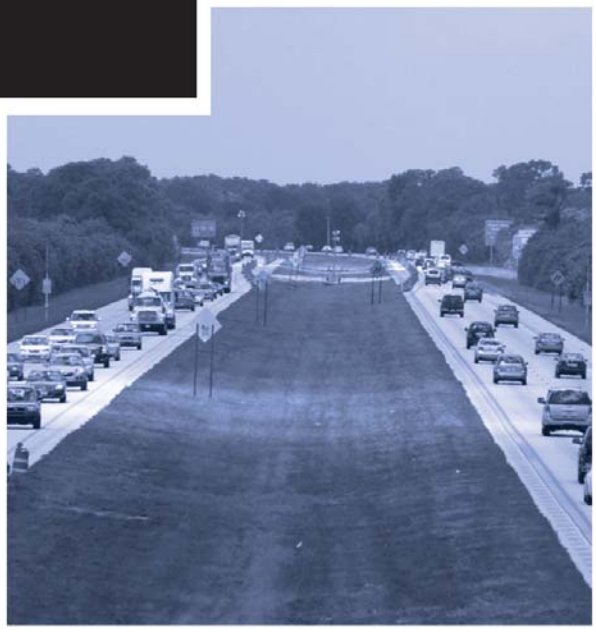
Wickham Road Intelligent Transportation System (ITS)

Before/After Summary Report



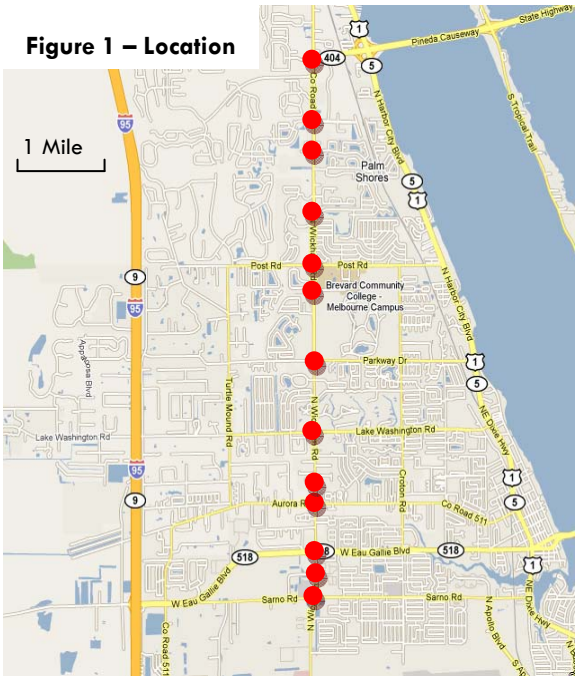
WICKHAM ROAD INTELLIGENT TRANSPORTATION SYSTEM (ITS)

Wickham Road is a four lane Principal Arterial running parallel to US 1 and I-95 and serves as the major non-interstate connector between Viera and the City of Melbourne. The Brevard County Traffic Engineering and Operations Division undertook a traffic operations and signal timing study on 5.6 mile section of Wickham Road from Pineda Causeway to Sarno Road. The Study analyzed the existing signal timings and operations at the thirteen (13) signalized intersections along the corridor and developed a new signal timing plan for the AM Peak, AM, Mid Day, and PM Peak periods to develop an Intelligent Transportation System (ITS) plan. The installation of microwave cameras at key intersections allows the County Traffic Operations Division to monitor the demand and make adjustments to the signal timing improving traffic flow and reducing delays.

Annual monitoring of this corridor has consistently reported volumes approaching the roadway capacity, and the long range traffic demand is projected to exceed the four lane configuration. With right-of-way constraints, funding limitations and a general disinterest in widening this corridor to six lanes the ITS strategy was the best alternative to improve the current situation and for the future. The following intersections part of the ITS strategy and are actively monitored by the County:

- Wickham Rd. @ Pineda Causeway
- Wickham Rd. @ Business Center Blvd
- Wickham Rd. @ Mariah Dr.
- Wickham Rd. @ Kensington Rd.
- Wickham Rd. @ Post Rd
- Wickham Rd. @ College Wood Dr.
- Wickham Rd. @ Parkway Dr.
- Wickham Rd. @ Lake Washington Rd.
- Wickham Rd. @ Northgate Plaza
- Wickham Rd. @ Aurora Rd.
- Wickham Rd. @ Eau Gallie Blvd.
- Wickham Rd. @ Greyhound Park Rd.
- Wickham Rd. @ Sarno Rd.

Figure 1 – Location



The Following section provides a summary of before and after travel time runs along the corridor recording the important travel variables like:

- Peak Hour Volume – the highest hourly volume occurring within the three periods of analysis (AM Peak, Mid Day and PM Peak)
- Travel Time – The time it takes to travel from one intersection to the next in seconds. The travel time includes the time spent waiting at signals and in congestion.
- Cumulative number of stops – A stop is counted when the speed drops below 5 mph after exceeding 15 mph along the corridor, this may occur at intersections or in congested conditions.
- Speed – The travel speed in Miles per Hour the average vehicle experienced between intersections and is also an indication of delay.

The before runs were collected in February 2008 prior to the implementation of the ITS and after runs were collected in May 2008 to record the results post implementation. Using both micro-simulation model runs of the corridor and actual field runs key findings are reported in the following section.

Peak Period Travel Characteristics

PEAK DIRECTIONAL VOLUME

The directional traffic flow on the Wickham Road Corridor shifts depending on the time of day and location. The common directional split occurs at Post Road, where in the AM Peak the northbound traffic is equal to the southbound traffic, but south of Post Road the southbound traffic is more than 60 percent of the total two way volume. The Mid-day traffic volumes are directionally balanced along the corridor for both southbound and northbound traffic. The PM Peak has a balanced directional split for a majority of the corridor with the southern segments between Eau Gallie Blvd. and Sarno Rd having a higher northbound split.

Figure 2 –AM Peak Directional Volume (7 – 8 AM)

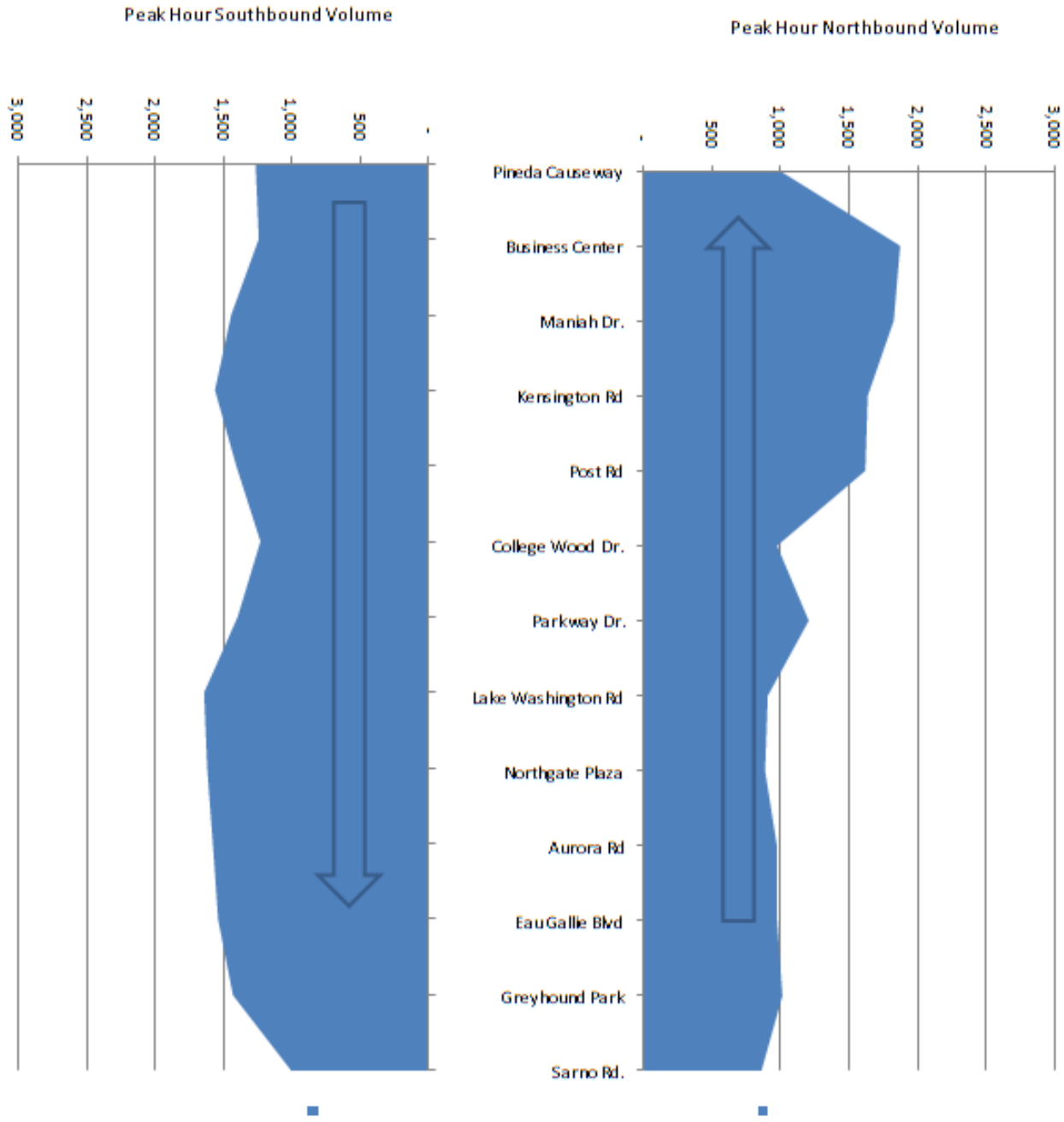


Figure 3 –MD Peak Directional Volume (12 – 1PM)

