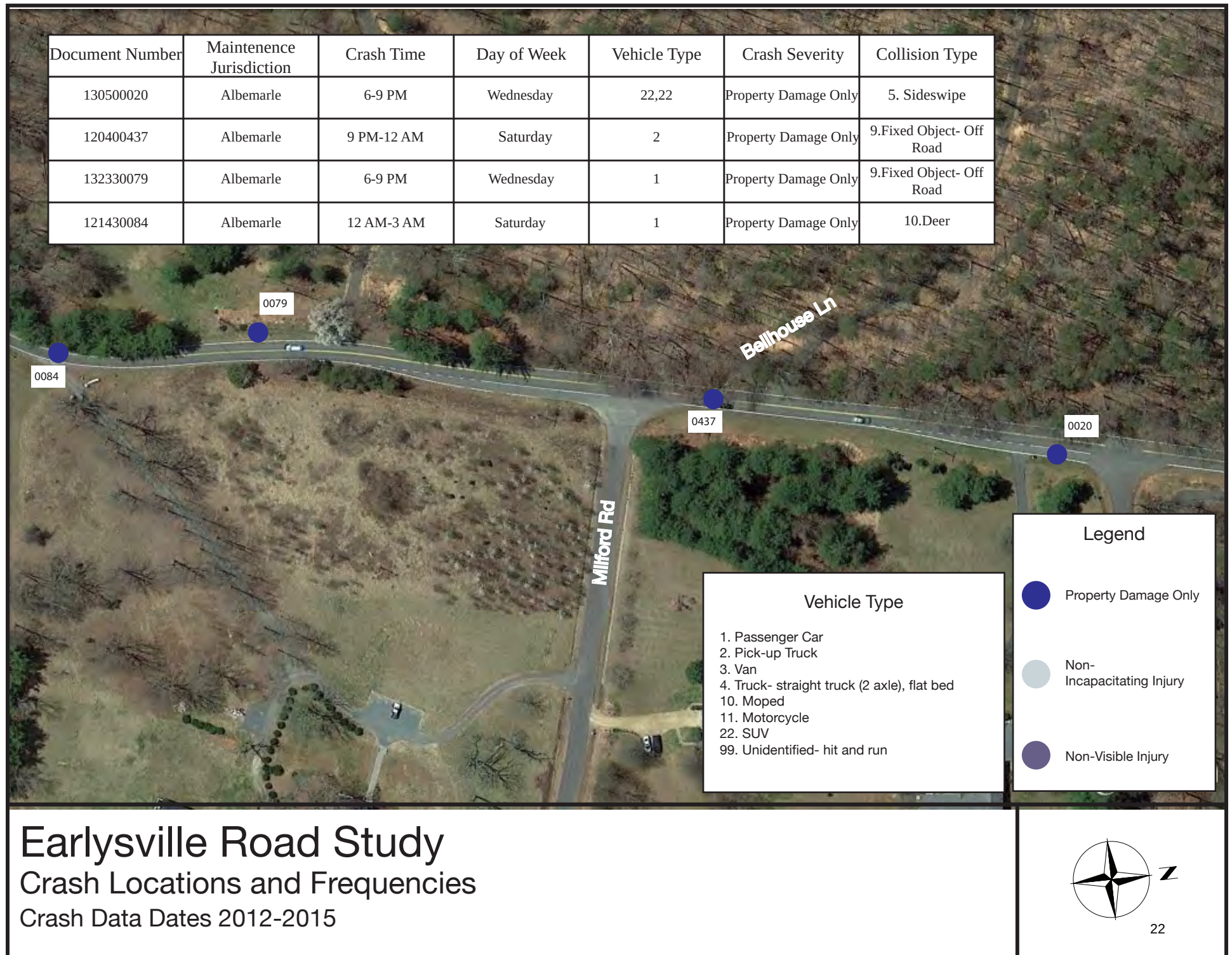


Figure 18

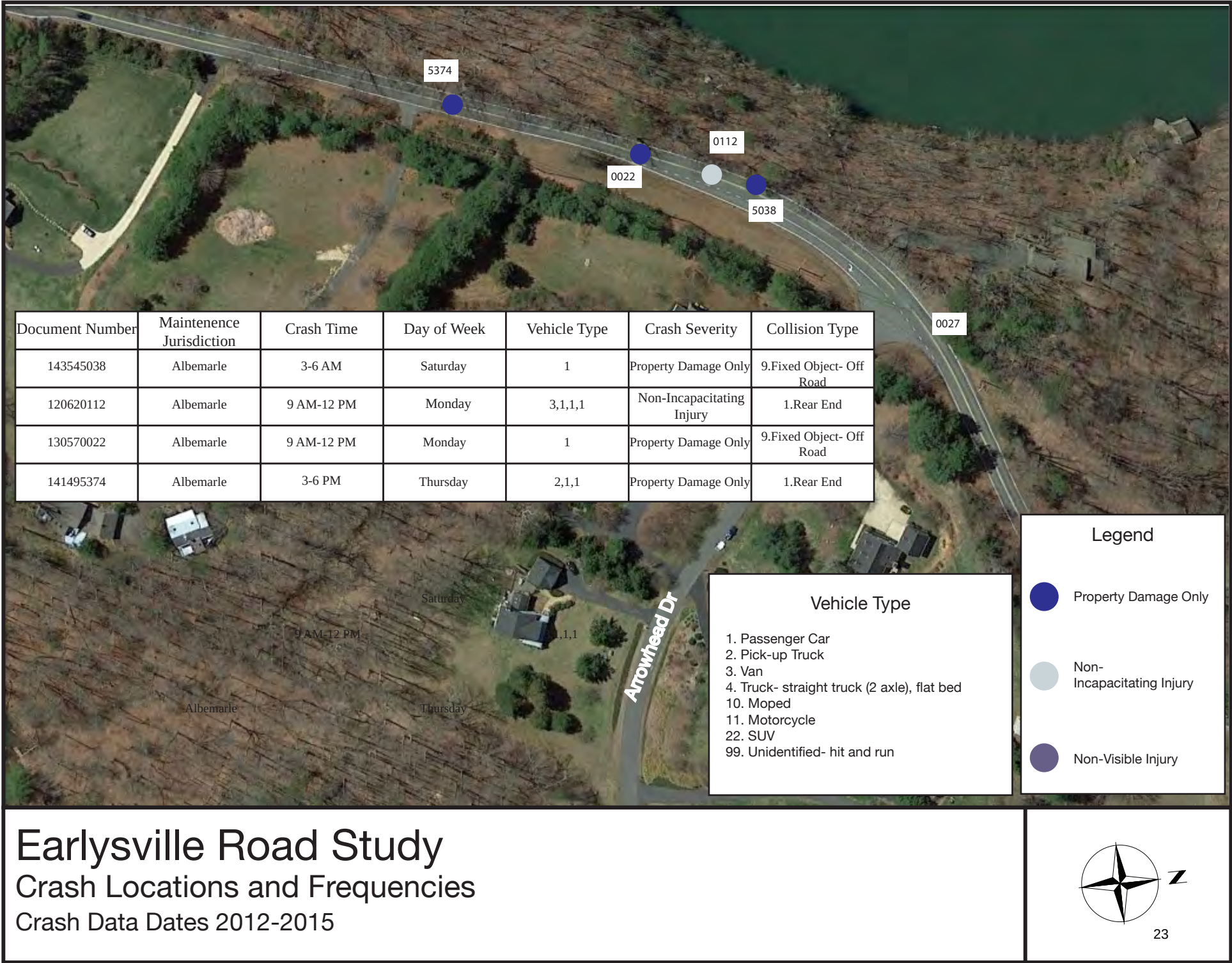


Figure 19

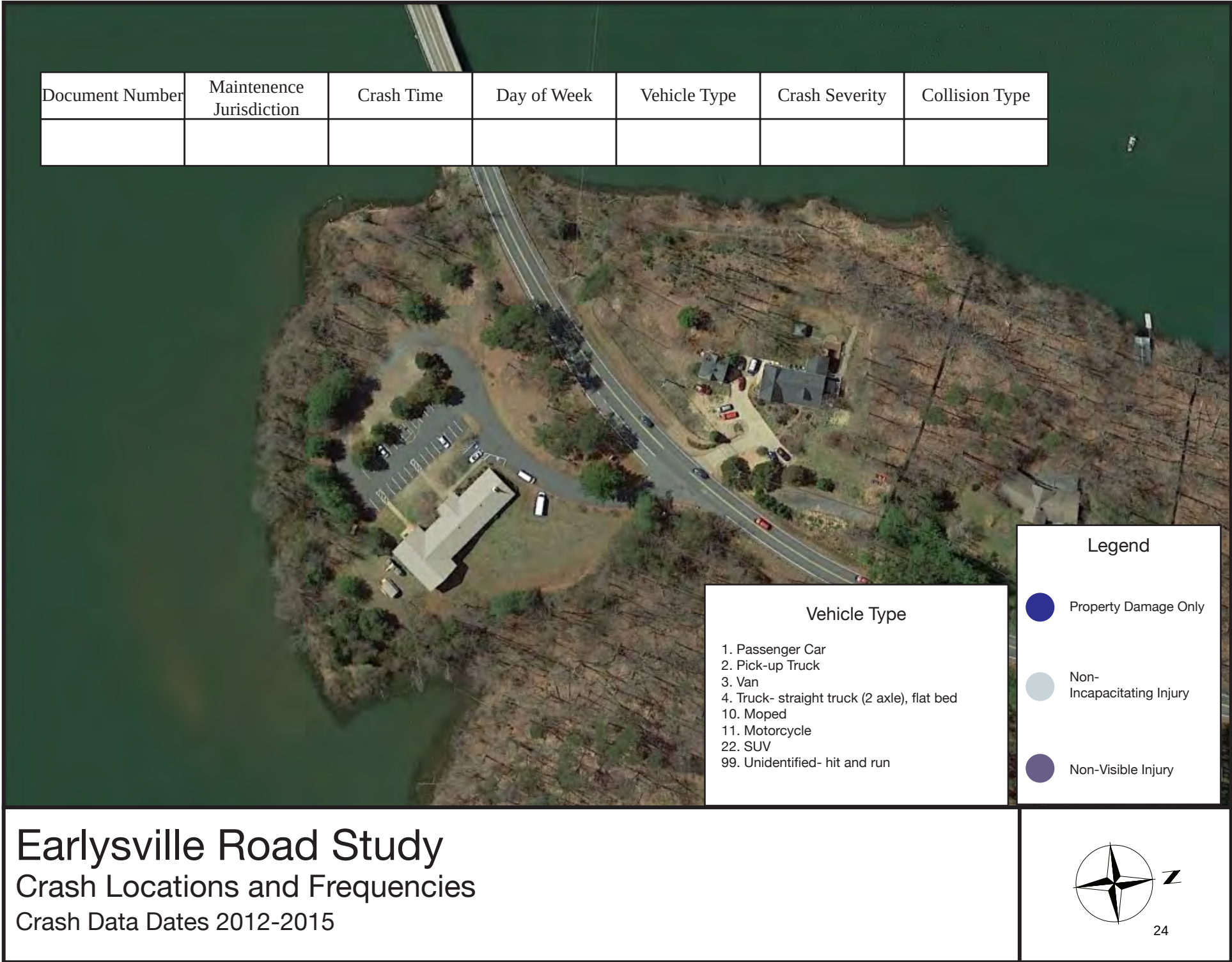


Figure 20

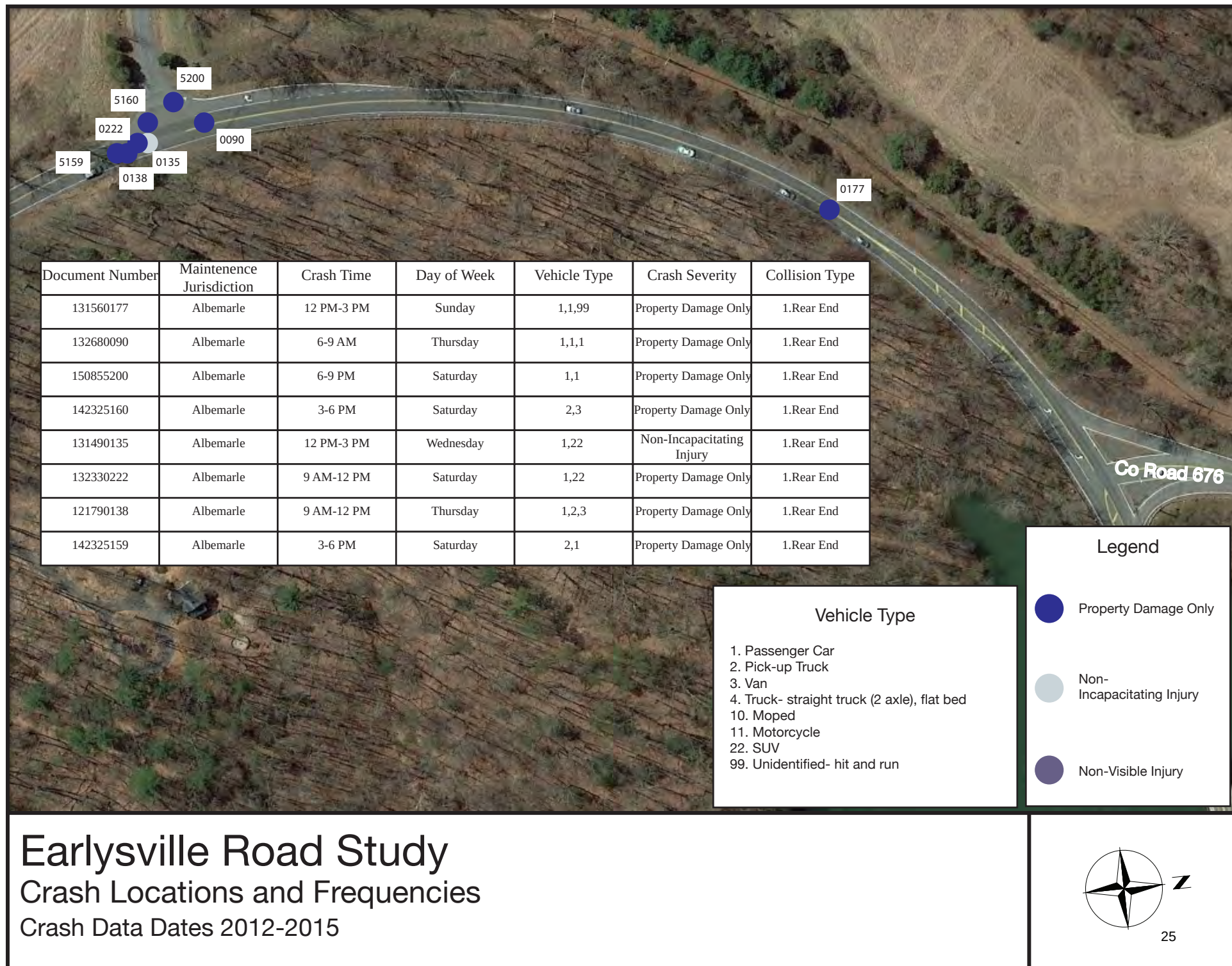


Figure 21

