



MEMORANDUM

TO: Chapin Spencer, Nicole Losch; Burlington Department of Public Works
FROM: CCRPC Transportation Staff
DATE: June 26, 2017
RE: North Avenue Pilot Project Data Collection

Transportation staff from the Chittenden County Regional Planning Commission (CCRPC) have been assisting the City of Burlington with data collection to evaluate the implementation of the North Avenue Pilot Project with respect to the section that was converted from four to three travel lanes. The CCRPC collected bicycle, pedestrian and vehicular traffic data as part of the quantitative metrics for this project. The initial phase of this process involved pre-pilot conditions data collection. Once the pilot was installed, the CCRPC replicated the data collection process that was used during the pre-pilot phase to collect data during the pilot. The following provides an overview of the data collected before and during the pilot.

Travel Times

The CCRPC collected travel time data before and during the pilot project. The data was collected from 7:00 - 8:30 AM and 4:30 - 6:00 PM for respective AM and PM peak travel times in June and November 2015 (before the pilot); August and September 2016, and May 2017 (during the pilot). Data was collected by traveling North Avenue in a vehicle and recording the time it took to traverse the section between the VT 127 and Shore/Heineberg intersections. Drivers were instructed to keep pace with traffic and not to exceed 35 miles per hour (mph). Before the pilot, drivers did pass vehicles on rare occasions such as a bus stopping or if a vehicle traveling below the posted speed limit of 30 mph was impeding normal traffic flow. During the pilot, drivers passed stopped busses when safe to do so. Time spent waiting at a red light or in a queue upon entering the corridor was included as part of the travel time. It is important to note that the northbound signal detection at the Ethan Allen Parkway intersection was not operating correctly when the August 2016 data was collected and resulted in some extensive traffic backups in the PM Peak. As a point of reference, if a vehicle were to travel the 0.8 mile section of roadway at 30 mph unimpeded (i.e. all green lights and no delays due to traffic) it would take 1 minute and 36 seconds.

Prior to implementing the pilot, the expectation was that, on average, drivers could see their travel times increase by one to two minutes. During the pilot, the largest increase in average travel time was observed traveling northbound during the PM peak when the Ethan Allen Parkway signal detection was not operating properly and it was 1 minute, 28 seconds. Since the detection was fixed, this has been reduced to around a minute on average. The next largest increase in average travel times was for southbound travel during the AM peak with school in session which was 27 seconds. To arrive at this number, we averaged the September 2016 and May 2017 average southbound travel times and subtracted the November 2015 value. These

increases in the AM and PM peaks are either consistent or less than the expectations that were set in advance of the pilot.

In addition to average travel times, maximum travel times are shown in the tables below. These values represent when traffic congestion is at its worst and are typically exhibited during a 15 to 30 minute window of the AM and PM peaks. Tables 1 and 2 below display AM and PM peak travel times respectively.

Table 1: North Ave AM Peak Travel Times (VT 127 to Shore/Heineberg)

		AM Peak Travel Times (minutes : seconds)				
		Before Pilot		During Pilot		
		6/17/2015	11/4/2015	8/4/2016	9/21/2016	5/4/2017
Northbound	Average	01:53	01:55	02:01	02:16	2:07
	Max	02:32	02:27	03:26	03:18	2:47
Southbound	Average	01:59	02:06	02:04	02:38	2:22
	Max	03:06	02:59	03:14	05:32	4:10

Table 2: North Ave PM Peak Travel Times (VT 127 to Shore/Heineberg)

		PM Peak Travel Times (minutes : seconds)				
		Before Pilot		During Pilot		
		6/16/2015	11/4/2015	8/3/2016	9/20/2016	5/4/2017
Northbound	Average	02:01	02:01	03:29	03:11	2:51
	Max	02:54	02:24	07:10*	06:01	4:14
Southbound	Average	02:11	02:25	02:33	02:38	2:18
	Max	03:09	03:58	03:22	04:56	4:08

*Ethan Allen Parkway signal detection issue – since resolved

Side Street Delay

Side street delay (i.e. the time in which it takes a vehicle to enter the corridor from a side street) were measured at four unsignalized North Avenue intersections (Village Green, Killarney Dr, Lakewood Pkwy and Saratoga Ave). This was done through the use of counting hardware where an analyst records the time in which each vehicle stops at a stop sign (or in a queue if there are multiple vehicles waiting to turn) and the time in which they make their turn onto North Avenue. Data collection occurred from 7:00 - 8:30 AM and 4:30 - 6:00 PM for respective AM and PM peak travel times.

