

Carter Road Traffic Study

Prepared for the City of Roanoke, VA



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Roanoke Valley Area Metropolitan Planning Organization



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Introduction

This study was conducted to quantify the amount of traffic that drives through Carter Road and Avenel Avenue without stopping in the adjoining residential neighborhood. This type of traffic is commonly referred to as “cut-through” traffic. The City has long heard complaints from residents along these streets that there is considerable cut-through traffic in their neighborhood.

Study Area

Carter Road and Avenel Avenue are located in the southwest portion of the Greater Raleigh Court neighborhood in the City of Roanoke, Virginia (Figure 1). They are local streets that connect the residential area to two arterials, Brandon Avenue and Grandin Road, which provide primary access into the City from points in Roanoke County and the City of Salem. Adjacent to the study area, along Grandin Road, is the adjoining campuses of Patrick Henry High School, the Roanoke Valley Governor’s School, and Raleigh Court Elementary School. The main entrance onto the campus is at the intersection of Grandin Road and Avenel Avenue.

Data Collection

License Plate Survey

In order to determine the extent of the cut-through traffic, staff conducted a vehicle license tag survey for traffic entering and exiting Carter Road and Avenel Avenue. A license plate survey involves recording the license plate number of a vehicle passing a particular point at a specific time. License plates recorded at both the entry and exit point within a certain time frame are considered to represent traffic passing through the neighborhood with neither an origin nor destination within it.

License plate numbers were manually collected on March 8, 2007 for the AM (7:00 to 9:00AM) and PM (4:00 to 6:00PM) peak periods, at the following intersections: Carter Road/Brandon Avenue, Carter Road/Grandin Road, and Avenel Avenue/Grandin Road (Figure 1). Vehicles that were recorded both entering and leaving the neighborhood within a 3-minute time frame were considered to be cut-through traffic.

During the 4-hour survey period, the license tag information was recorded for 753 vehicles. The breakdown of these records for the AM and PM peak 2-hour periods, including vehicles entering and exiting the neighborhood, is shown in Table I. Sixty-two percent of the surveyed vehicles were recorded during the AM peak (467), compared with 38% (286) in the PM peak.

Table I: Total License Plate Observations by Location

Survey Location	AM Period (7:00 to 9:00 AM)		PM Period (4:00 to 6:00 PM)	
	Southbound	Northbound	Southbound	Northbound
Carter/Brandon	144	81	83	46
Carter/Grandin	70	65	57	48
Avenel/Grandin	97	10	33	19
Total	311	156	173	113

Figure I: Vicinity Map with Survey and Counter Locations





Traffic Counts

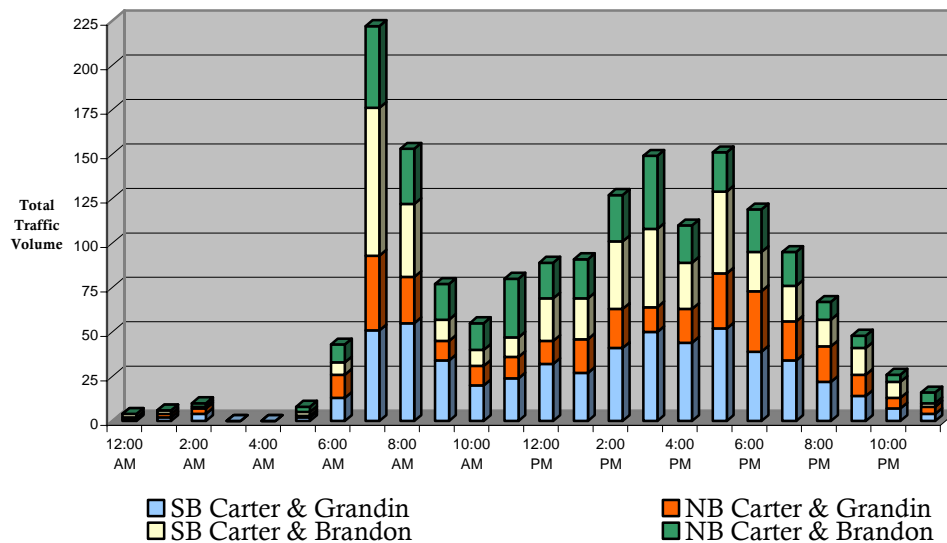
Additional traffic count information was also collected on March 8, 2007 by the City of Roanoke Transportation Division using Nu-Metrics Hi-STAR traffic analyzers. The data was collected in order to verify that the combined license plate records closely match the actual traffic during the survey periods. A significant mismatch between the license plate record totals and the traffic counts can be indicative of problems with the license plate survey. A later section shows the comparison of the total number of observed license plates (entering and exiting) and the traffic count results.

Table 2: Traffic Counts by Location					
Survey Location	Daily	AM Period (7:00 to 9:00 AM)		PM Period (4:00 to 6:00 PM)	
		Southbound	Northbound	Southbound	Northbound
Carter/Brandon	840	124	77	72	43
Carter/Grandin	918	106	68	96	50
Total		230	145	168	93

A total of 4 traffic counters were located on Carter Road at its intersection with Brandon Avenue and Grandin Road. One counter was located in each lane in order to separately measure the entering and exiting traffic. The counters began collecting data at 10AM on March 7, 2007 and concluded on March 9, 2007 at 10AM, lasting a total of 48 hours. Data was recorded in 15 minute time periods. The traffic counts by location and direction of traffic are shown in Figure 2 for the 12-hour count period on March 8, the day of the license plate survey. This chart shows three distinct traffic peaks, a morning peak between 7AM to 9AM, and two afternoon peaks, from 2PM to 4PM and from 5PM to 6PM. The dual PM peaks are likely due to school ending from 2PM-3PM and the expected PM peak from 4PM-6PM.