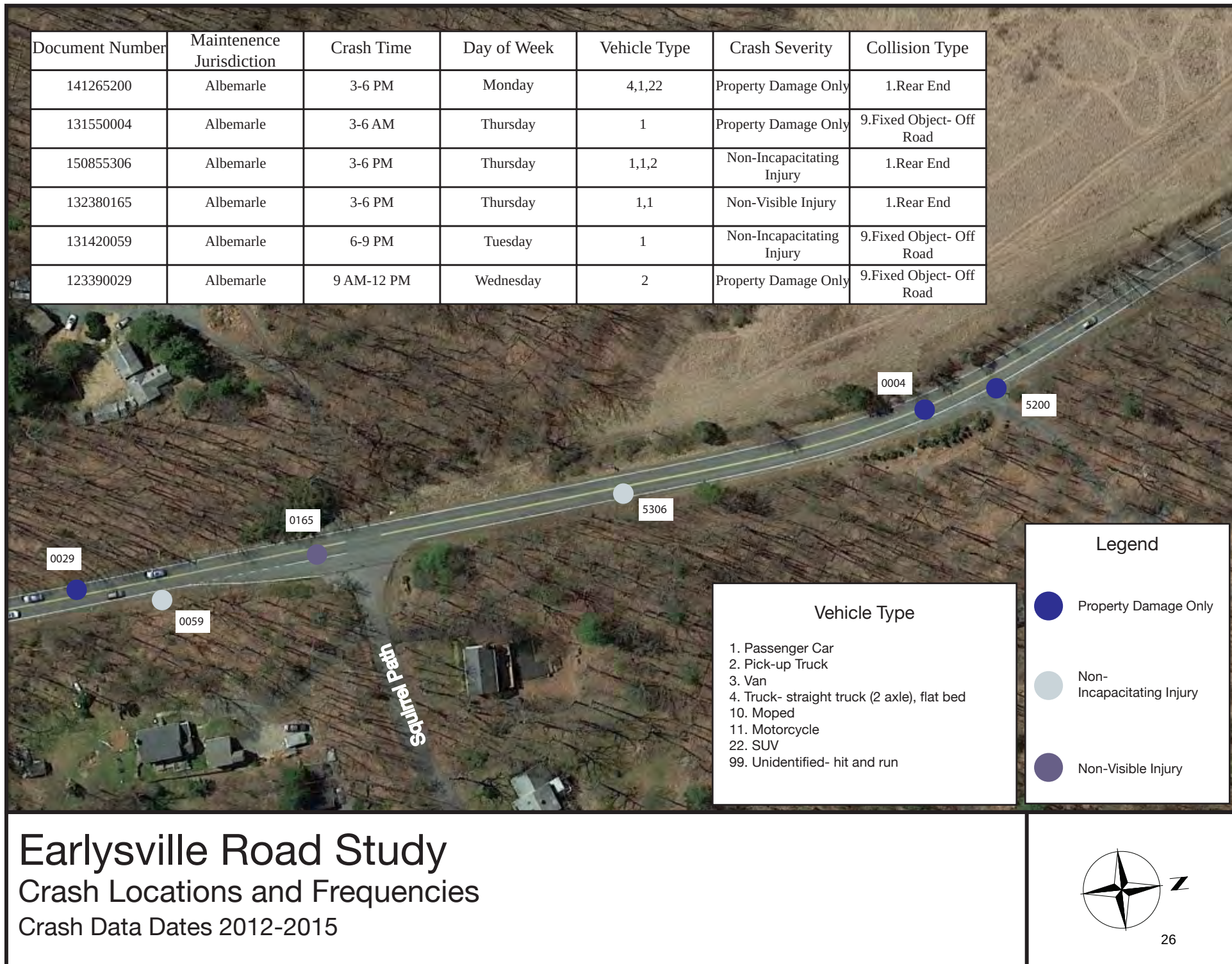


Figure 22

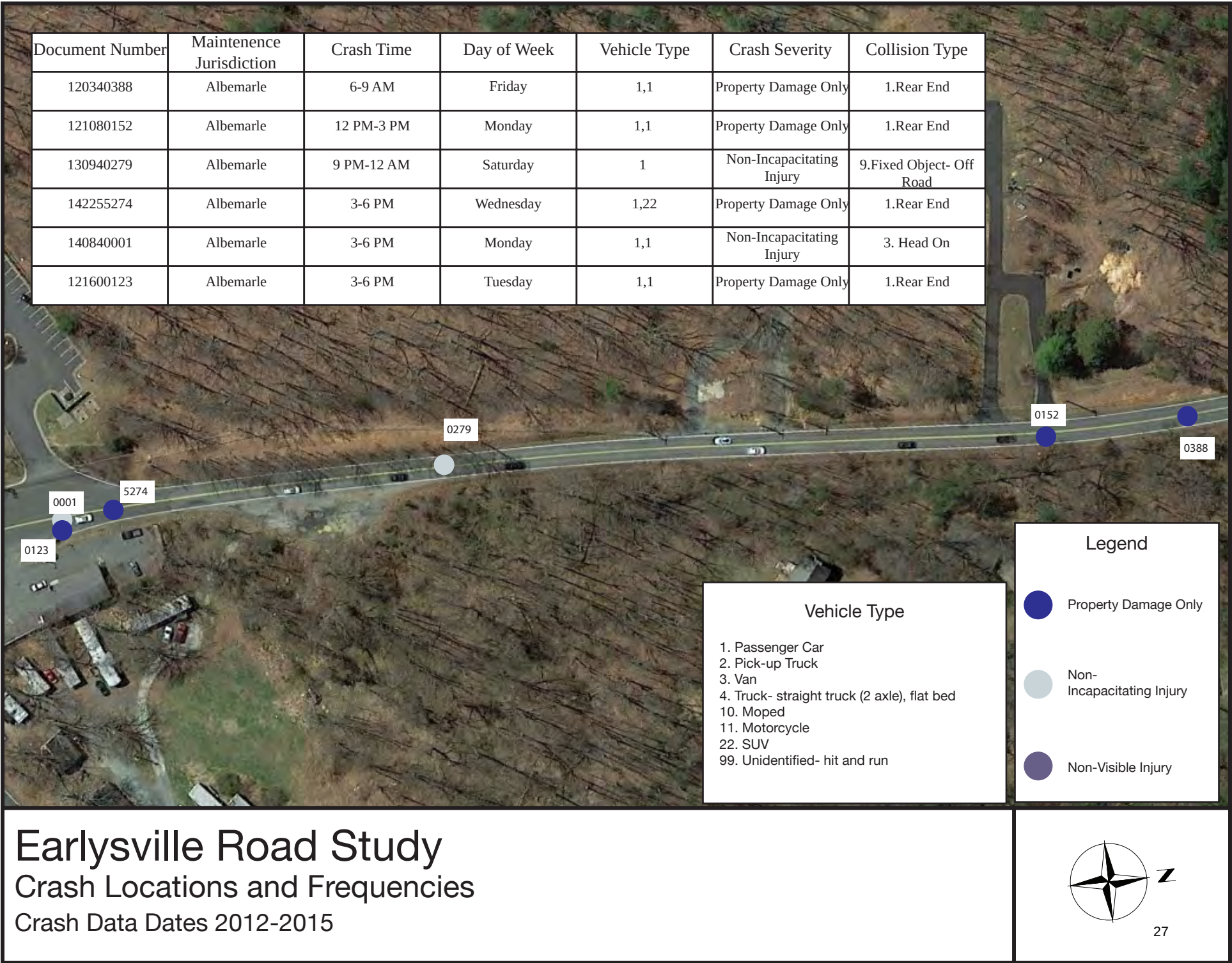
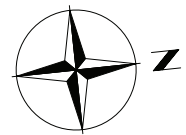


Figure 23

Document Number	Maintenance 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.