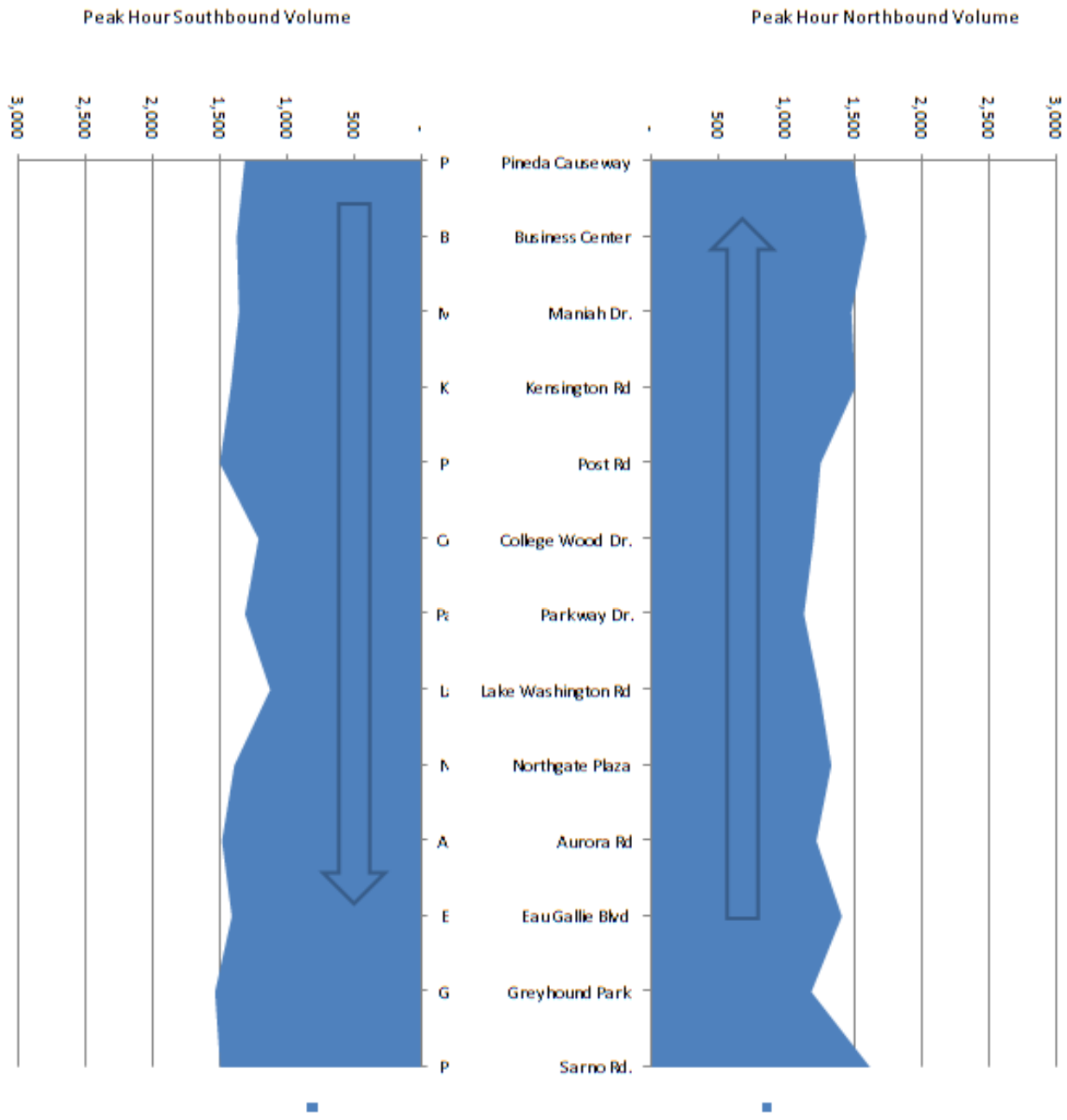
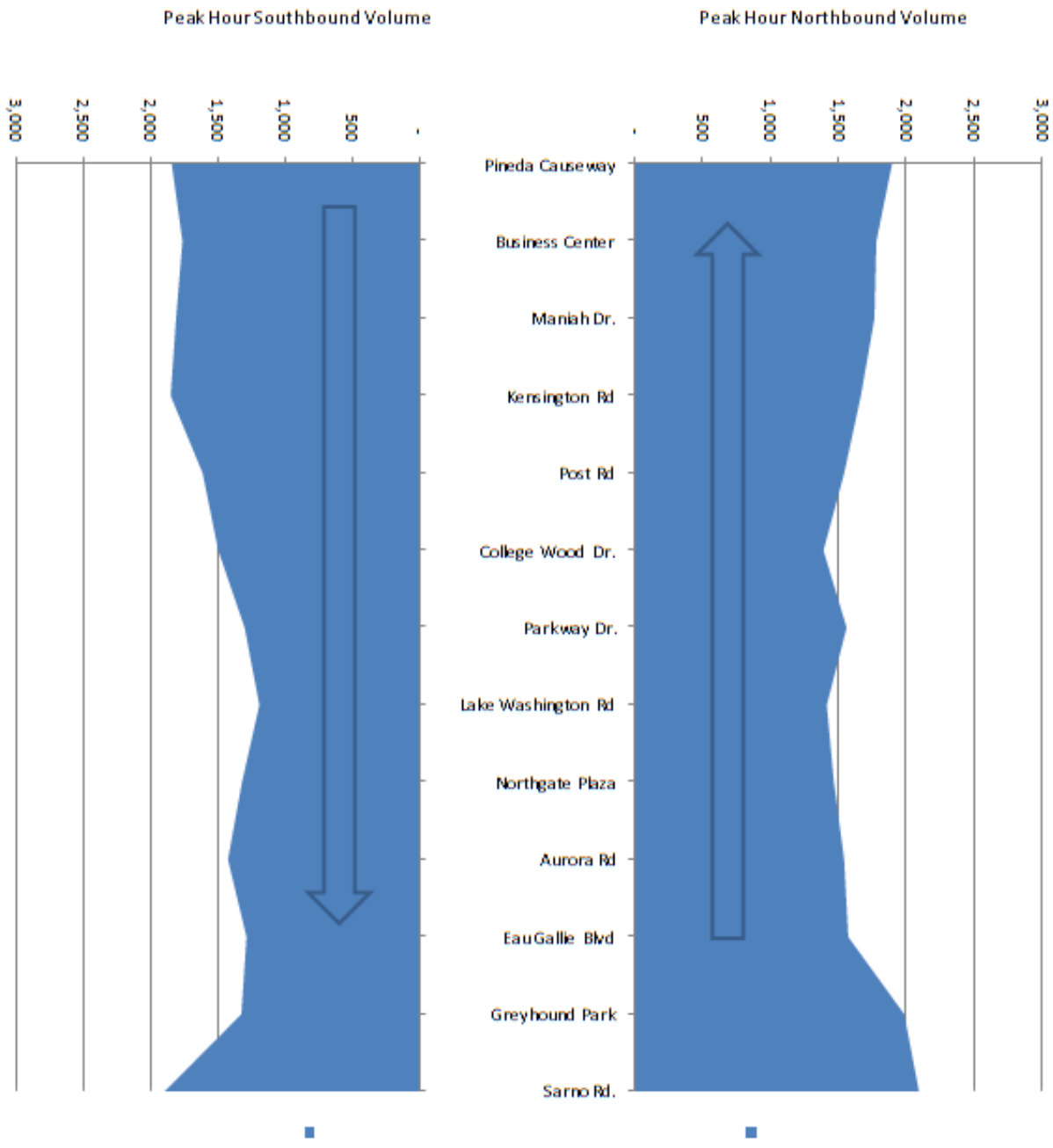


Figure 4 –PM Peak Directional Volume (4-5PM)



AVERAGE TRAVEL TIME

The travel time is measured by direction, from the beginning of the segment to the end, recording the time it took to pass through each intersection. The time is reported in seconds and the cumulative travel time for both southbound and northbound directions is summarized for each time period in the figures below.

