

Introduction

This report summarizes the results of the follow-up traffic study for the Hillwood Neighborhood Traffic Calming Project in Nashville, Tennessee. Construction of the traffic calming project began in late 2011. The purpose of the follow-up study is to evaluate the effectiveness of the implemented traffic calming plan after the measures have been in place for approximately six months. This study primarily focuses on the four specific streets in the Hillwood Neighborhood where the majority of the traffic calming measures were implemented and speed and volume data for the “before” condition were available. These neighborhood streets include Bresslyn Road, Brook Hollow Road, Hillwood Boulevard, and Davidson Road.

Both speed and volume data was collected by RPM Transportation Consultants, LLC on these four streets in the neighborhood where traffic calming devices were implemented in order to prepare a before and after analysis report. Comparisons have been made to the speed and volume data that were collected by Metro Public Works prior to implementation of traffic calming measures. Additionally, crash data was evaluated to determine if the implemented traffic calming devices have had any impacts on traffic safety.

Traffic Calming Implementation

A combination of traffic calming devices and techniques were implemented throughout the Hillwood Neighborhood. The specific devices and locations were selected through coordination with and approval from both the council member and neighborhood association. Table 1 below provides a brief summary of the streets that were included in the follow-up study where traffic calming devices were implemented and the specific measures that were applied to each of these neighborhood streets.

Table 1: Neighborhood Traffic Calming Treatment by Street

Street	Traffic Calming Device/Technique	Count
Bresslyn Road	Choker/Chicane	2 pair
	Speed limit pavement marking (30 mph)	6
	Custom Neighborhood Traffic Calming Sign	2
	All-way Stop	1
Brook Hollow Road	Radar Speed Sign	2
	Speed limit pavement marking (30 mph)	3
	Speed Limit Signs	2
	Custom Neighborhood Traffic Calming Sign	2
	All-way Stop	1
Hillwood Boulevard	Radar Speed Sign	1
	Speed Limit Pavement Marking (30 mph)	3
	Custom Neighborhood Traffic Calming Sign	3
	Change Yield Control to Stop Control	1
Davidson Road	Radar Speed Sign	2
	Custom Neighborhood Traffic Calming Sign	2
	All-way Stop	1
	Speed limit pavement marking (30 mph)	4
	Speed Limit Signs	8

It should be noted that the custom neighborhood traffic calming signs and speed limit pavement markings were installed on nearly every street that provides access into the Hillwood neighborhood.

Speed Evaluation

RPM conducted bi-directional machine tube counts at four locations in the Hillwood neighborhood to capture the “after traffic calming” conditions. These counts were conducted over the seven-day period of May 19 – 25, 2012. The counts provided bi-directional speed data and average daily traffic volumes. The speed and volume data collected during the “before traffic calming” conditions were conducted by Metro Public Works on various dates between 2008 and 2010. Table 2 below provides a summary comparison of the “before and after traffic calming” speeds for the four streets under study. As previously discussed, a combination of several traffic calming devices and techniques were implemented throughout the Hillwood neighborhood. The table below also indicates the primary traffic calming devices that were implemented on each of the neighborhood streets.

Table 2: Speed “Before & After” Comparison

Street	Traffic Calming Measure	Direction	85th-Percentile Speed (mph)			
			Before	After	Difference	% Change
Bresslyn Road	Chicane/Choker & Speed Limit Markings	Northbound	44	39	-5	-11.4%
		Southbound	43	38	-5	-11.6%
Brook Hollow Road	Radar Signs & Speed Limit Markings & Stop Signs	Northbound	43	36	-7	-16.3%
		Southbound	42	37	-5	-11.9%
Hillwood Boulevard	Radar Sign & Speed Limit Markings	Eastbound	40	37	-3	-7.5%
		Westbound	39	38	-1	-2.6%
Davidson Road	Radar Signs & Stop Signs	Eastbound	39	38	-1	-2.6%
		Westbound	40	38	-2	-5.0%

As shown in Table 2, the speed data comparison indicates that the 85th-percentile speeds were reduced on all four streets in both directions. The 85th-percentile speed is the speed at which 85% of the traffic is traveling at or below. As shown, the “before” speeds were in the 39-44 mph range and the “after” speeds were measured in the 36-39 mph range. Therefore, it can be deduced that the implementation of the traffic calming plan has been successful in lowering the vehicle travel speeds on the residential streets in the Hillwood neighborhood.