Increases in side street delay are a known trade-off in four to three lane conversions and it was important to monitor this to determine to what degree the side streets were impacted. The side streets evaluated are concentrated towards the southern end of the corridor as this is where traffic is heaviest and would offer fewer gaps in traffic to turn onto North Avenue. On average, the side street delay increased by five to six seconds in the AM peak and a little over

12 seconds in the PM peak. The greatest impacts were felt at Village Green and Saratoga Ave during the PM peak (May 2017 data) which is likely due to the northbound North Avenue congestion and the subsequent difficulty in making a left turn from a side street. It was initially thought that the faulty signal detection at Ethan Allen Parkway was partially to blame for the increases in delay for vehicles exiting Village Green and Saratoga Ave (June 2016 data). This doesn't seem to be the case based on the data collected in May 2017 but it is worth noting that between Village Green and Saratoga Ave there were 62% more vehicles entering North Avenue when compared to the June 2016 data. Tables 3 and 4 on the following page display AM and PM peak side street delay respectively.

Below is a histogram that shows the distribution of the side street delay values during the pilot project. This includes data from 2016 and 2017 AM and PM peaks. From this chart, 80% of drivers at the four side streets monitored are turning onto North Avenue in 30 seconds or less. It is noted that there were a few drivers that encountered what could be described as extreme difficulty in attempting to turn onto North Avenue. This consequently caused several other drivers to wait as well. While these situations were rare, they are concerning and solutions should be pursued to mitigate this phenomenon.

Chart 1: North Avenue Side Street Delay Distribution During Pilot

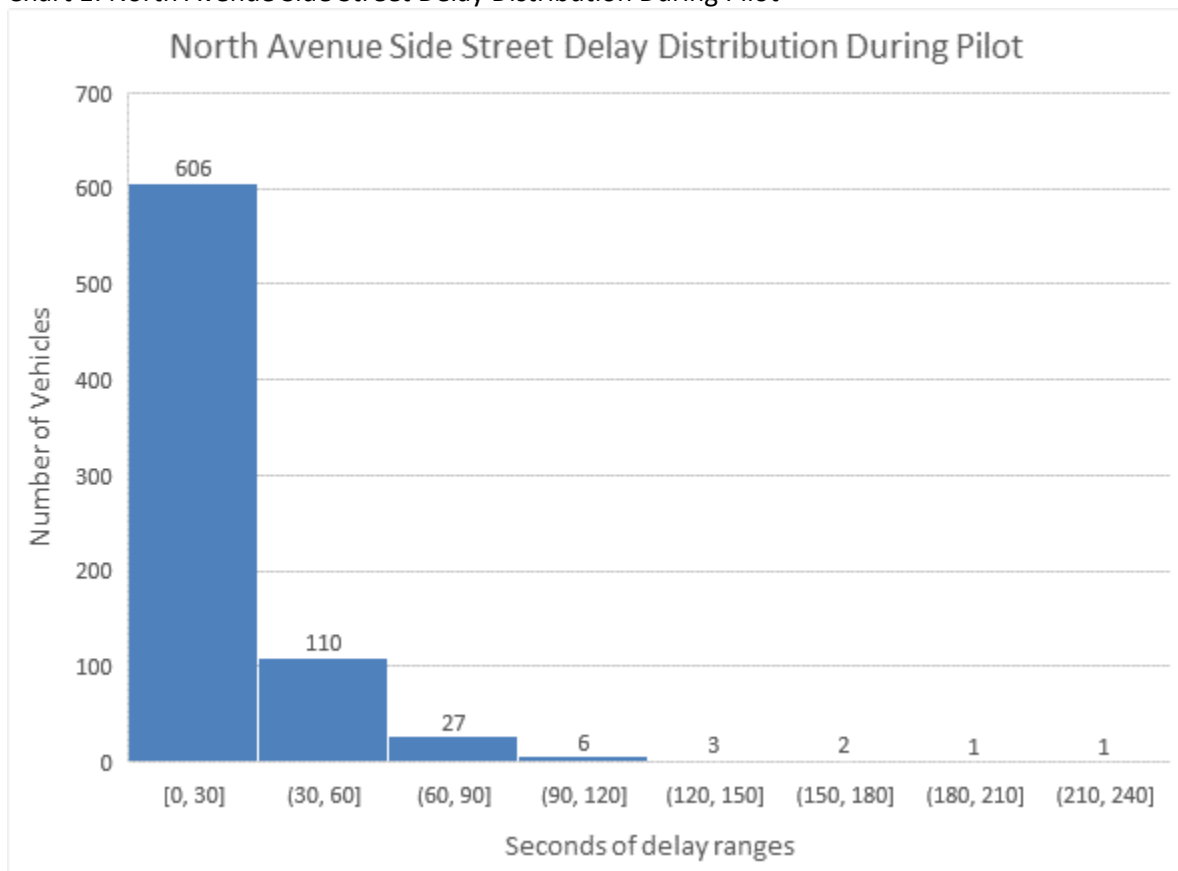


Table 3: Average AM Peak Side Street Delay (seconds)