Figure 5 –AM Peak SB Travel Time (seconds)

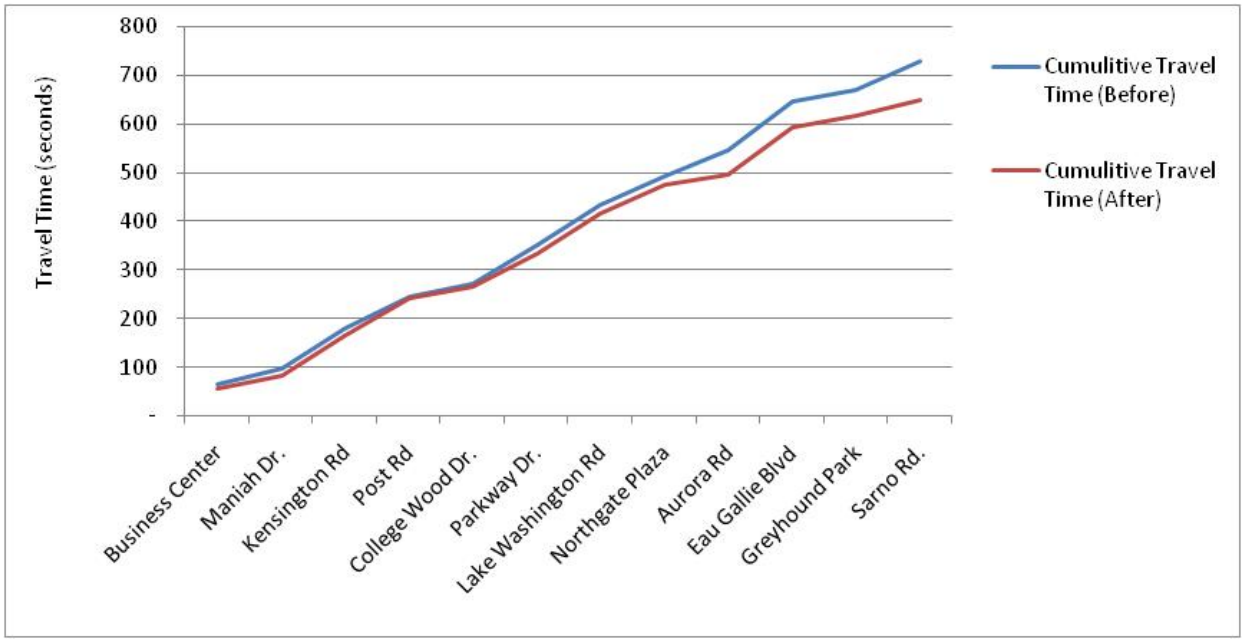


Figure 6 –AM Peak NB Travel Time (seconds)

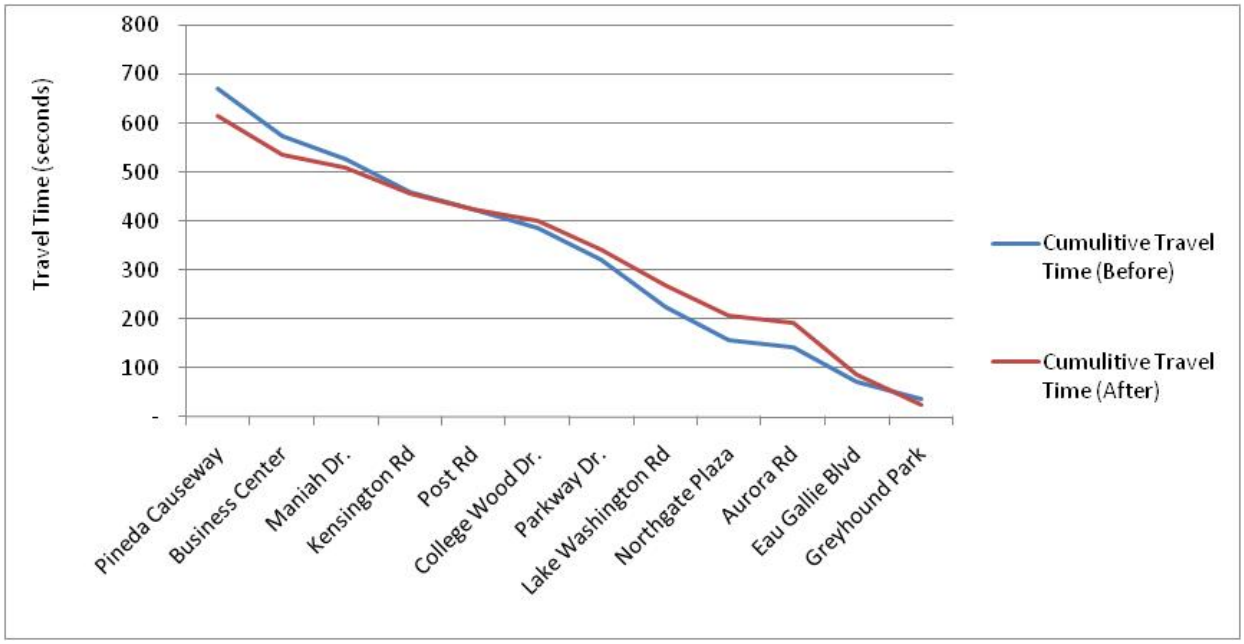


Figure 7 –MD Peak SB Travel Time (seconds)

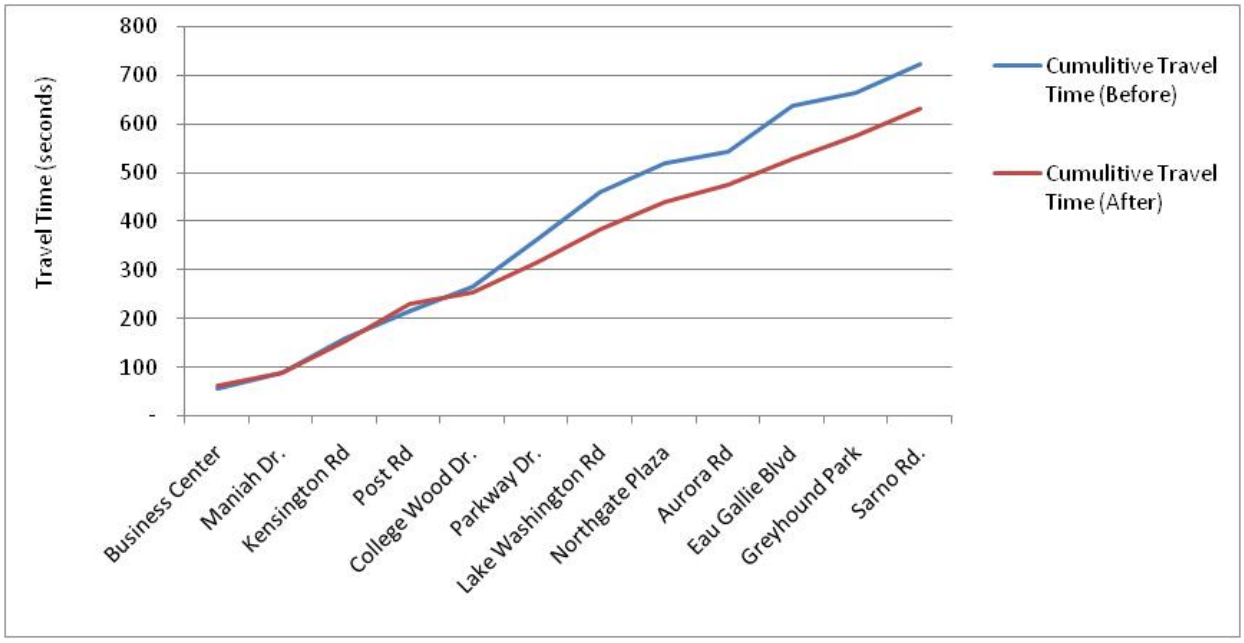


Figure 8 –MD Peak NB Travel Time (seconds)