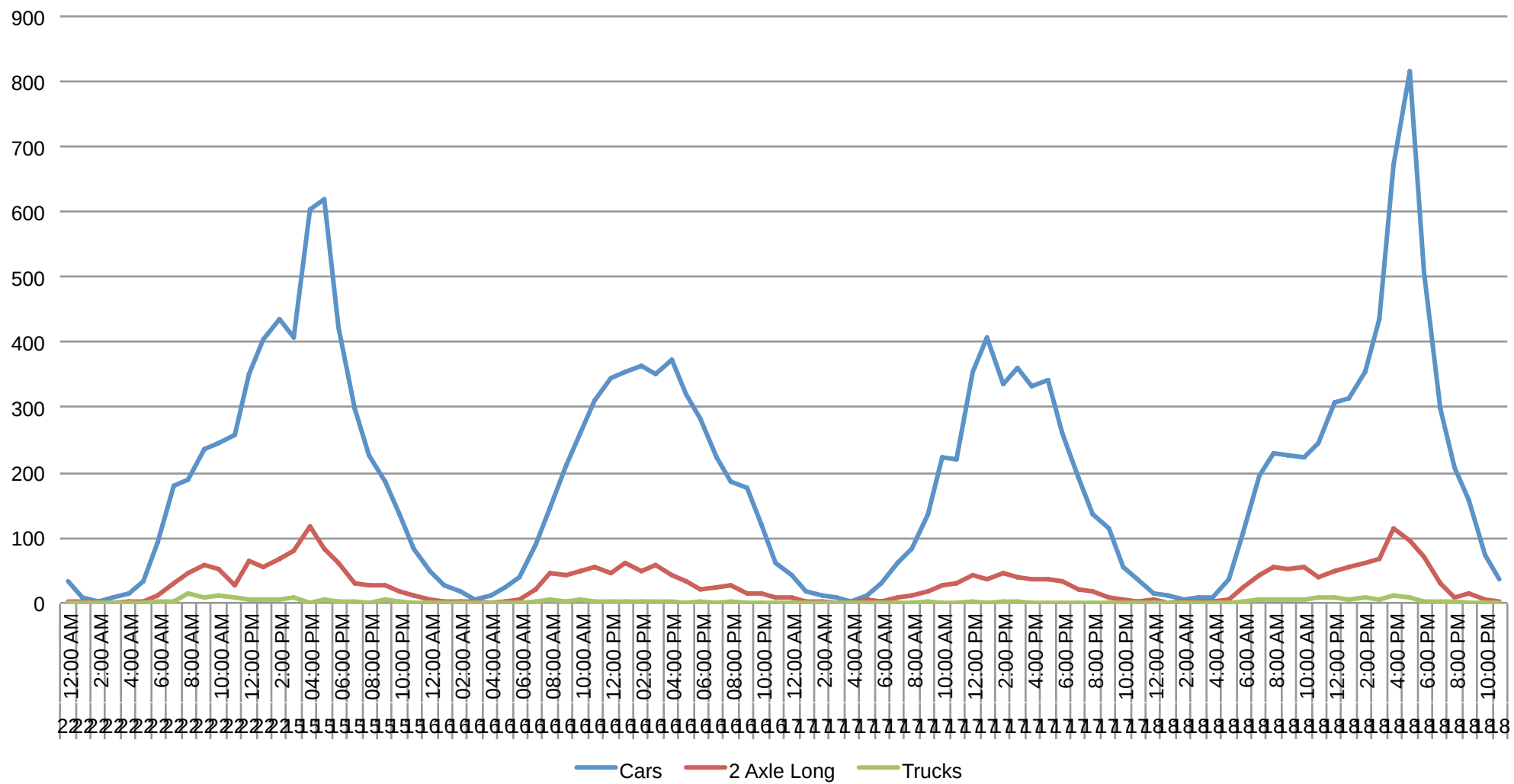
- The crash data does not appear to indicate that trucks are causing crashes along the corridor.

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.