Bresslyn Road

Specifically, the data shows that Bresslyn Road has experienced a 5 mph speed reduction in both directions with the implementation of speed limit pavement markings and two chicane/chokers. This speed reduction is more than an 11% change in prevailing speeds on Bresslyn Road. Bresslyn Road is a local neighborhood street, and prior to implementing the traffic calming plan, the speeds on Bresslyn Road were recorded at 14 mph over the posted speed limit of 30 mph in the northbound/westbound direction and 13 mph over in the southbound/eastbound direction. While the prevailing speeds on Bresslyn Road remain above the posted speed limit, the speed data indicates that the margin between the 85th-percentile

speed and the speed limit has been significantly narrowed between the “before” condition and the “after” condition.

Brook Hollow Road

Similarly, the recorded speeds on Brook Hollow Road after the traffic calming measures were implemented indicate the 85th-percentile speeds were reduced by 7 mph in the northbound direction and 5 mph in the southbound direction. This is a significant speed reduction, which can be attributed to a combination of radar signs, speed limit pavement markings, the speed limit reduction on Brook Hollow Road, as well as the implementation of an all-way stop at Fleetwood Drive. It should be noted that the available “before” speed data was collected on a segment of Brook Hollow Road south of Davidson Road and the Hillwood neighborhood where traffic calming measures were not implemented as part of this project. Therefore, the reduction between the “before” speeds and “after” speeds is not necessarily representative of the affects of the implemented traffic calming measures. However, it can be assumed that the prevailing speeds on Brook Hollow Road through the Hillwood neighborhood have been reduced to some degree as a result of the traffic calming devices.

Hillwood Boulevard

On Hillwood Boulevard, the combination of a radar speed sign and speed limit pavement markings appears to have provided a 3 mph reduction in 85th-percentile speeds in the eastbound direction, which is a -7.5% change, and a 1 mph reduction in the westbound direction, which is a -2.6% change.

Davidson Road

On Davidson Road, the combination of a new all-way at Hickory Valley Road, radar speed signs, speed limit pavement markings, and posted speed reduction appear to have provided a 1 mph reduction in 85th-percentile speeds in the eastbound direction, which is a -2.6% change, and a 2 mph reduction in the westbound direction, which is a -5.0% change.

Volume Evaluation

Along with the speed data, the machine counts also collected bi-directional volume data. A summary of the average daily traffic (ADT) volumes on the roadways under study as well as the primary traffic calming devices that were implemented on each street is provided in Table 3. As mentioned, the “before” data was collected on various dates between 2008 and 2010, and the “after” data was collected in May 2012. As shown, the average daily traffic volume on Bresslyn Road has increased from 618 vehicles per day (vpd) to 878 vpd, which is a 42.1% volume increase since 2008. While the data indicates a significant percent increase in daily traffic volume has occurred on Bresslyn Road over the last four years, the total number of vehicles traveling on Bresslyn Road per day remains extremely low.

Table 3: Volume “Before & After” Comparison

Street	Traffic Calming Measure	Direction	ADT Volume (vpd)			
			Before	After	Difference	% Change
Bresslyn Road	Chicane/Choker & Speed Limit Markings	Northbound	313	470	157	50.2%
		Southbound	305	408	103	33.8%
		<i>Total</i>	<i>618</i>	<i>878</i>	<i>260</i>	<i>42.1%</i>
Brook Hollow Road	Radar Signs & Speed Limit Markings	Northbound	1,334	1,353	19	1.4%
		Southbound	1,611	1,467	-144	-8.9%
		<i>Total</i>	<i>2,945</i>	<i>2,820</i>	<i>-125</i>	<i>-4.2%</i>
Hillwood Boulevard	Radar Sign & Speed Limit Markings	Eastbound	2,090	2,253	163	7.8%
		Westbound	2,095	2,309	214	10.2%
		<i>Total</i>	<i>4,185</i>	<i>4,562</i>	<i>377</i>	<i>9.0%</i>
Davidson Road	Radar Signs & Stop Signs	Eastbound	2,669	2,240	-429	-16.1%
		Westbound	2,884	2,061	-823	-28.5%
		<i>Total</i>	<i>5,553</i>	<i>4,301</i>	<i>-1,252</i>	<i>-22.5%</i>

The “before and after” volume comparison, shows that the average daily traffic on Brook Hollow Road has declined slightly since 2010 while the average daily traffic on Hillwood Boulevard has moderately increased since 2009. Davidson Road has experienced a moderate decline in average daily traffic between 2008 and 2012 according to the “before and after” volume data.