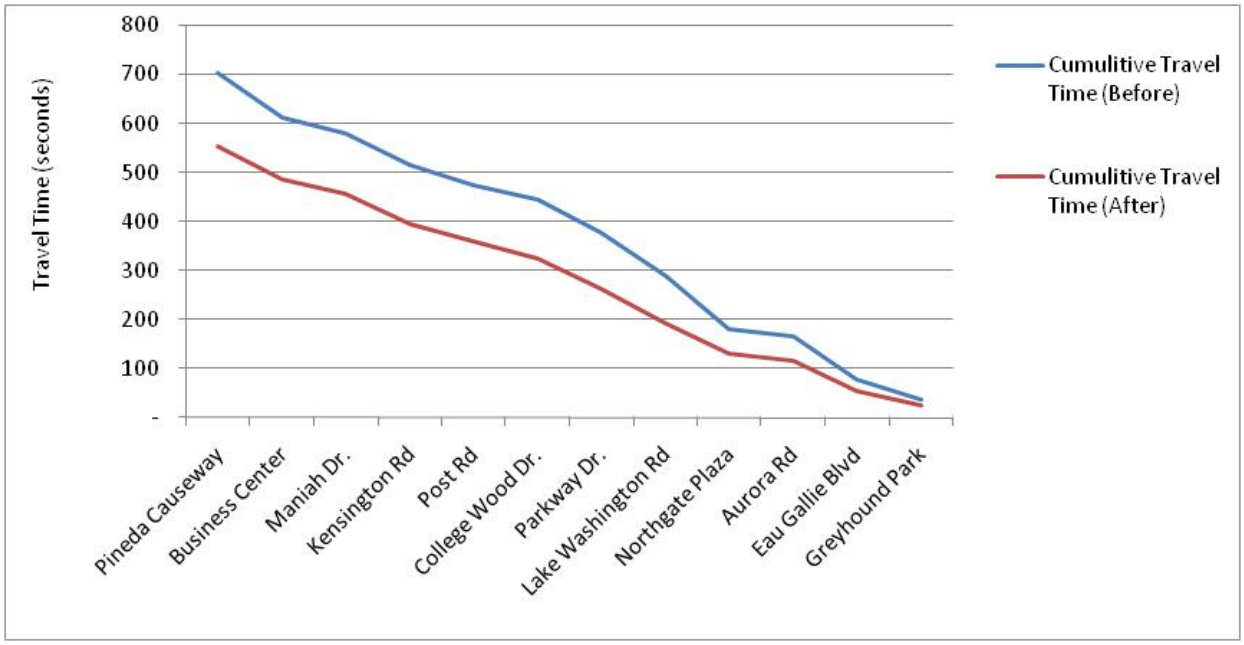


Figure 9 –PM Peak SB Travel Time (seconds)

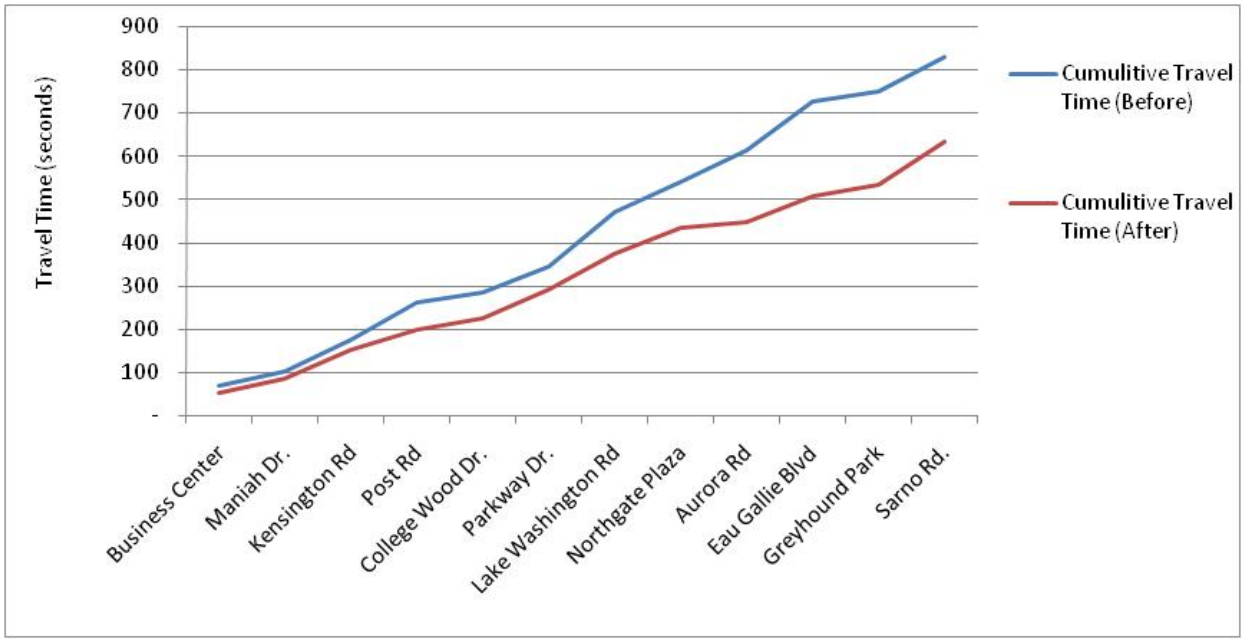
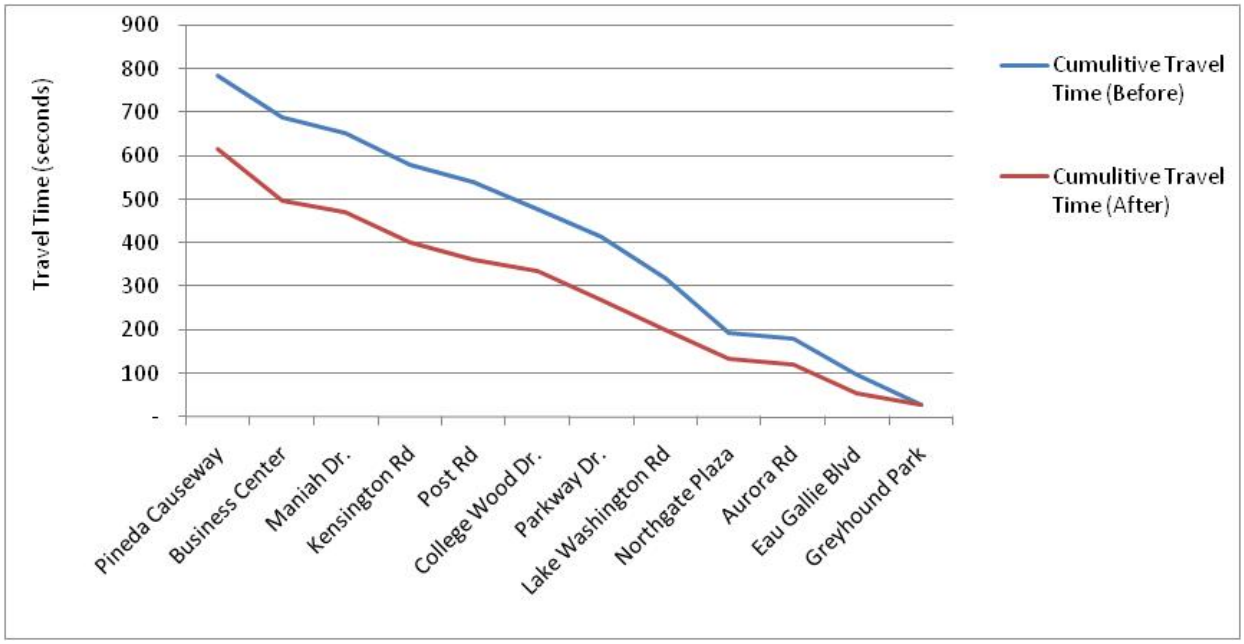
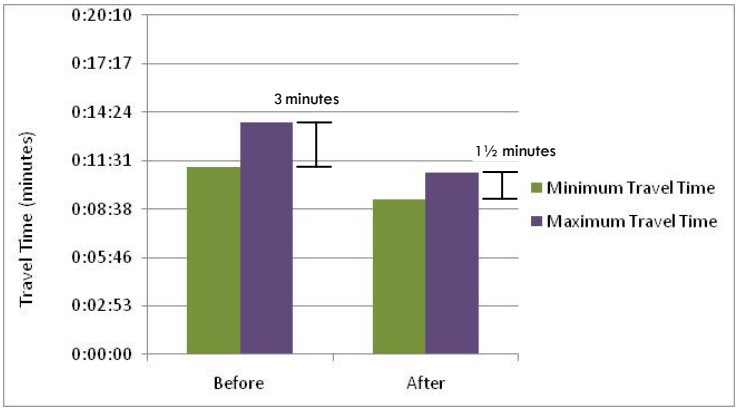


Figure 10 –PM Peak NB Travel Time (seconds)



Overall the travel time has been reduced across all four time periods and for a typical work trip (southbound in the AM Peek and northbound in the PM Peak) the savings equates to just over four minutes a day, or 20 minutes a week. More importantly the travel time variability has been reduced by almost half. As seen in figure 14 the average trip (depending on time of day) may take as little as 11 minutes or up to 14 minutes to travel the 5.2 mile corridor. That gap of three minutes has been reduces with the ITS strategy to just over a minute and a half with the shortest travel time of nine minutes and longest travel time of 10 and a half minutes. Travel time variability is an important indicator of functionality and efficiency of a corridor, a high degree of variability indicates that the system is unreliable and travelers can't anticipate their travel times adding stress and increasing aggressive driving.

Figure 11 –Travel Time Variability (minutes)



AVERAGE STOPS PER VEHICLE

The stops are recorded when the vehicle slows down to less than 5 mph after it exceeded 15 mph. The stop most often occurs at intersections, but may be a result of a congested condition. Prior to the ITS strategy a trip in either direction would have an average of 5 stops, stopping multiple time between Post Road and Eau Gallie Blvd. With the strategy the average number of stops declined with an average of two stops occurring on a trip, but as seen in the Average Stop figures below long stretches occur with no or very few stops per vehicle.