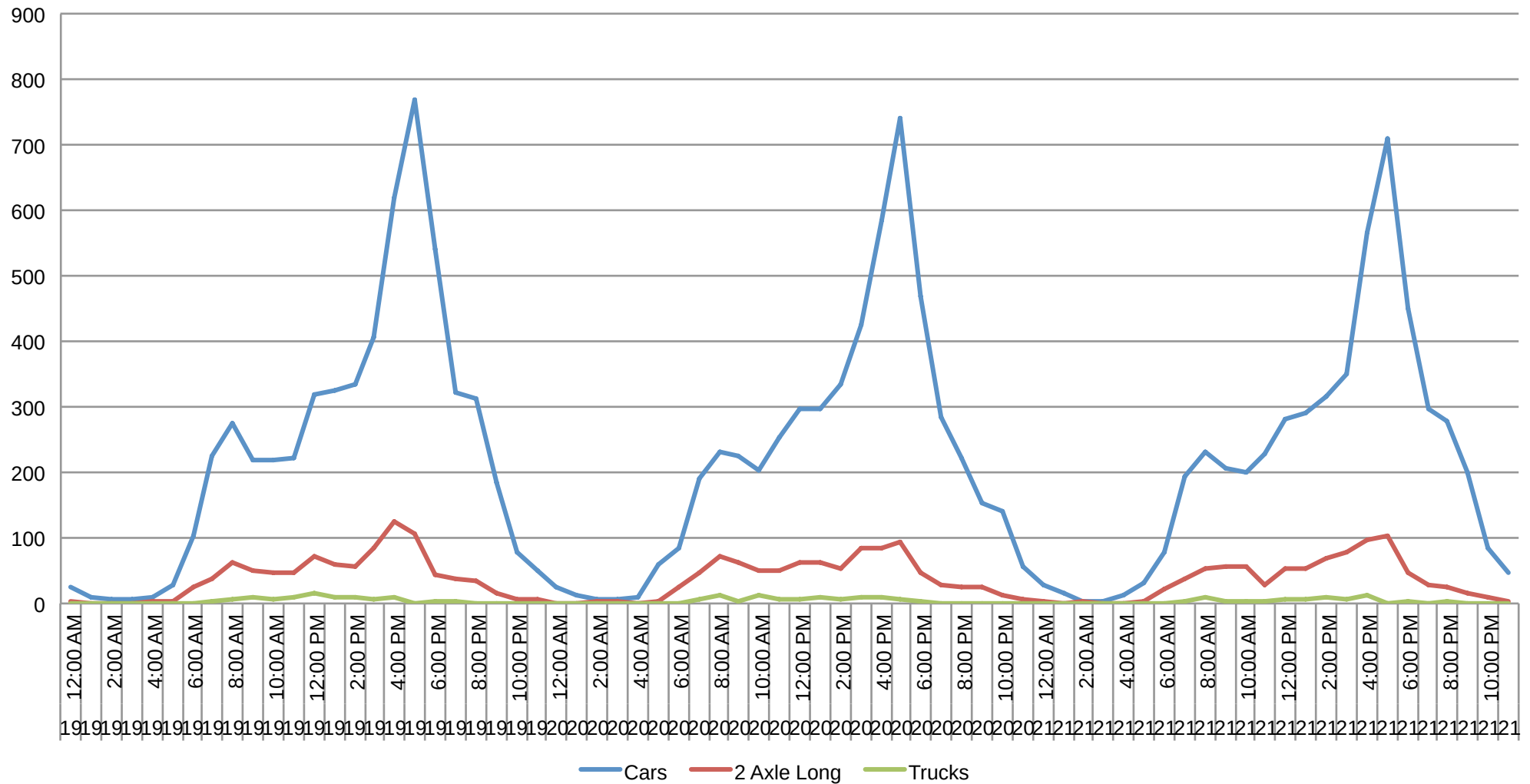
Appendices

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

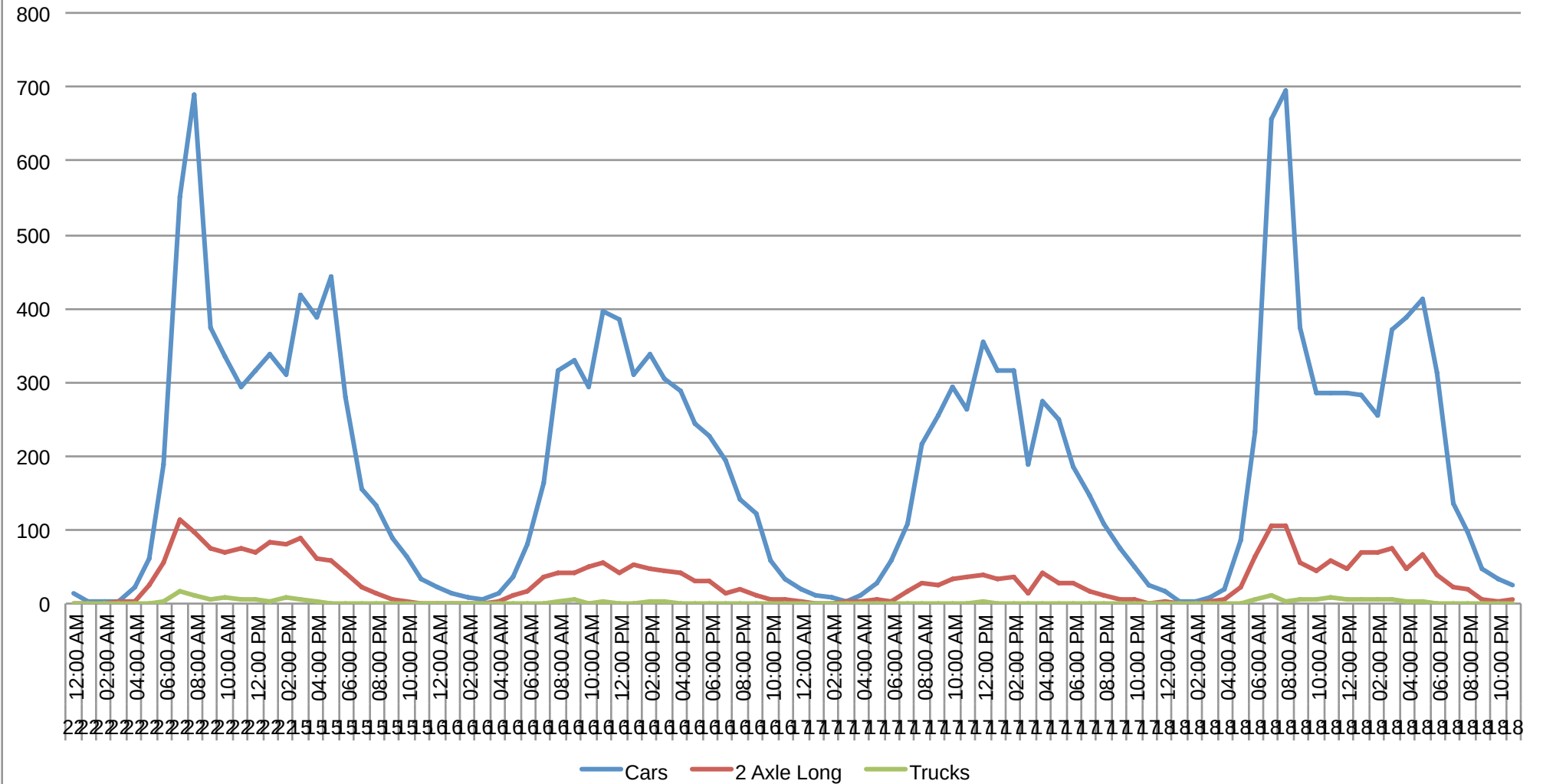
Location A NB
5/22 & 5/15-5/18



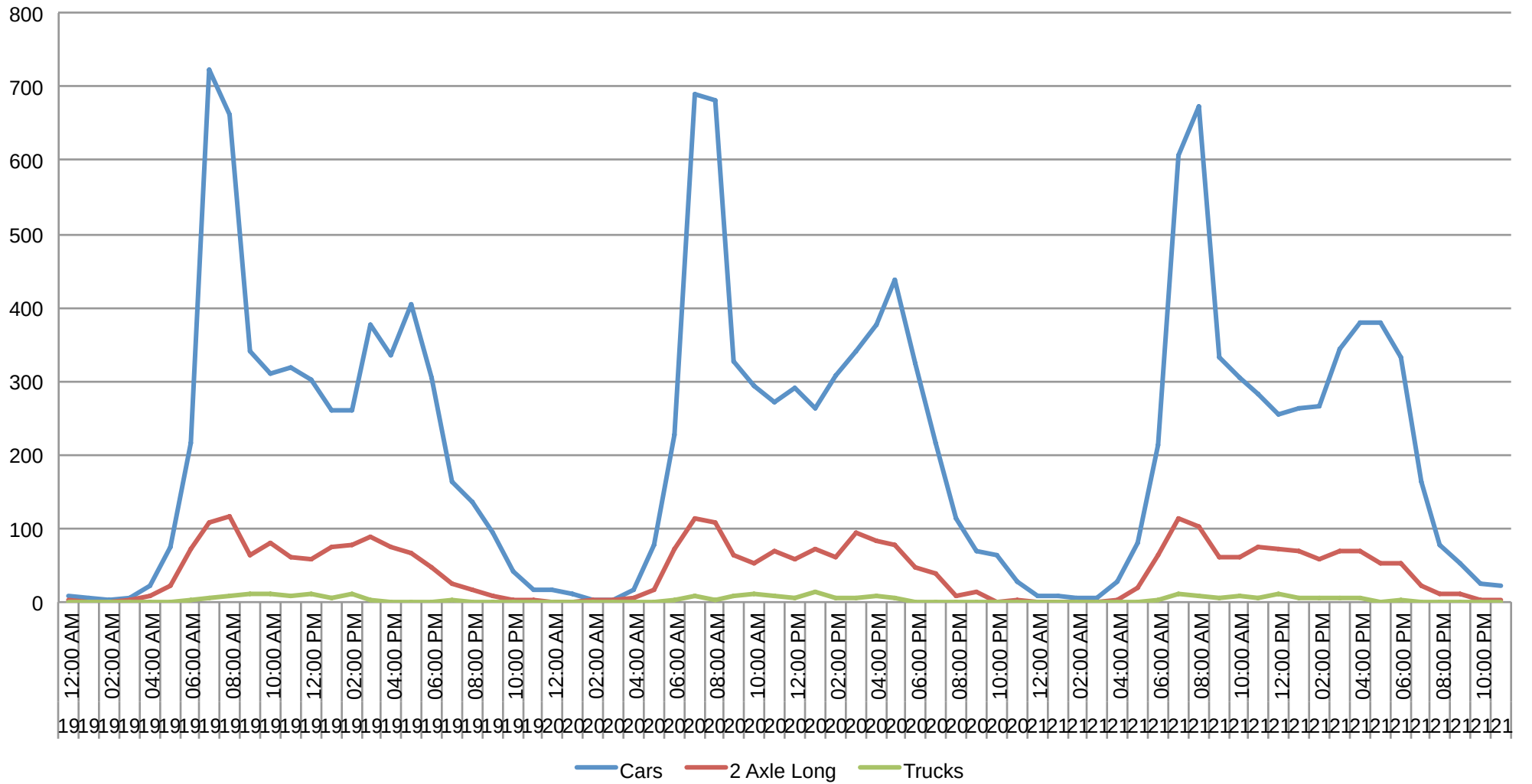
Location A NB 5/19-5/21



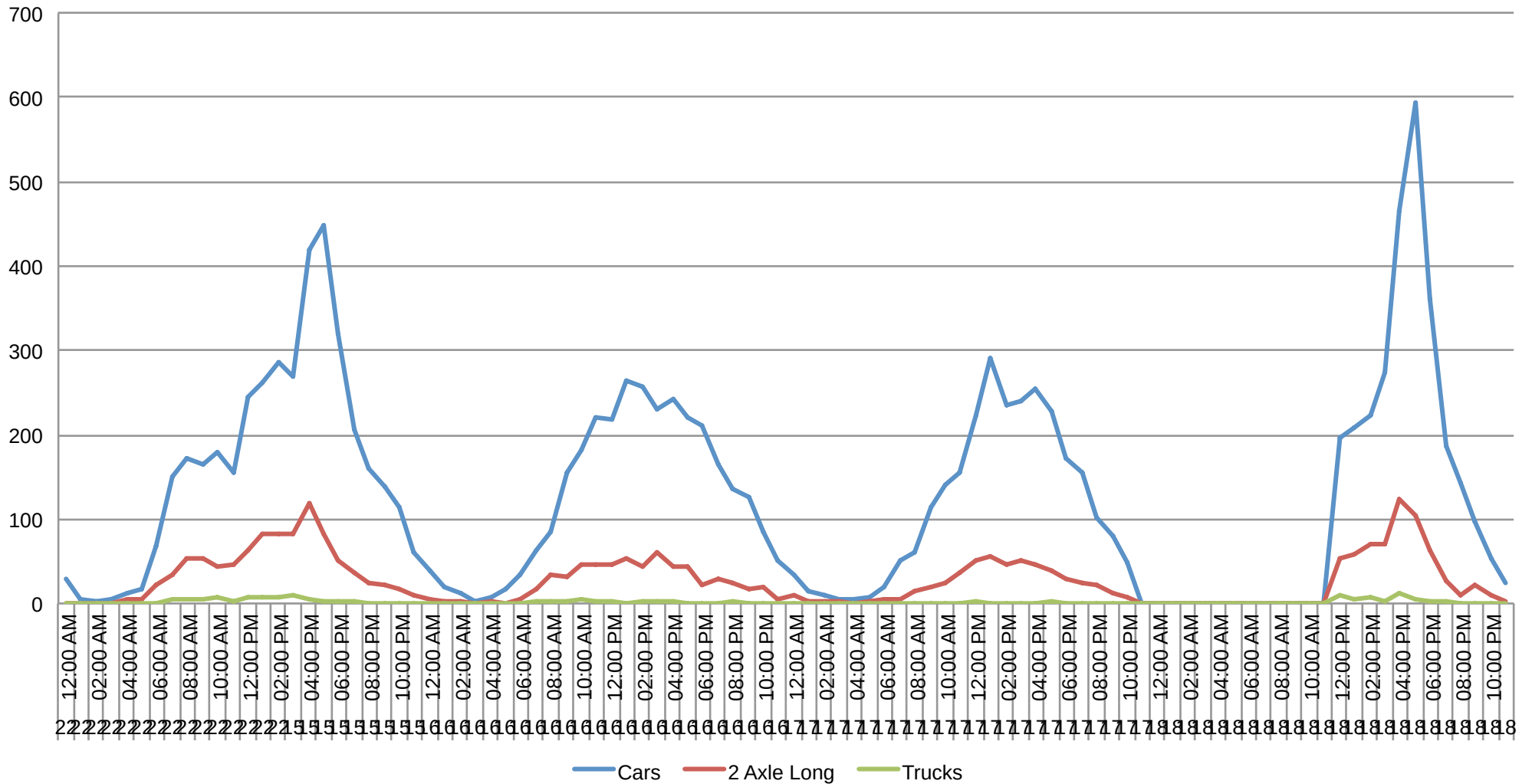
Location A SB 5/22 & 5/15-5/18



Location A SB 5/19-5/21

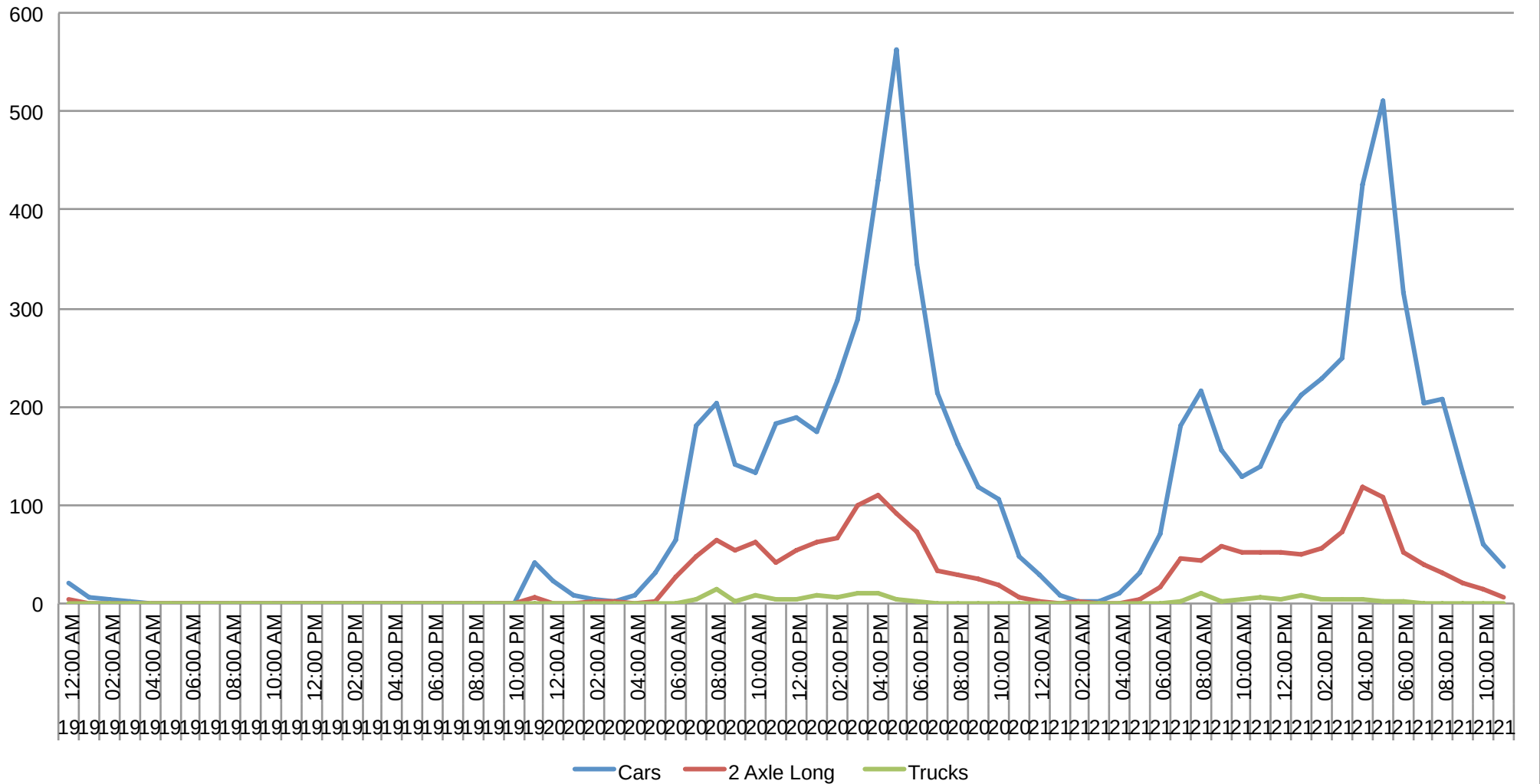