Ninety-seven percent of the vehicles recorded by the traffic counters on Carter Road were passenger vehicles, with small trucks and school buses making up the remaining 3%. The average speed of all vehicles was 18 miles per hour, with 6.65% exceeding the 25mph speed limit near the Grandin Road intersection and 8% near the Brandon Avenue intersection.

Figure 2
Total Volume of Carter Street
 (3/08/07)





Travel Time

Travel times within the study area were collected on two different days for both the AM and PM peak periods. The travel times are used to compare the time required to travel on arterials versus a combination of arterials and local streets, which can provide insight into the possible motivations of cut-through drivers. Average travel times, based on multiple runs, are provided in Table 3.

Table 3: Comparison of Travel Times by Route				
Route	AM Period Travel Time (Minutes & Seconds)		PM Period Travel Time (Minutes & Seconds)	
	Southbound	Northbound	Southbound	Northbound
Brandon/Grandin (b/t Carter & Avenel)	3:00	6:11	3:05	5:16
Brandon/Grandin (b/t Carter & Carter)	3:30	6:40	3:27	5:45
Carter	1:05	1:06	1:05	1:12
Carter/Avenel	1:13	0:59	1:17	1:00

The travel times for the routes traveling on the local streets of Carter Road or Avenel Avenue are significantly less than those using the arterials of Grandin Road and Brandon Avenue, particularly during the AM peak period. The largest time savings were realized by vehicles using Avenel and/or Carter to travel northbound from Grandin Road to Brandon Avenue. During the AM peak, the trip from Grandin to Brandon, without using a neighborhood cut-through, is slowed by manual traffic control at the intersection of Grandin Road and Avenel Avenue, as well as the traffic signal timing for the left turn from Grandin onto Brandon. The manual traffic control is used to manage traffic entering and exiting the Patrick Henry High School campus from 7:45 to 8:00AM. Considerable time savings was also gained by vehicles using Carter and/or Avenel to travel southbound from Brandon Avenue to Grandin Road. Many of these vehicles had business at the school campus, especially during the AM time period.

Analysis

License Plate Versus Traffic Counts

Traffic count data is used as a means to verify the collective number of license plate records against traffic counts. Significant discrepancies between the number of license plates survey records and the number of vehicles counted by the traffic counter could be indicative of problems with the survey. In the license tag survey of Carter Road, the number of vehicles recorded was within 4%-11% of the traffic counts for both the AM and PM peak periods (Table 4). The discrepancies in counts are likely due to minor machine over or undercounting caused by vehicle queuing or vehicle route deviations due to on-street parking.

Table 4: Comparison of License Plate Survey vs. Traffic Counts				
Survey Location	AM License Plate Survey	AM Traffic Counts	PM License Plate Survey	PM Traffic Counts
Carter/Brandon	225	201	129	115
Carter/Grandin	135	174	105	146
Total	360	375	234	261



License Plate Matches

Following the collection of license plate numbers, the data was analyzed in order to determine the level of traffic passing through the neighborhood without stopping. A valid match was confirmed if the license plate recorded at an entry point matched a plate recorded at an exit, and occurred within a consecutive 3-minute period. If a match occurred above the 3-minute threshold, the vehicle was considered to have had business in the neighborhood and did not contribute to the overall through-traffic total.

Table 5: Match Rate at Each Survey Location

Survey Location	AM Matches	Total Valid AM Records	Match Percent	PM Matches	Total Valid PM Records	Match Percent
Carter	68	362	18.7%	52	236	22%
Carter/Avenel	51	105	48.6%	10	50	20%
Total	119	467		62	286	

During the AM peak period 48.6% of Avenel Avenue’s traffic was determined to be through-traffic, which was more than any other survey location or time period. This high percentage during the AM period can be almost entirely contributed to vehicles seeking a cut-through route to gain quicker access to the school campus. The main entrance to the campus is located at the southern terminus of Avenel Avenue, just after crossing Grandin Road.

Conclusions

This study has shown that there is a significant amount of traffic passing through Carter Road and Avenel Avenue without stopping in the neighborhood. This issue seems particularly prevalent during the AM and PM peak traffic periods. It also corresponds very closely with the schedule of the three schools contained on the Patrick Henry High School campus. Based on field observations of the traffic, it appears that a majority of the through traffic’s origin or destination is the school campus, particularly for vehicles traveling on Avenel Avenue.

The travel time analysis shows that there is significant time savings for vehicles using Carter Road and/or Avenel Avenue to shorten their trip from or to Grandin Road and Brandon Avenue. For example, a vehicle traveling east on Grandin Road, with a destination west on Brandon Avenue, could save over 5 minutes of time by using Carter Road to gain access to Brandon Avenue. These time differences, and others noted previously, are largely due to the signal timing at the intersection of Grandin Road and Brandon Avenue. The short length of the right turn lane and the right on red restriction from Brandon onto Grandin also creates long travel times for vehicles traveling along that route. Additional delay is also created during the AM peak by the manual traffic control at the intersection of Grandin Road and Avenel Avenue.

Many communities consider 20% through-traffic in residential areas as a threshold for additional traffic study or consideration of traffic calming measures. Based on the traffic count information speeding is not a major issue on the two subject streets, however the volume of traffic and congestion created from through-traffic can be problematic for adjacent residents. The City of Roanoke should consider meeting with neighborhood residents to discuss acceptable traffic calming strategies that would effectively mitigate the impact of the through traffic.