Figure 12 –AM Peak SB Stops

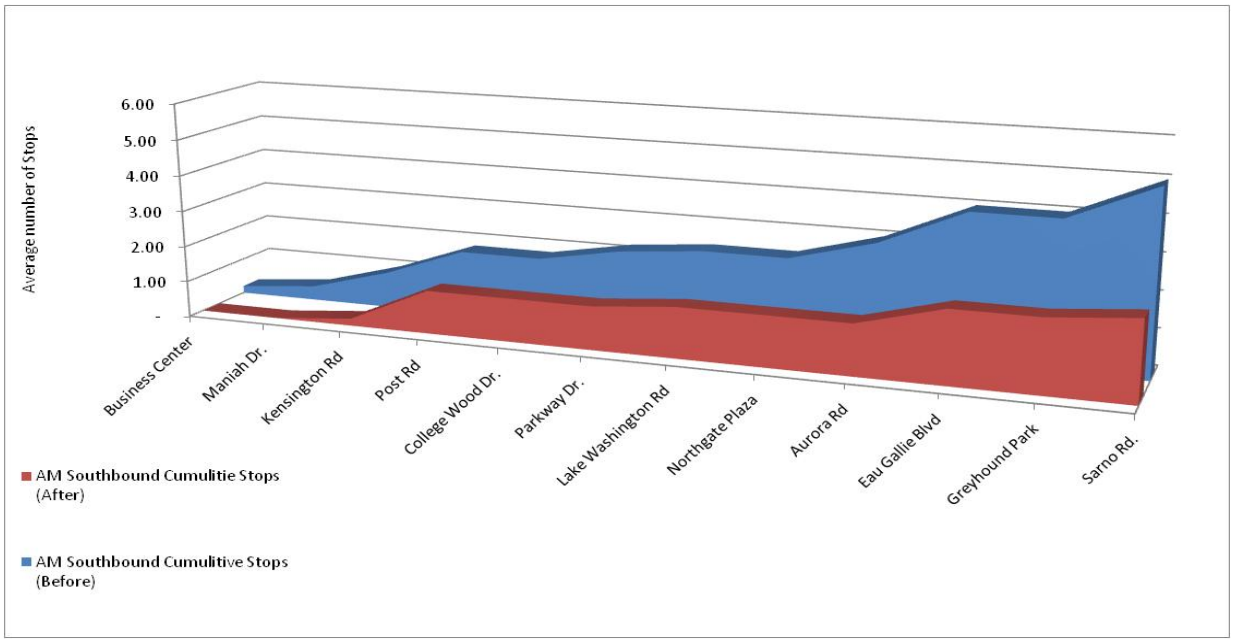


Figure 13 –AM Peak NB Stops

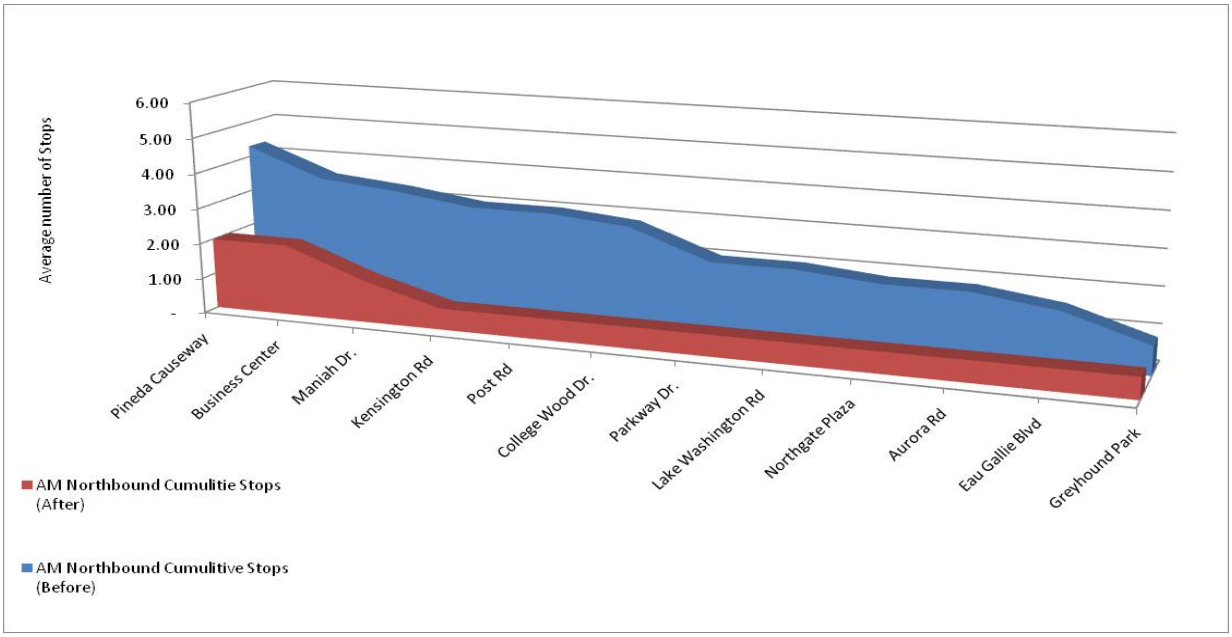


Figure 14 –MD Peak SB Stops

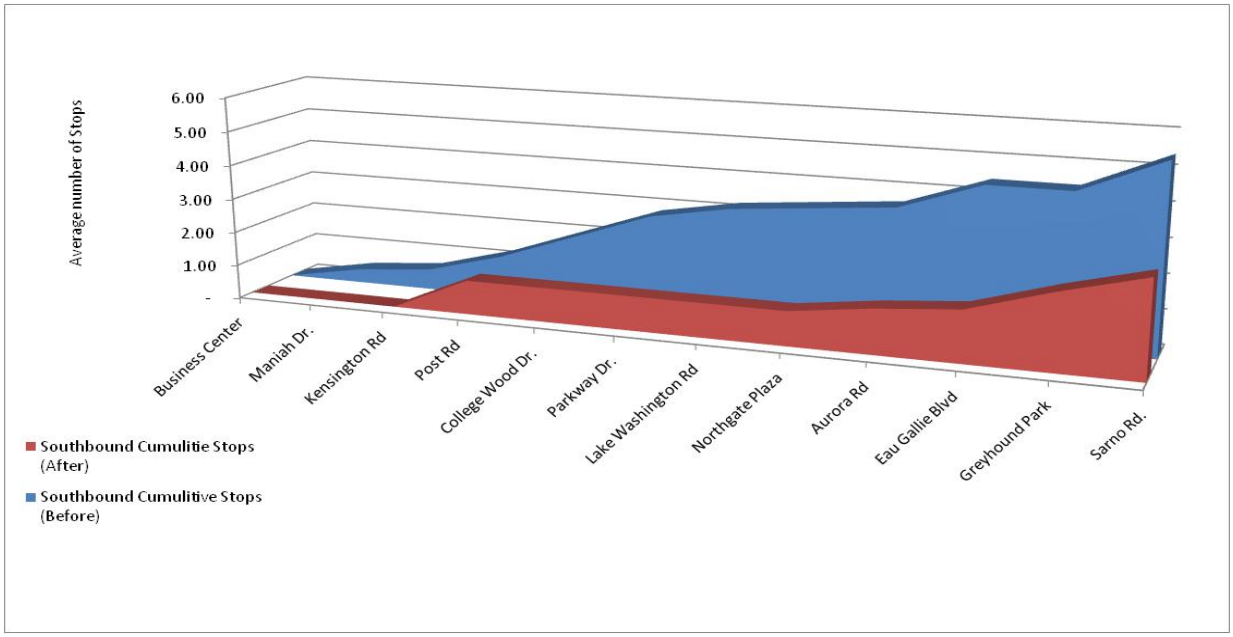


Figure 15 –MD Peak NB Stops

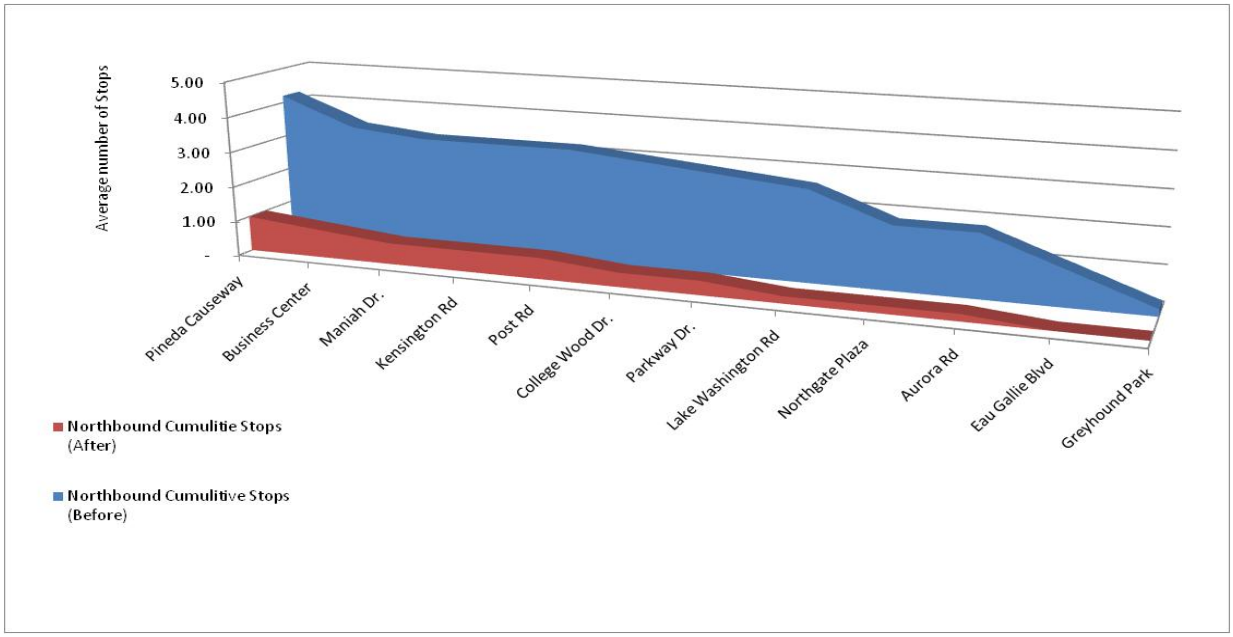


Figure 16 –PM Peak SB Stops

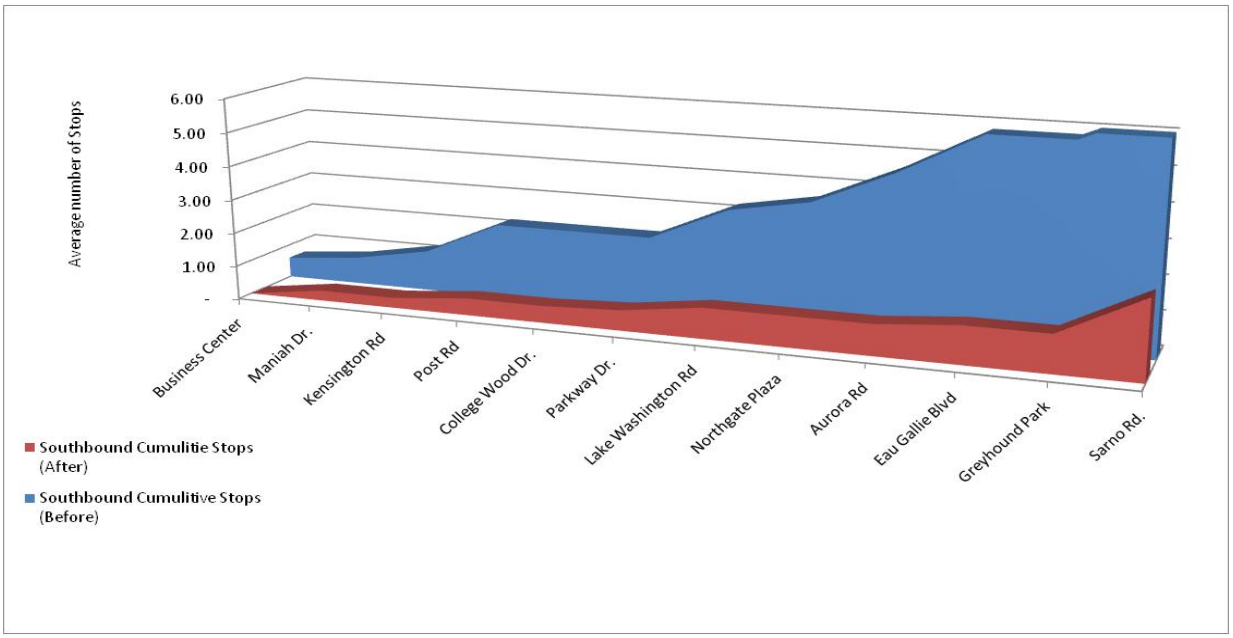
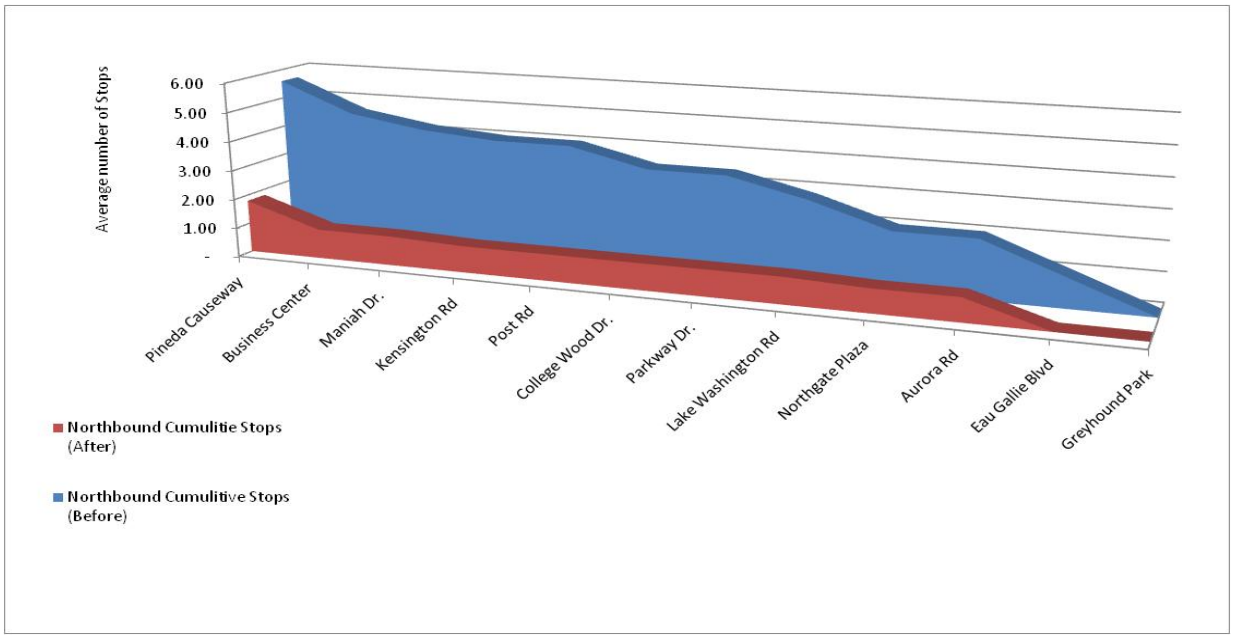


Figure 17 –PM Peak NB Stops



AM AVERAGE TRAVEL SPEED

The average travel speed is a good indication of the corridors overall performance, a consistent travel speed through the corridor represents uncongested conditions or a steady flow. Large variations in the travel speed identify intersections or segments where there is significant delay or congestion is occurring. With the ITS strategy focusing on optimizing the north / south travel flow on Wickham Road, variation in travel speed most likely indicates geometric deficiencies at the intersection as opposed to signal timing (which is optimized with ITS. There are still some travel speed decreases around Post Road and Eau Gallie with the ITS strategy, the variations in travel speed across the corridor is much more consistent for longer stretches.