Location B NB 5/22 & 5/15-5/18



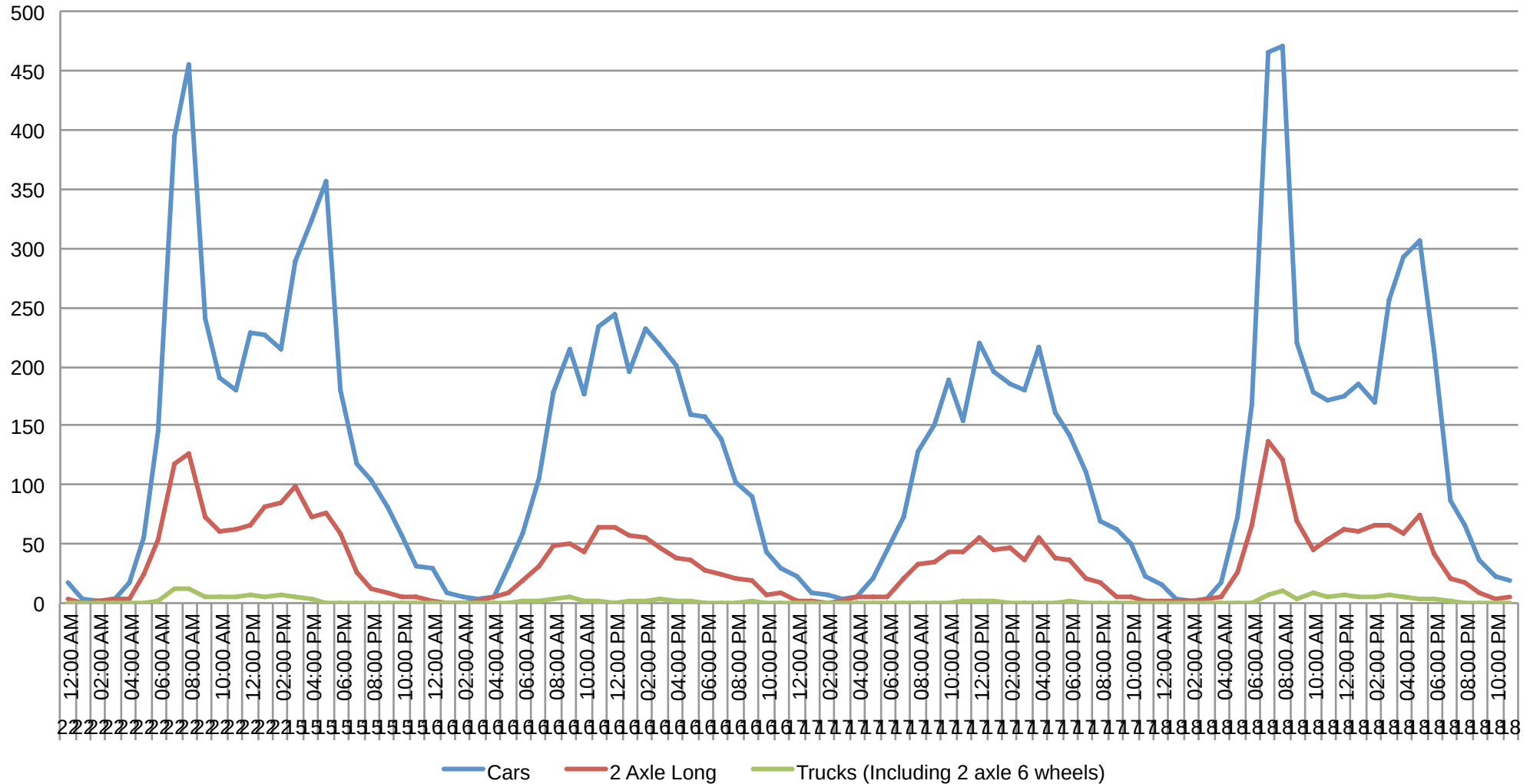
Counter short circuit 11 PM-12 AM

Location B NB 5/19-5/21

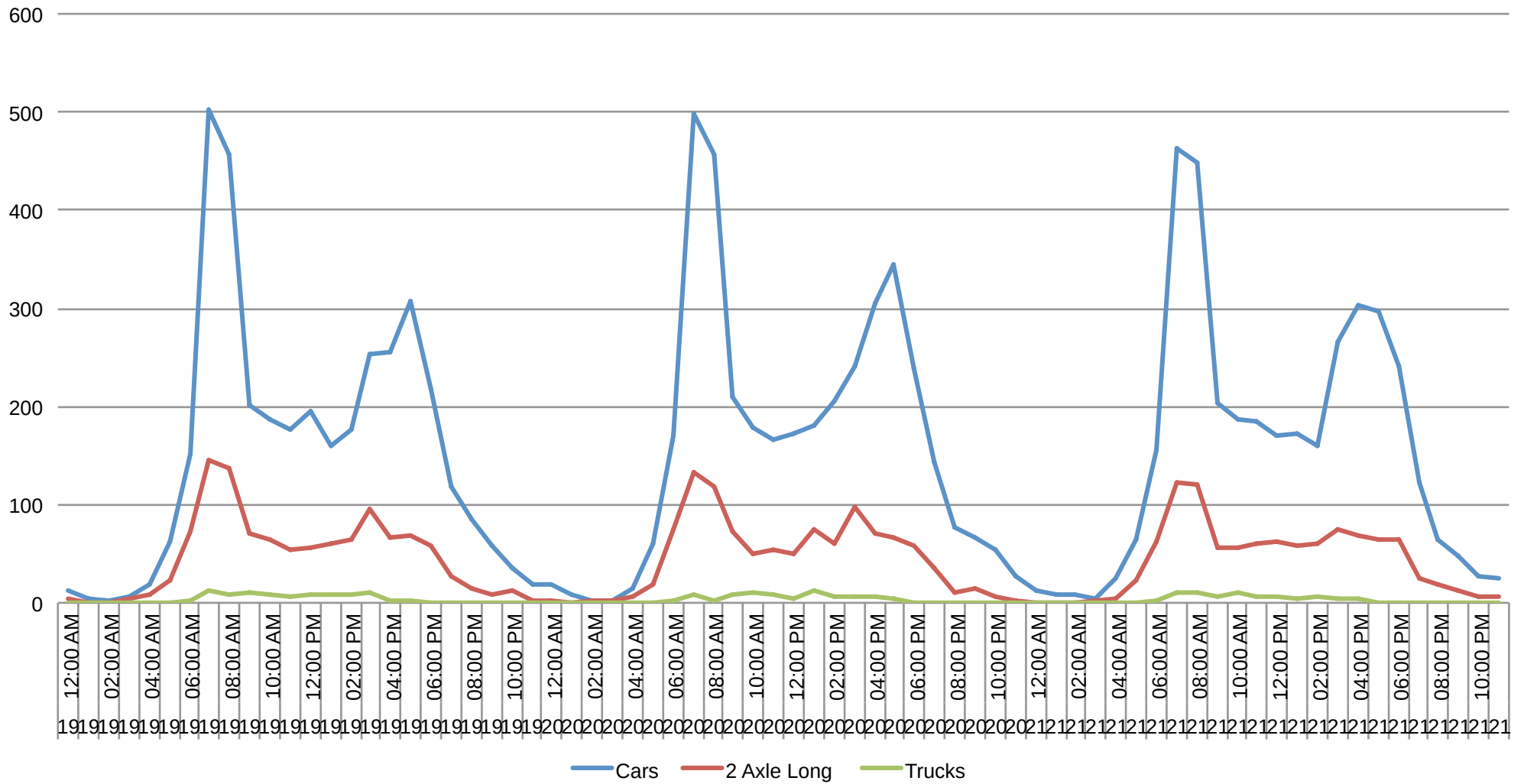


Counter short circuit 12 AM -10 PM

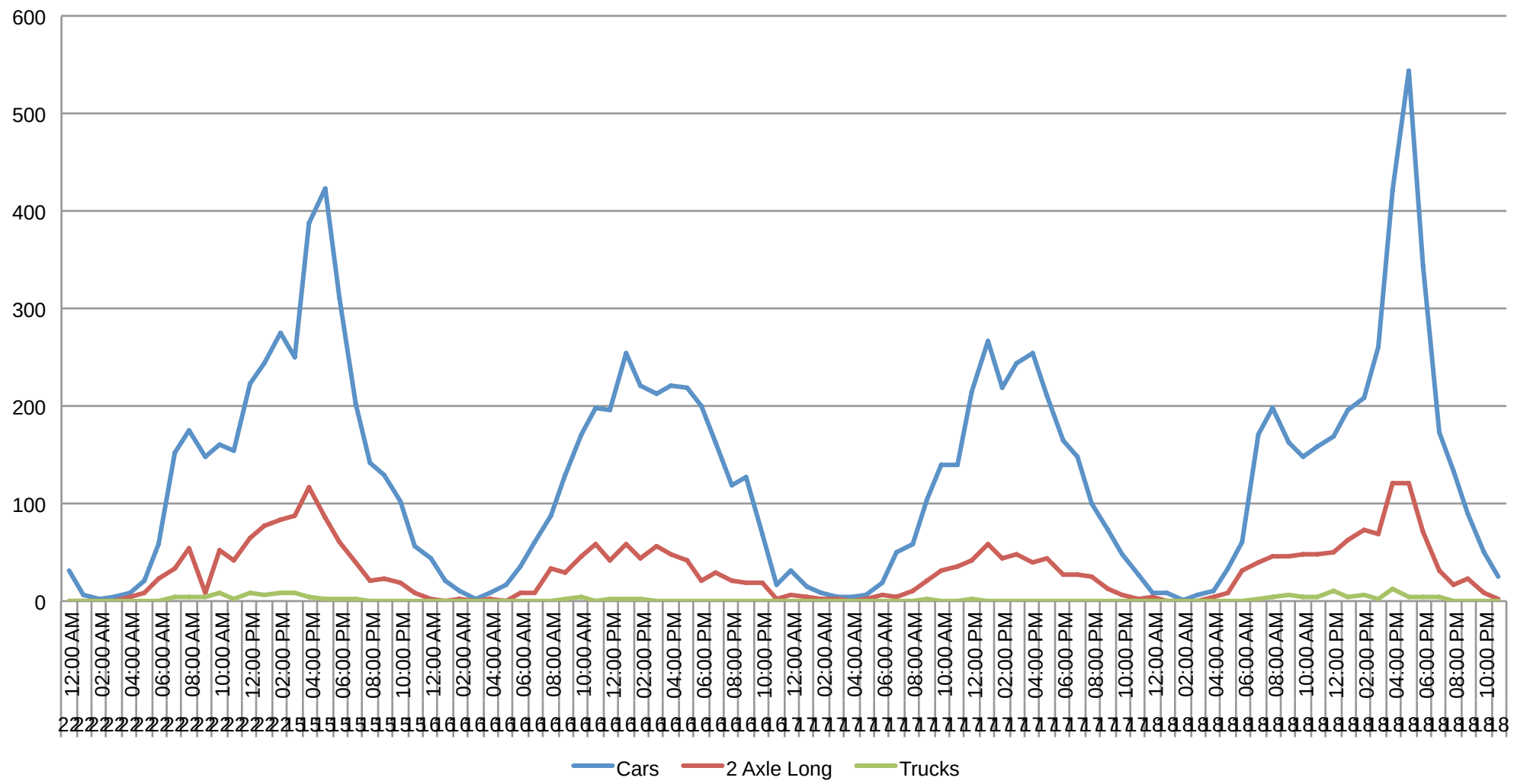
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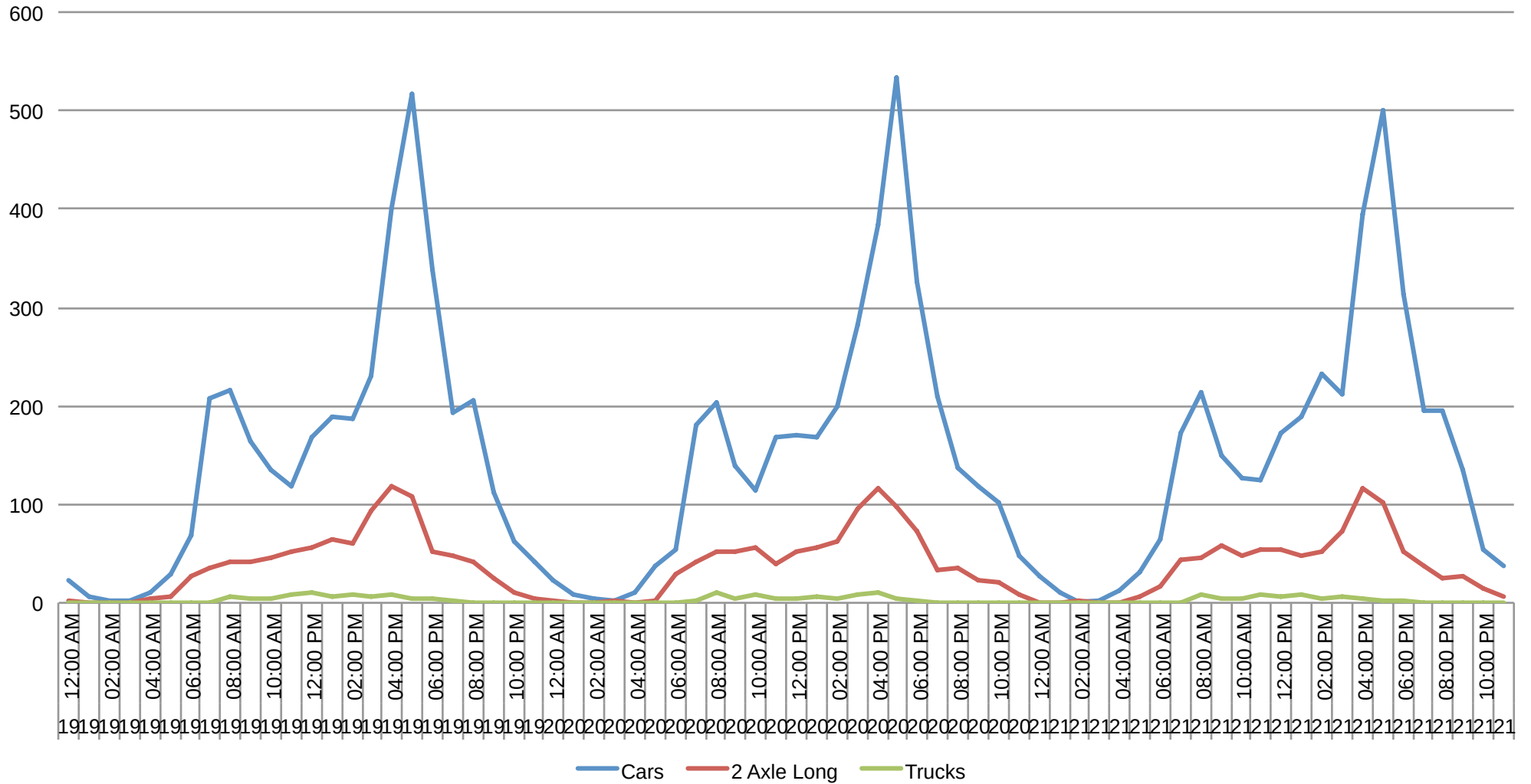
Location B SB 5/19-5/21