	Before Pilot	During Pilot		Delay Increase	
		6/2016	5/2017	6/2016	5/2017
Killarney	10.6	19.1	14.0	8.5	3.4
Lakewood	6.8	9.3	16.0	2.5	9.2
Saratoga	12.6	16.2	16.3	3.6	3.6
Village Green	8.6	17.8	11.1	9.2	2.4
Weighted Average	9.3	15.4	14.4	6.1	5.1

Table 4: Average PM Peak Side Street Delay (seconds)

	Before Pilot	During Pilot		Delay Increase	
		6/2016	5/2017	6/2016	5/2017
Killarney	19.2	26.7	22.4	7.5	3.2
Lakewood	8.9	19.4	14.0	10.5	5.1
Saratoga	17.5	24.3*	35.3	6.8	17.8
Village Green	15.0	36.5*	31.4	21.6	16.4
Weighted Average	14.0	26.4	26.6	12.3	12.5

*Ethan Allen Parkway signal detection issue – since resolved

Speed and Volume Metrics

Speed and volume data were collected using Automated Traffic Recorders (ATRs). These devices measure speed, volume and vehicle type, and collect data 24 hours per day. Data were collected at two locations on North Avenue and one location on Plattsburg Avenue before and during the pilot.

The data indicates that speeds have remained relatively constant in the northern section of North Avenue between the shopping center and Shore/Heineberg intersections. The southern section between Ethan Allen Parkway and VT 127 has seen noteworthy reductions in all speed metrics.

A concern prior to implementing the pilot was whether traffic would choose to take VT 127 and avoid North Avenue. Based on the data this has not been shown to have happened with the volumes remaining relatively constant in the southern section of North Avenue and on Plattsburg Avenue. The northern section of North Avenue by the Ethan Allen Shopping Center has seen a slight decrease in volume. Speed and volume data at respective sites are presented in Table 5 on the following page.

Table 5: Speed (mph) and Volume (vehicles) Data

		Before Pilot	During Pilot	
			2016	2017
North Ave between VT 127 & Saratoga Ave	85 th Percentile speed ¹	38	39	36
	Average speed	34	34	32
	Percent exceeding posted speed limit (30 mph)	86%	84%	70%
	Seasonally Adjusted Daily Volume	16,200	16,700	16,900
	Unadjusted (Raw) Daily Volume	17,234	17,337	17,015
North Ave between Shop Ctr. & Shore Rd	85 th Percentile speed ¹	34	33	34
	Average speed	29	29	30
	Percent exceeding posted speed limit (30 mph)	46%	42%	44%
	Seasonally Adjusted Daily Volume	14,500	14,000	13,800
	Unadjusted (Raw) Daily Volume	14,804	14,662	14,141
Plattsburg Ave near VT 127	Seasonally Adjusted Daily Volume	*	9,400	9,200
	Unadjusted (Raw) Daily Volume	9,355	9,939	9,263

¹ The speed at which 85% of the vehicles are travelling at or below

* Not enough days of data to properly adjust raw volumes for seasonal variance

Bicyclist and Pedestrian Counts

A snapshot of bicyclist and pedestrian travel was extracted from turning movement counts, which included these modes in addition to vehicles. These data represent average per intersection totals at peak hours. The four intersections counted were North Ave/VT 127, North Ave/Ethan Allen Pkwy, North Ave/Ethan Allen Shopping Center and North Ave/Shore Rd. The peak hours for these data sets were from 7:00 - 9:00 AM in the morning and from 4:00 - 6:00 PM in the afternoon (Note: the VT 127 intersection also contained data from 2:00 - 4:00 PM). Counts were conducted for one midweek day (Tuesday – Thursday) before and during the pilot under favorable weather conditions (i.e. no rain, comfortable temperatures) during the months of June and July. The data indicates an increase in the number of on road bicyclists, a decrease in bicyclists using the sidewalk, and an increase in pedestrian travel.

The Burlington Department of Public Works collected turning movement count data in late April/early May of 2017. Unfortunately, the bicyclist and pedestrian data was collected incorrectly and at the wrong time of year for it to be comparable with previous counts in 2015 and 2016. The intersections should be recounted during the summer in favorable weather for an accurate comparison. Table 6 on the following page displays the available bicycle and pedestrian data.

Table 6: North Ave Bicycle and Pedestrian Counts

		Average volumes by mode*	
		Before Pilot	During Pilot 2016
Bicycles	On road	36	69
	On sidewalk	33	13
Pedestrians		77	85

*Averages were derived from both the AM and PM peak, totaling 4 hours per day (6 for VT 127 intersection) and were aggregated from all four intersections listed above.