Figure 18 –AM Peak SB Travel Speed

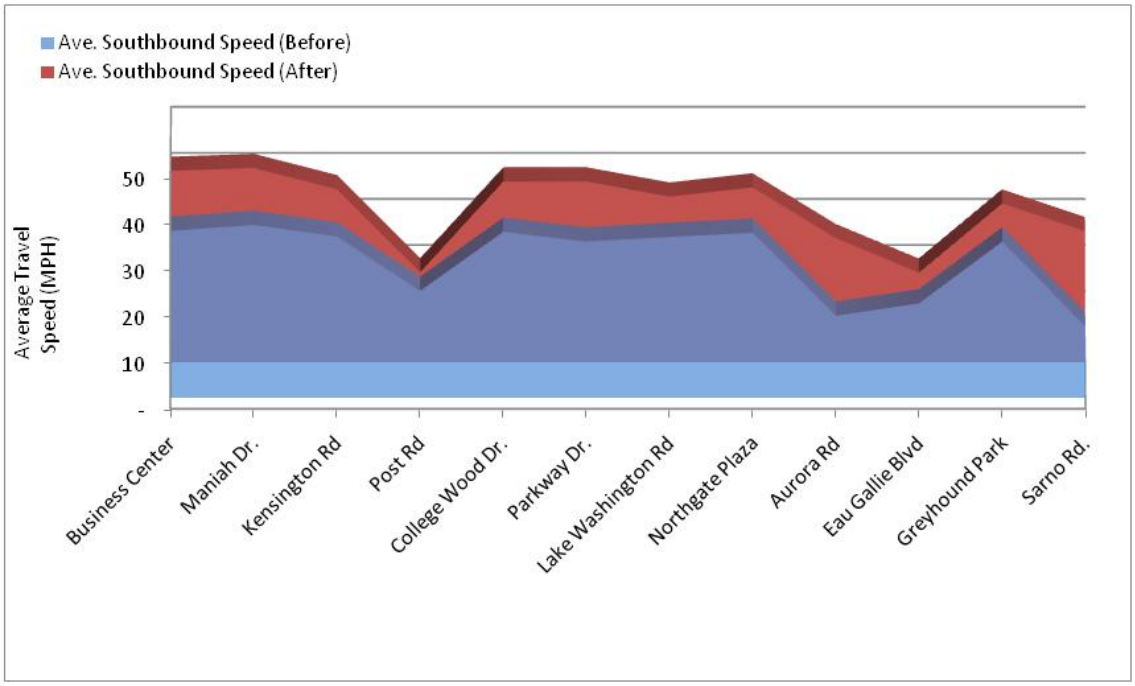


Figure 19 –AM Peak NB Travel Speed

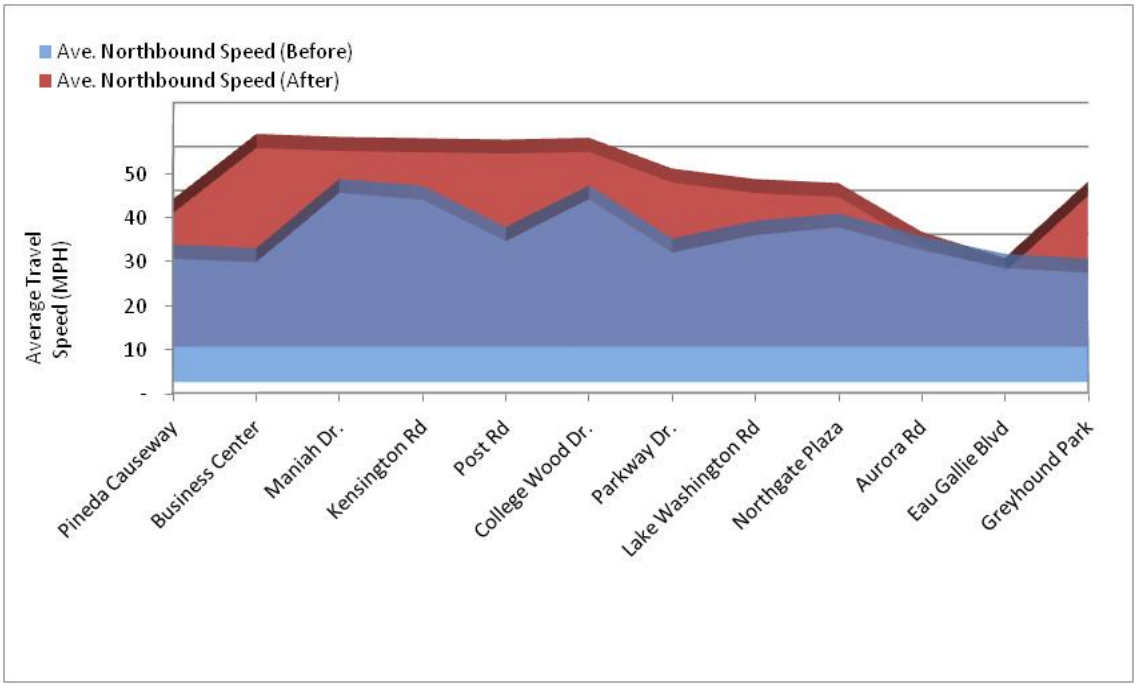


Figure 20 –MD Peak SB Travel Speed

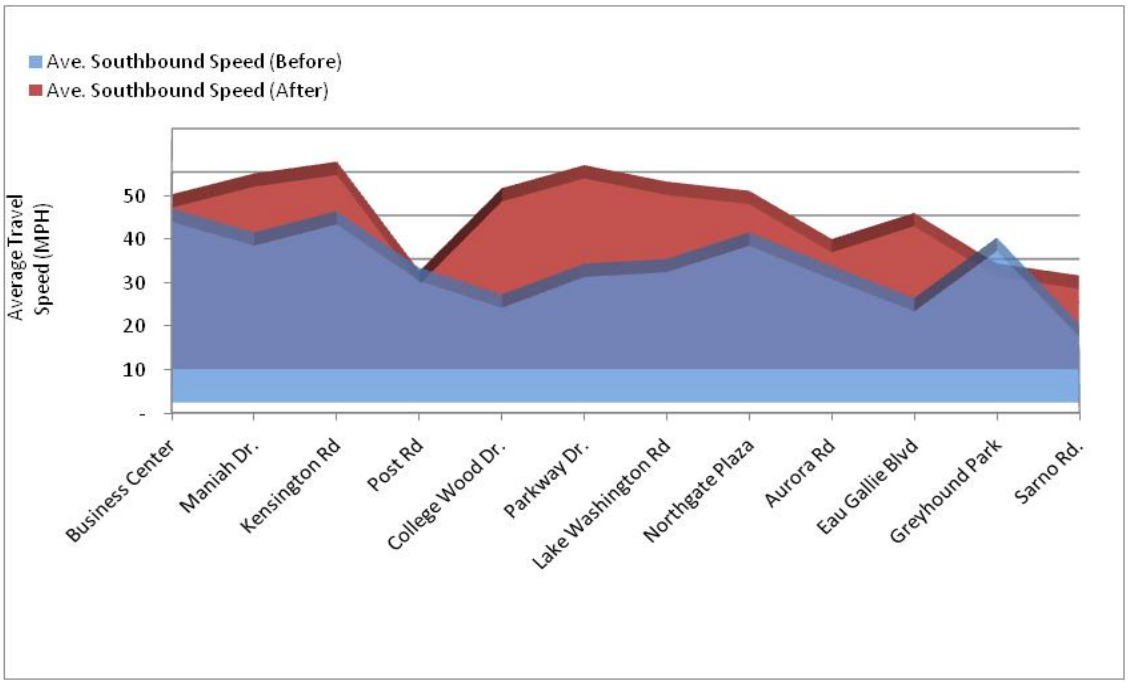


Figure 21 –MD Peak NB Travel Speed

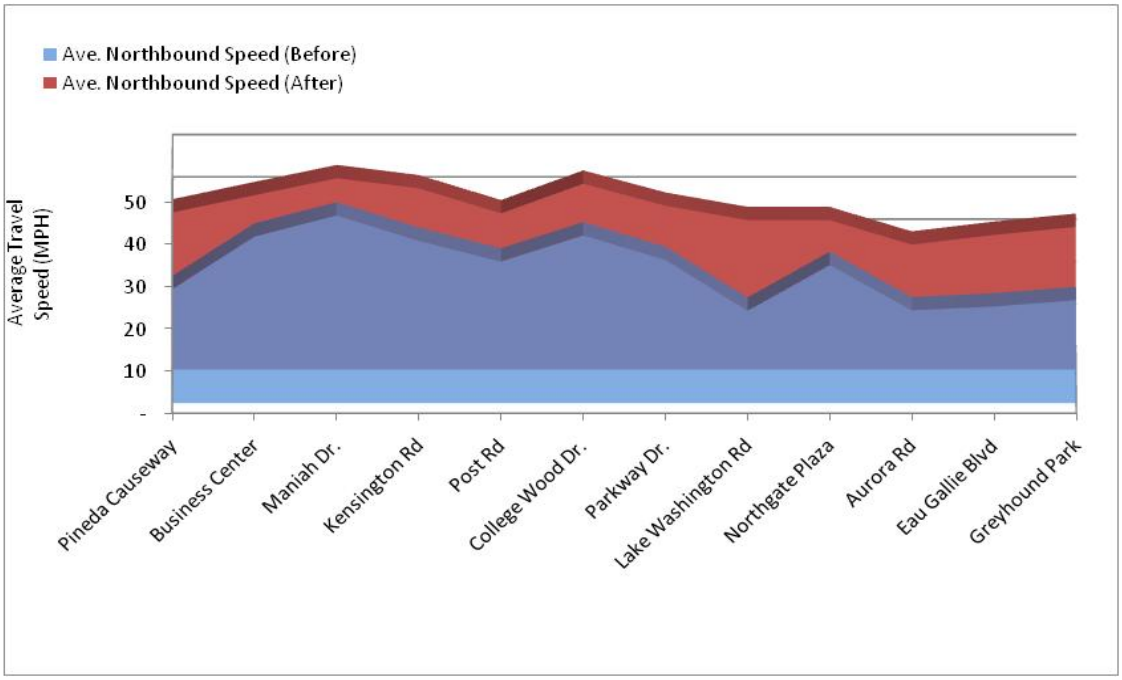


Figure 22 –PM Peak SB Travel Speed

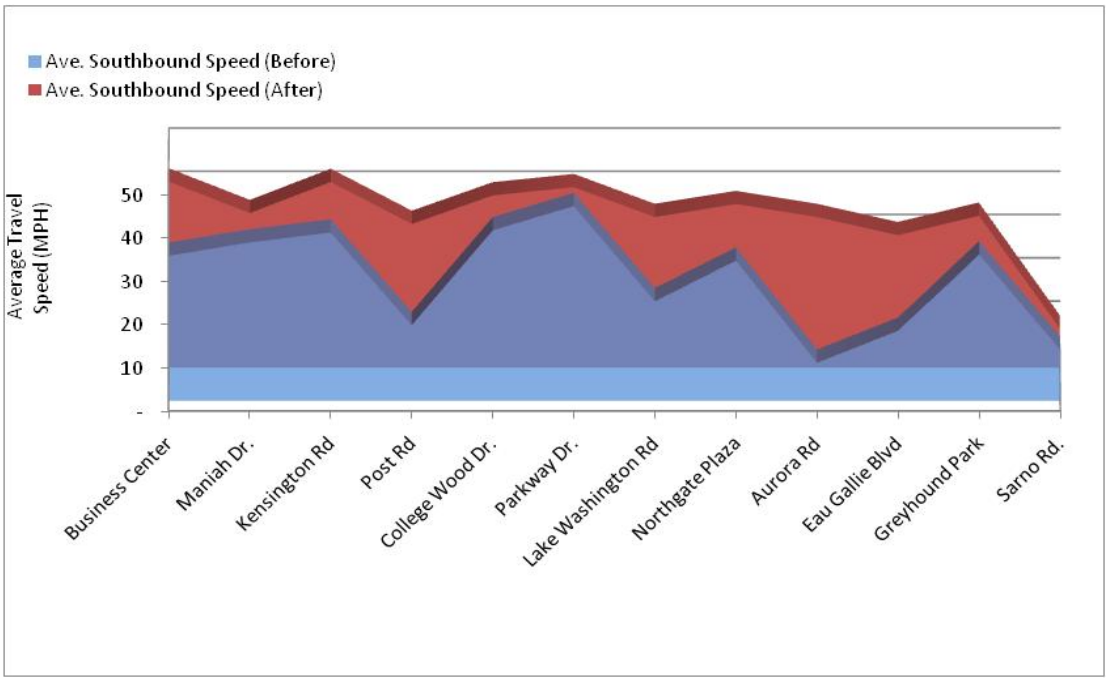
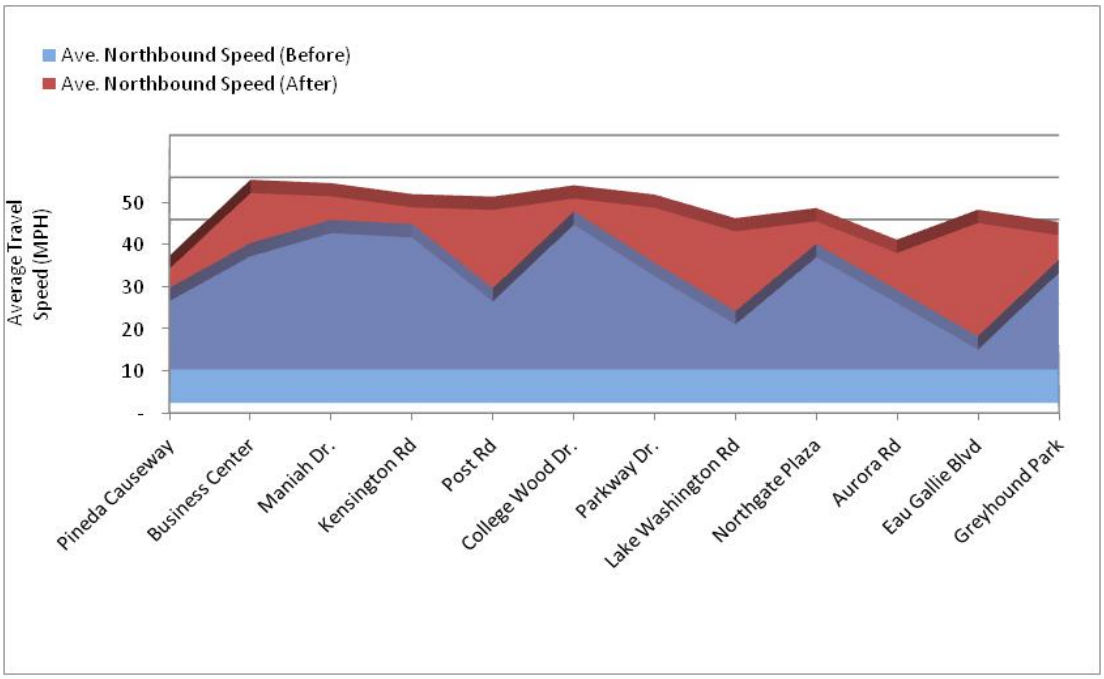


Figure 23 –PM Peak NB Travel Speed

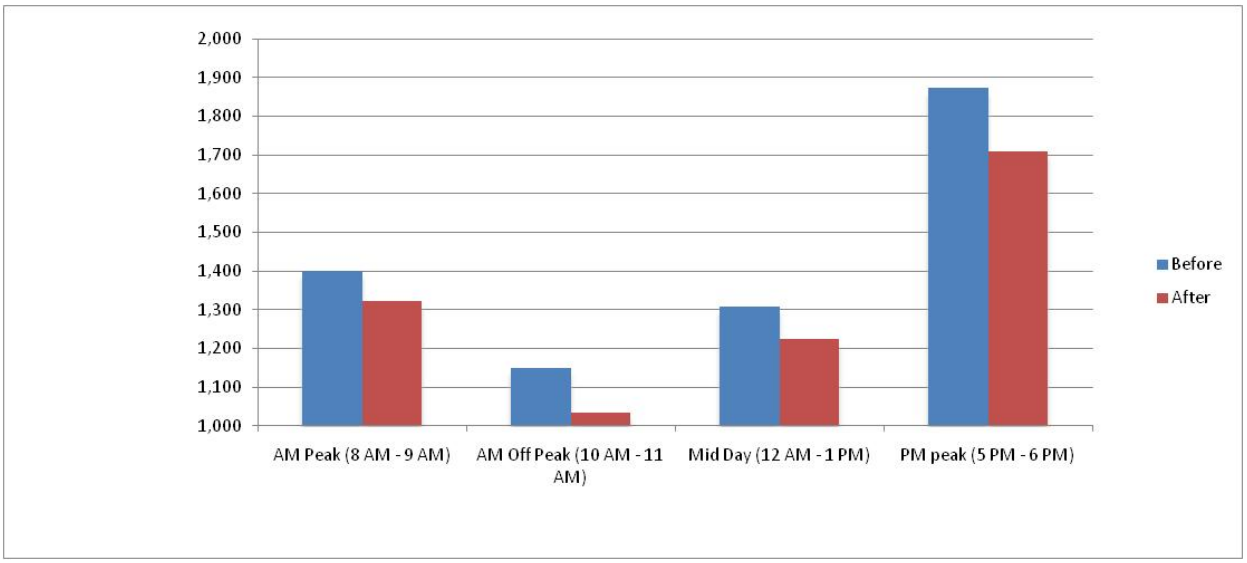


FUEL CONSUMPTION

The federal government is putting more emphasis on promoting energy conservation, protecting the environment as well as reducing green house gasses (GHGs). ITS strategies like the one implemented on Wickham Road reduces the amount of delay and travel time, as a result reducing the consumption of fuel used to travel on the corridor and reducing green house gasses. Figure 31 identifies the total fuel consumed by all vehicles on the 5.2 mile stretch of Wickham Road. With the ITS implementation, fuel consumption on the corridor decreased by 9 percent during the PM peak period, and as much as 10 percent during the AM off peak period.

Figure 24 – Wickham Road Fuel Consumption

	AM Peak (7 AM - 8 AM)	AM Off Peak (10 AM - 11 AM)	Mid Day (12 AM - 1 PM)	PM peak (5 PM - 6 PM)
Before	1,400	1,150	1,307	1,872
After	1,323	1,034	1,224	1,709
Fuel saved per hour	77	116	83	163
Percent Change	**-6%**	**-10%**	**-6%**	**-9%**



Summary Wickham Road – Before and After ITS