Location C NB
5/22 & 5/15-5/18



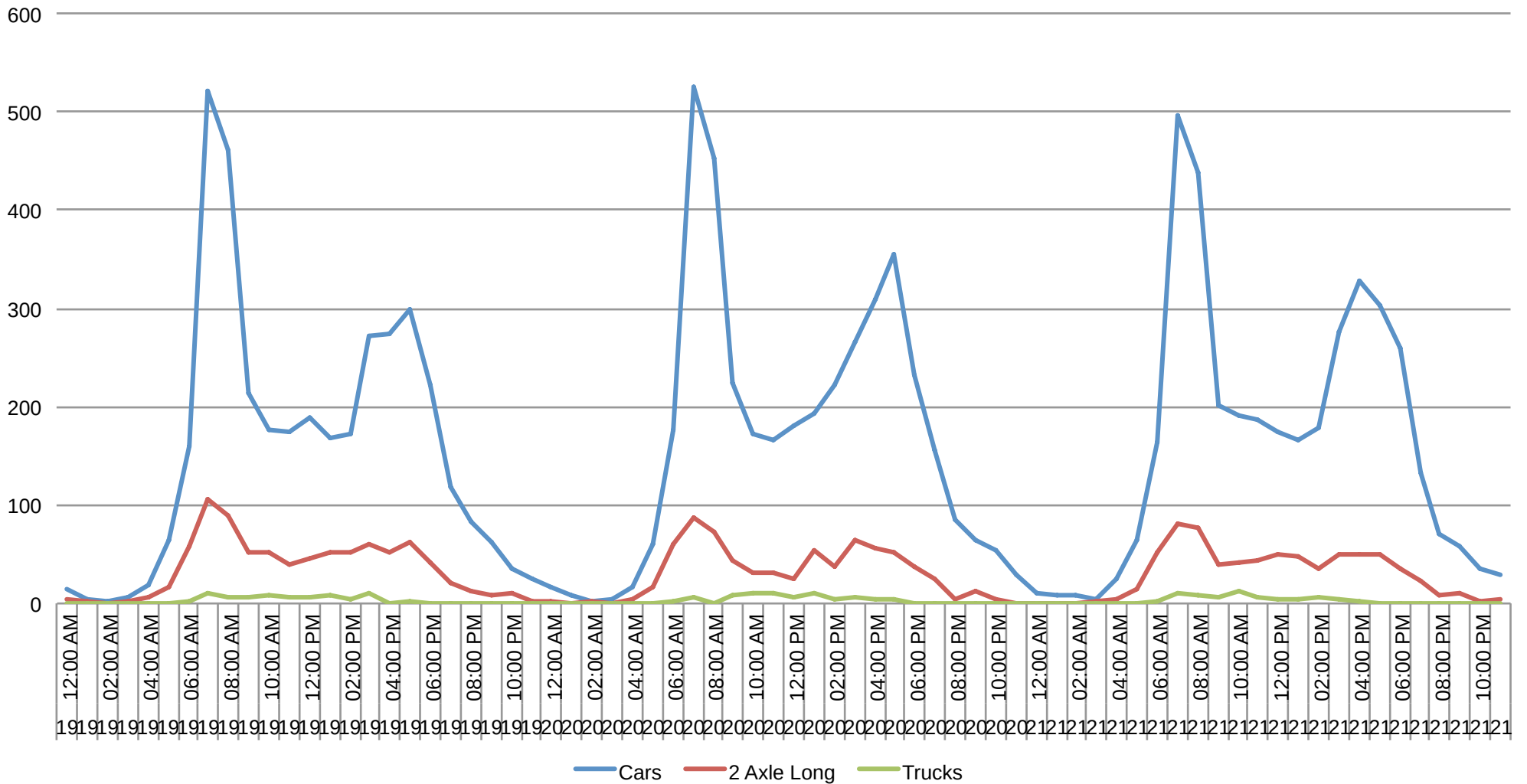
Location C NB 5/19-5/21



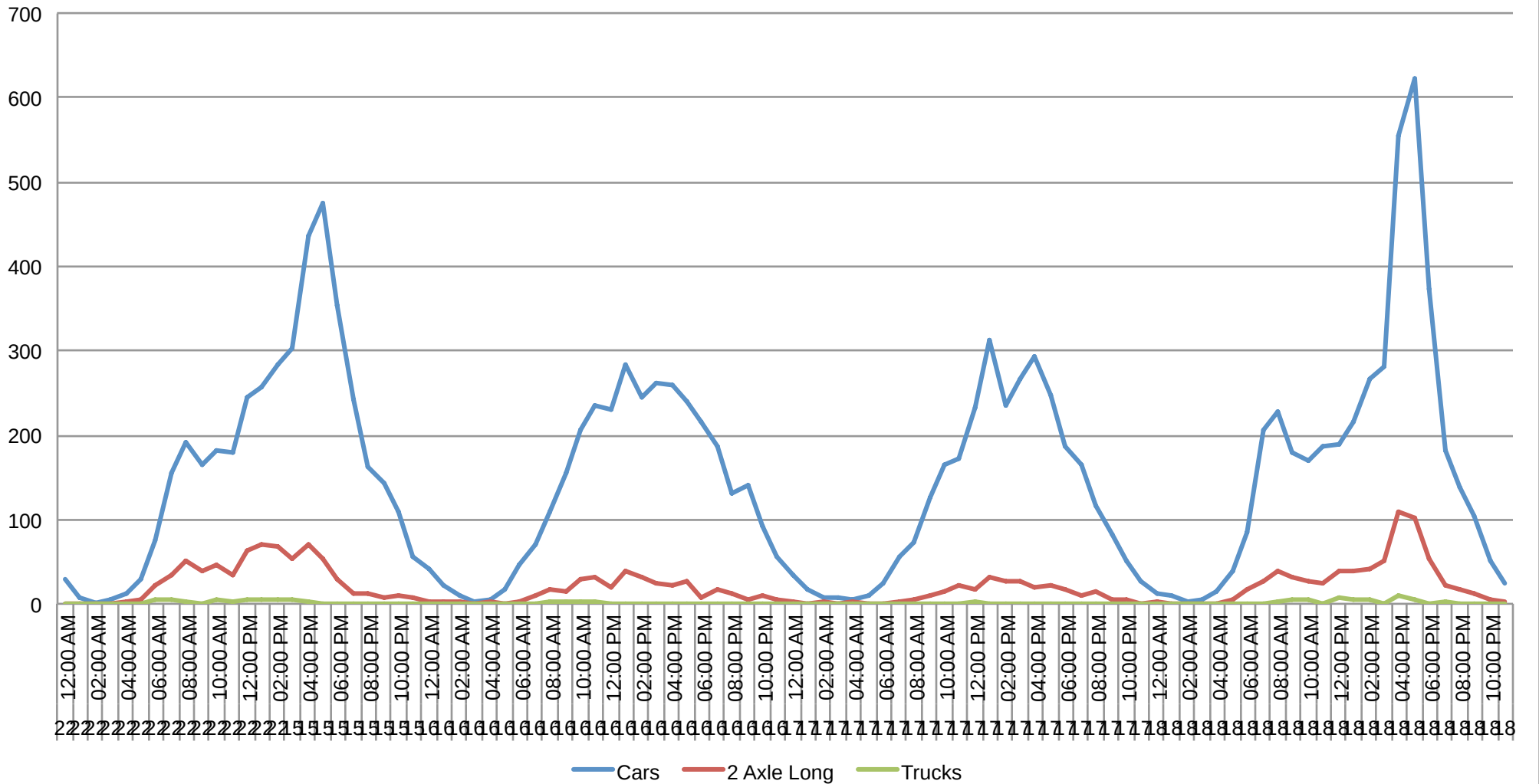
The chart displays the traffic volume of three vehicle types over a 24-hour period. The Y-axis represents the number of vehicles, ranging from 0 to 600. The X-axis shows time in 2-hour intervals. The legend indicates three categories: Cars (blue line), 2 Axle Long (red line), and Trucks (green line). The data shows a clear diurnal pattern with peaks in the morning and evening. Cars are the most numerous vehicle type, followed by 2 Axle Long vehicles, and Trucks are the least numerous.

Time	Cars	2 Axle Long	Trucks
12:00 AM	20	10	10
02:00 AM	10	10	10
04:00 AM	50	20	10
06:00 AM	150	80	10
08:00 AM	450	90	10
10:00 AM	180	50	10
12:00 PM	230	50	10
02:00 PM	210	70	10
04:00 PM	300	60	10
06:00 PM	370	50	10
08:00 PM	110	20	10
10:00 PM	110	10	10
12:00 AM	30	10	10
02:00 AM	10	10	10
04:00 AM	20	10	10
06:00 AM	100	20	10
08:00 AM	180	30	10
10:00 AM	200	30	10
12:00 PM	180	30	10
02:00 PM	250	40	10
04:00 PM	210	30	10
06:00 PM	160	20	10
08:00 PM	150	10	10
10:00 PM	100	10	10
12:00 AM	30	10	10
02:00 AM	10	10	10
04:00 AM	20	10	10
06:00 AM	130	20	10
08:00 AM	190	30	10
10:00 AM	170	30	10
12:00 PM	230	30	10
02:00 PM	210	30	10
04:00 PM	180	20	10
06:00 PM	230	40	10
08:00 PM	160	30	10
10:00 PM	120	20	10
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10:00 PM	20	10	10