The “before and after” comparison shows some fluctuation in traffic volume along these four streets in the Hillwood neighborhood over the past two to four years. However, this fluctuation cannot be necessarily attributed to the implementation of the neighborhood traffic calming plan. Several immeasurable factors affect daily traffic volume such as month, season, weather, etc. Furthermore, increased density over the last few years in the Nashville West and H.G. Hill commercial developments on Charlotte Pike could cause fluctuation and shifts in daily traffic volumes; however, the volume data does not indicate any significant increases that could be directly attributed to these developments. Therefore, no significant conclusions can be drawn from the comparison of the “before” traffic volumes and “after” traffic volumes.

Safety Evaluation

Crash reports were obtained from Metro Public Works in order to evaluate the safety impacts of the implemented traffic calming plan. The safety evaluation was conducted in an effort to determine whether the traffic calming devices have had a positive or negative effect on safety on the neighborhood streets. Two years of crash reports, which included June 2010 through mid-June 2012, were available from Metro Public Works. The crash reports were divided into “before” and “after” traffic calming implementation. For the purposes of this study, crashes that occurred after December 1, 2011 were included in the “after” condition because construction of the traffic calming project began in November and December 2011. However, some pre-construction preparations occurred in September and October 2011. It should also be noted that the speed radar signs were not installed until February or March of 2012. Therefore, the full effect of the traffic calming plan was not realized until March 2012, which only

encompasses the most recent three months of available crash data. Table 4 provides a summary of the “before and after” crash analysis.

Table 4: Crashes “Before & After” Comparison

Street	Segment	Number of Crashes			
		Before	After	Difference	% Change
Bresslyn Road	B/w Old Charlotte Pike & Davidson Road	1	1	0	0%
Brook Hollow Road	B/w Charlotte Pike & Davidson Road	5	1	-4	-80%
Hillwood Boulevard	B/w Charlotte Pike & Wilsonia Avenue	10	7	-3	-30%
Davidson Road	B/w Brook Hollow Pike & Harding Pike	12	7	-5	-41.6%
Notes:					
1. Available “before” crash data included 12 months of data. Available “after” crash data included 6.5 months of data.					
2. It should be noted that one crash is counted for both Davidson Road and Bresslyn Road for the “after” condition since it occurred at the intersection of these two roads. Similarly, one crash is counted for both Brook Hollow Road and Bresslyn Road in the “before” condition since it occurred at the intersection of these two roads. Two crashes are counted for both Davidson Road and Brook Hollow Road for the “before” condition since they occurred at the intersection of these two roads.					

As shown in Table 4, fewer crashes have occurred since the traffic calming devices were implemented than occurred in the 12 months prior. It is important to note the “after” traffic calming timeframe and therefore, available “after” data, is only 6.5 months while there is 12 months of “before” data available. Therefore, it is difficult to make comparisons of the “before and after” conditions. Typically, safety studies include at least three years of data in order to identify crash trends. For this study, there were only 6.5 months of data available during the “after” condition, which is not enough time to develop crash trends. Therefore, additional time and study is needed to develop data-supported documentation of the safety impacts (both positive and negative) caused by the implemented traffic calming devices.

Although sufficient time has not passed following the implementation of the traffic calming plan in order to develop trends in crashes, the 16 crashes that occurred during the 6.5-month “after” condition were evaluated. This evaluation determined that none of the crashes occurred at locations involving one of the installed traffic calming devices. One right-angle crash occurred at the three-legged intersection of Davidson Road and Hickory Valley Road, which was modified from a one-way stop to an all-way stop. The crash report indicated that both drivers stopped at the intersection and then failed to alternate and yield right-of-way.

Conclusion

The data comparisons indicate that vehicular speeds in the Hillwood neighborhood have been significantly reduced following the implementation of the traffic calming plan. The volume data shows a fluctuation in daily traffic volume through the neighborhood over the last few years; however, this fluctuation does not indicate any significant changes in travel patterns that could be attributed to the traffic calming devices. A longer period of time with the traffic calming devices in place is needed in order to evaluate the safety impacts (both positive and negative)

of the traffic calming plan. The analysis of the available crash data did not reveal any immediate safety concerns due to the implementation of the traffic control devices.

Based on the analysis of the data, it can be concluded that the Hillwood Neighborhood traffic calming plan was successful in increasing driver awareness to the neighborhood setting thereby providing a fairly significant reduction in vehicular speeds, which was the primary objective of the traffic calming plan. Due to the number and combination of traffic calming devices implemented on each of the roadways studied, it was not possible to rank the effectiveness of each type of traffic calming device in the neighborhood.