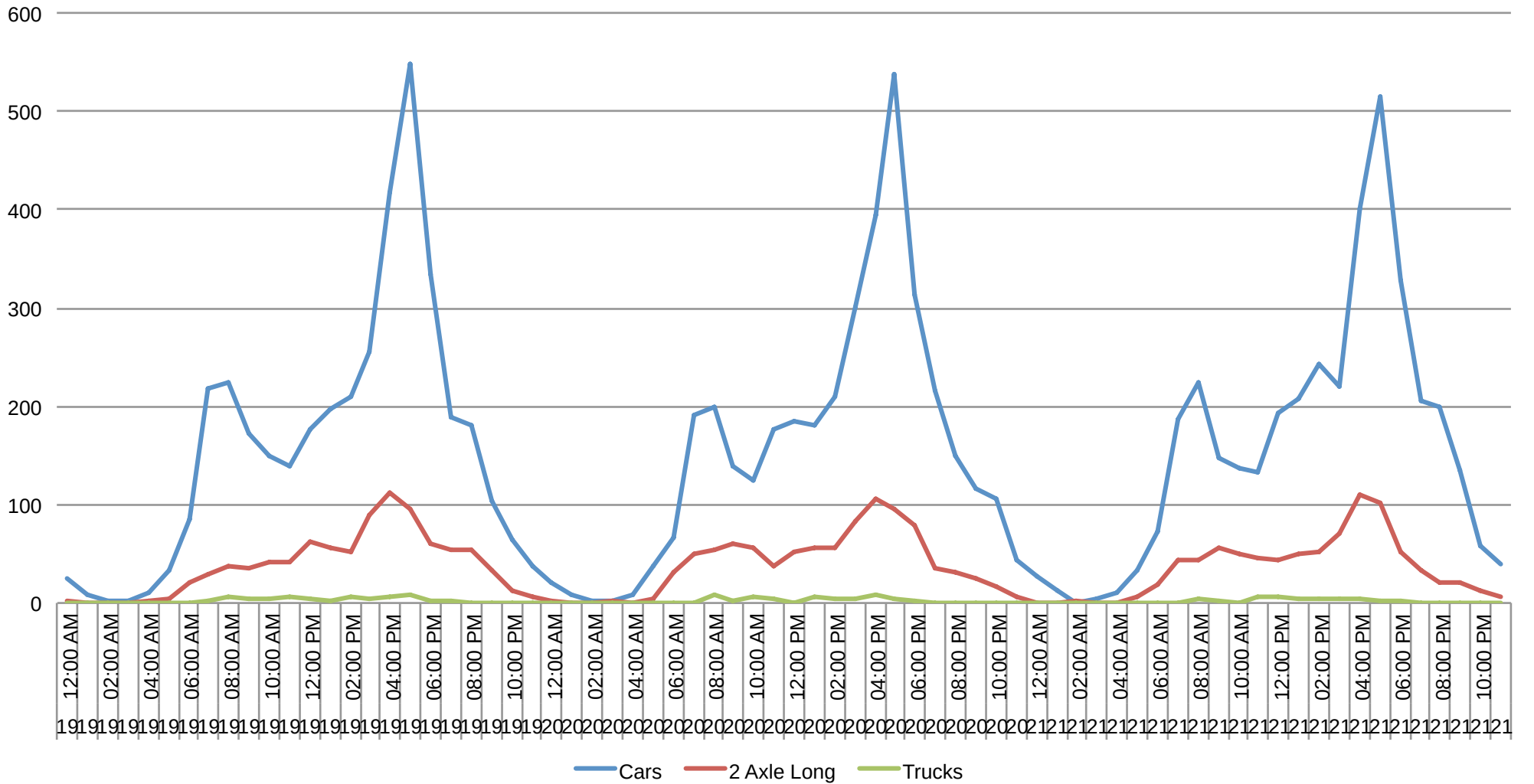
Location C SB 5/19-5/21



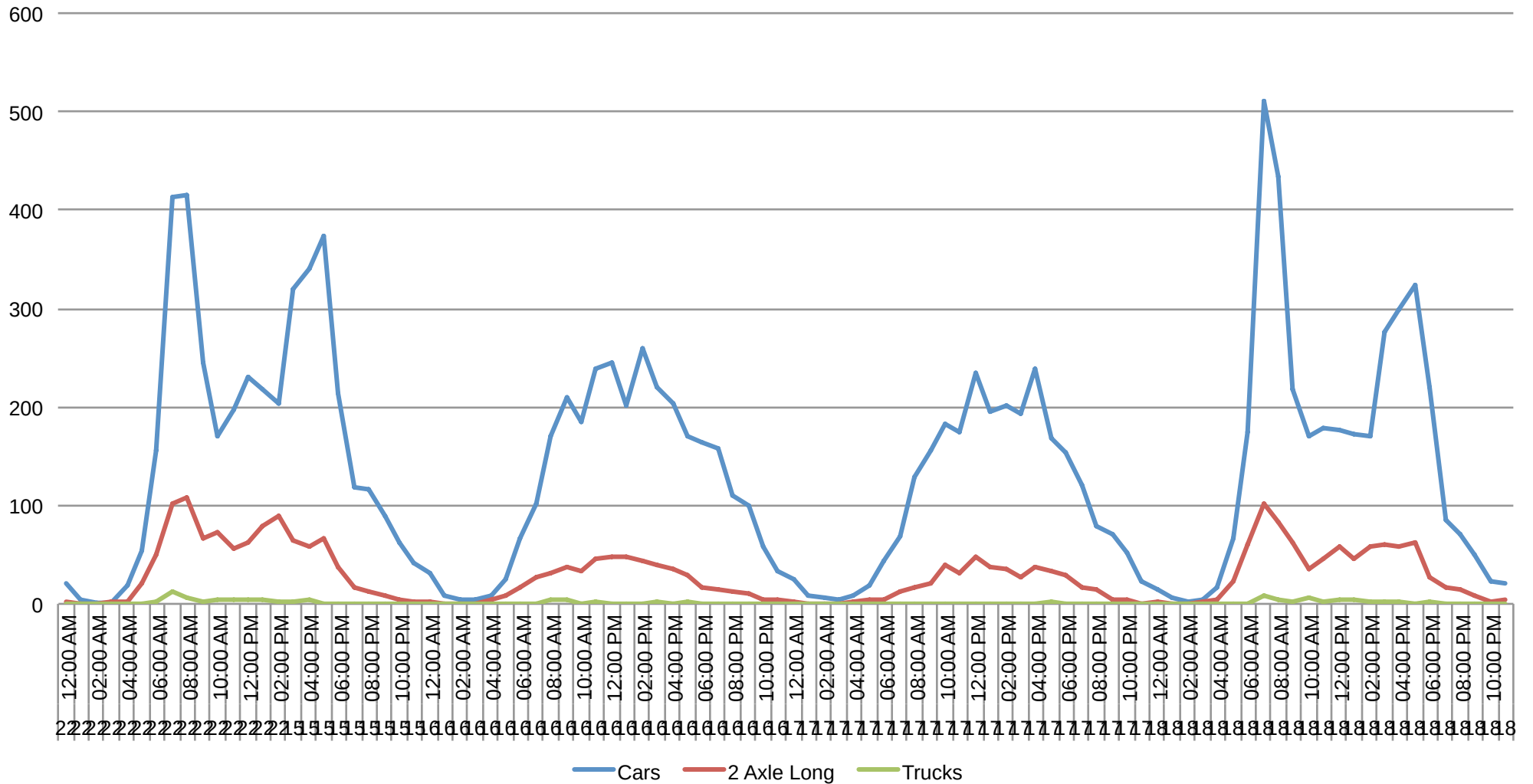
Location D NB 5/22 & 5/15-5/18



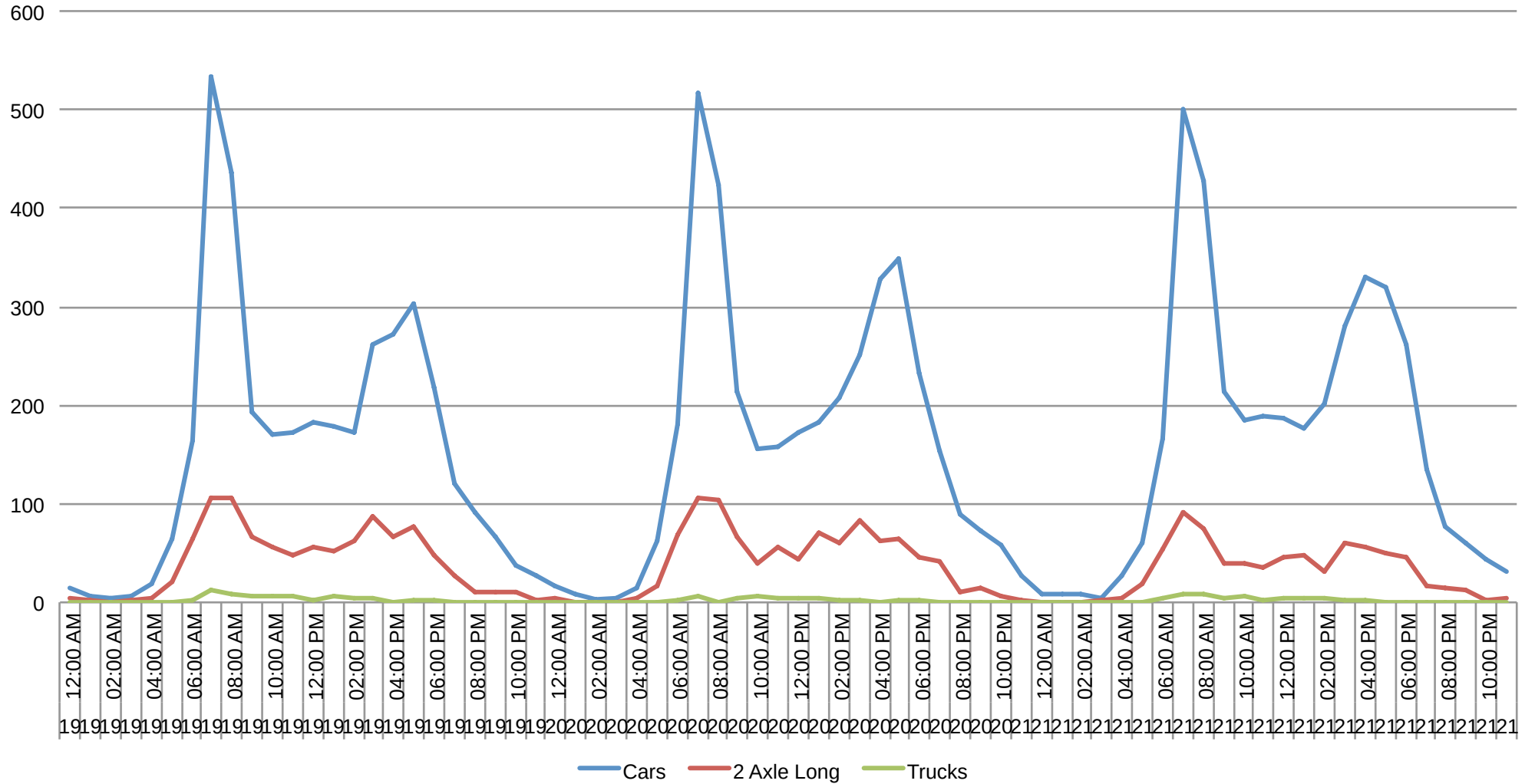
Location D NB 5/19-5/21



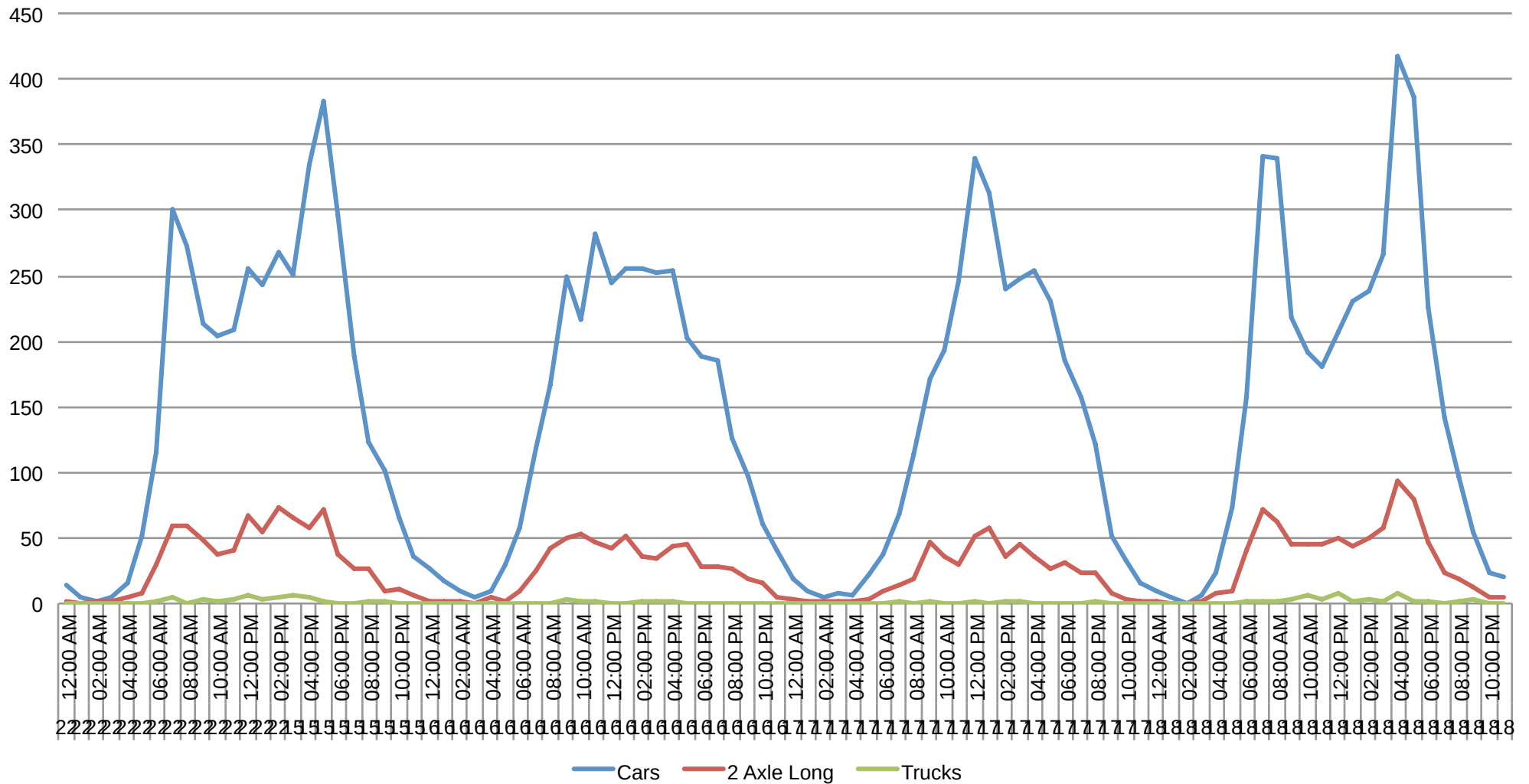
Location D SB 5/22 & 5/15-5/18



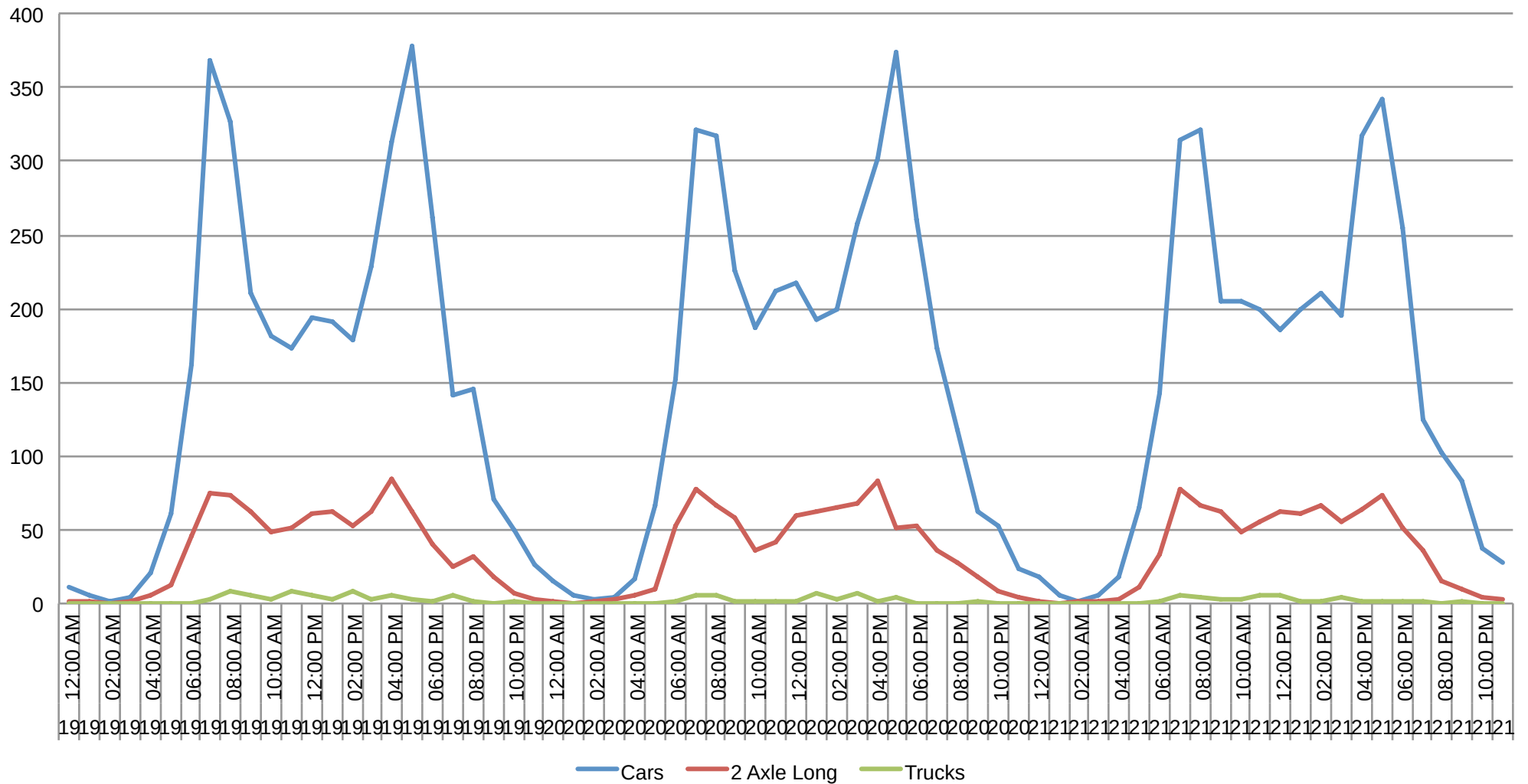
Location D SB 5/19-5/21



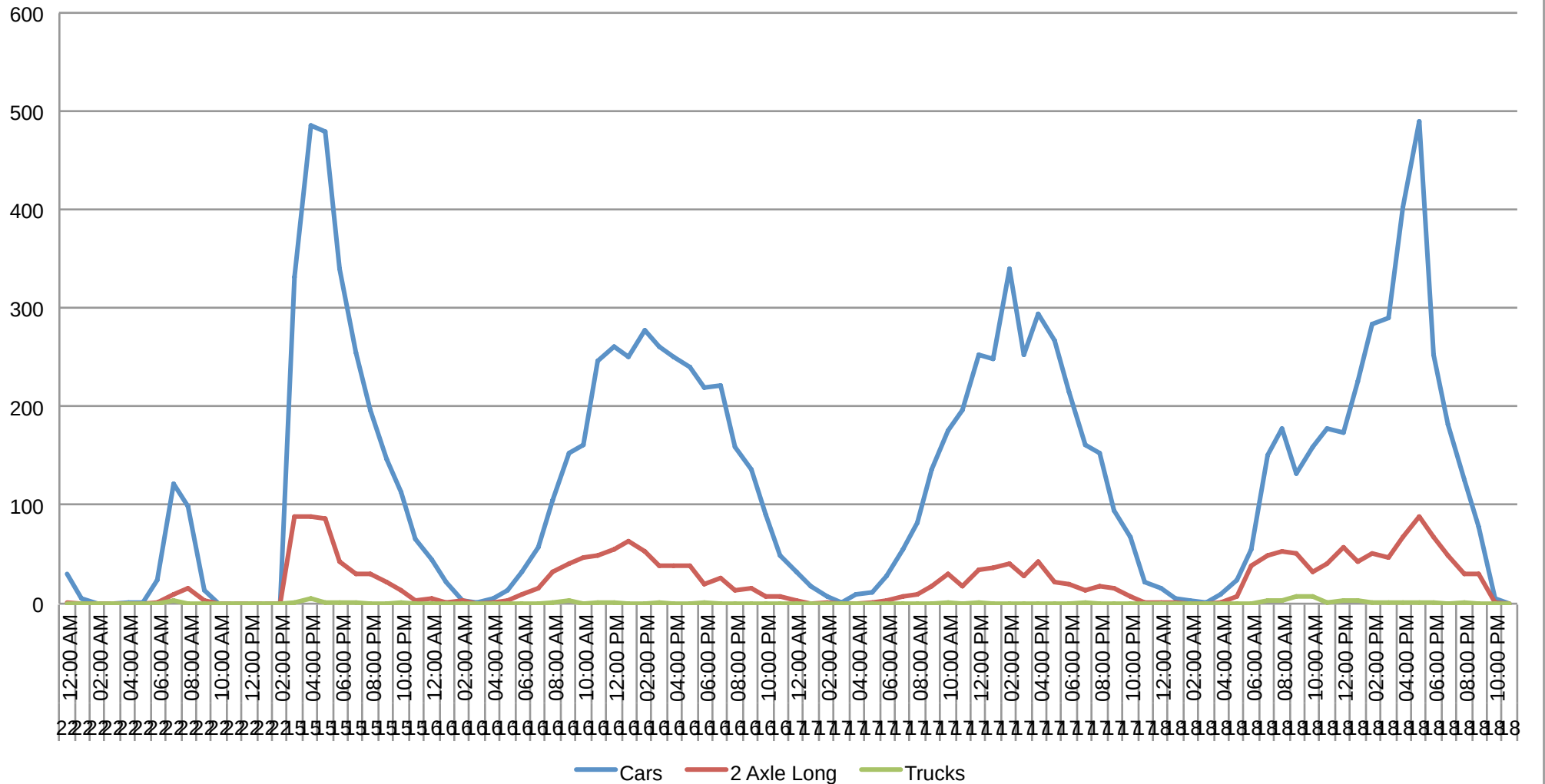
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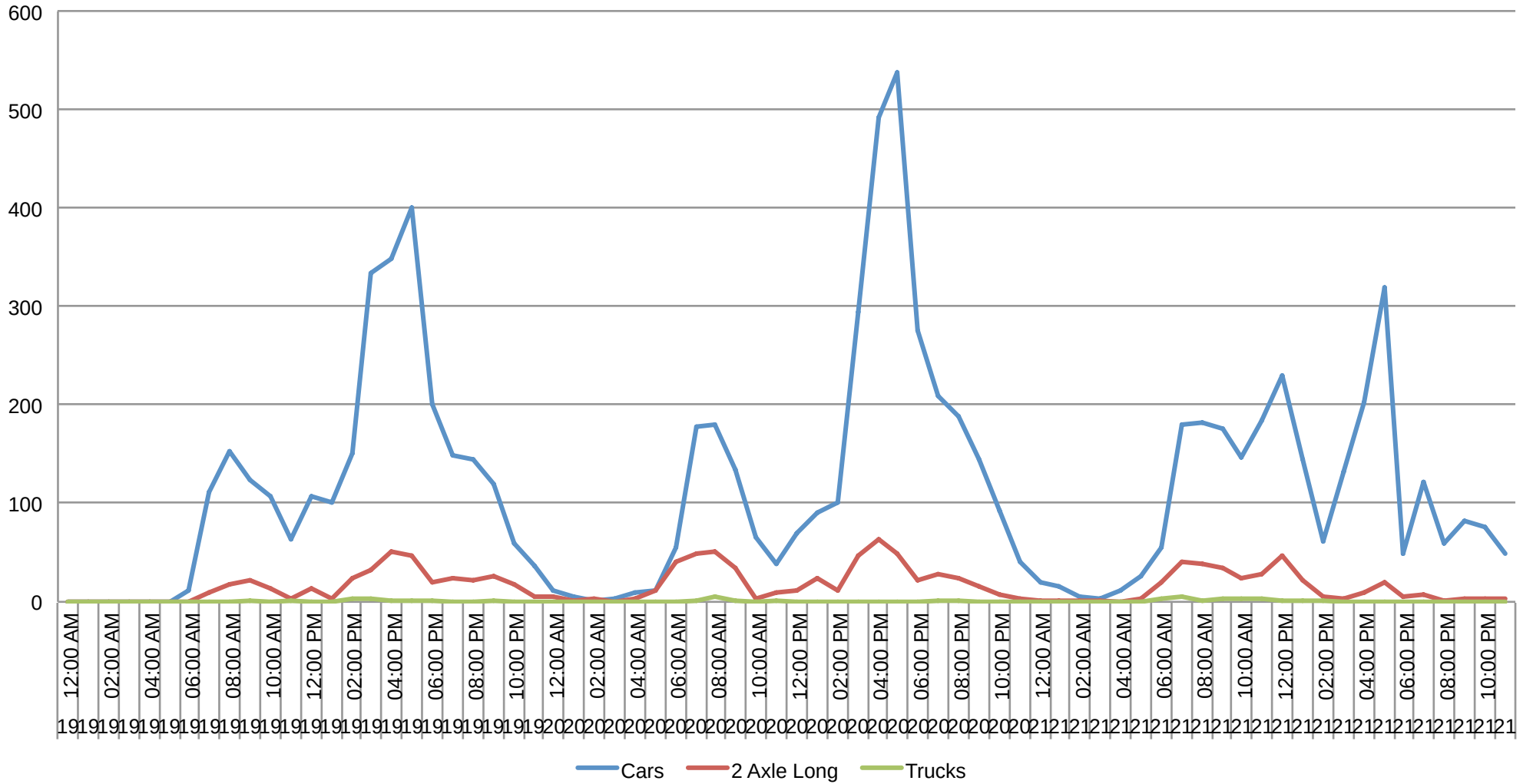
Location E NB 5/19-5/21



Location E SB 5/22 & 5/15-5/18



Location E SB 5/19-5/21



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