The implementation of ITS strategies along the Wickham Road corridor has made significant improvements in the mobility measures for work related trips (AM peak + PM Peak) for travel time, number of stops, and time in delay (calculated from speed) as well as reductions in the amount of money spent from fuel consumed. Though the results from this study show significant benefits from the implementation, the results are not transferable to other corridors. Other corridors may have different directional characteristic or more competing volume from side streets. In general ITS strategies improve the performance of a corridor, but how much improvement is based on the variables involved.

- The ITS strategy is estimated to increase travel time by 17%, which will save the average traveler 20 minutes per week in travel time on Wickham Road
- The ITS strategy will reduce the number of stops on Wickham Road by an estimated 63% which equates to over 26 stops for the typical work trip per week.
- The strategy will also reduce the time spent in delay by 63%, the typical work trips is estimated to spend almost 20 minutes less time per week in delayed conditions
- With the reduction in fuel consumption the typical work related trip will use 7% less fuel for an estimated $1.34 per week savings in fuel cost (based on an average $3.33 per gallon average annual fuel cost).

Figure 25– Summary of Mobility Measures

	Daily		Weekly		Yearly	
	Before	After	Before	After	Before	After
Travel Time	0:25:15	0:21:05	2:06:15	1:45:25	105:12:30	87:50:50
	Difference	0:04:10		0:20:50		17:21:40
	% Difference	17%		17%		17%
Stops	8.4	3.1	42.0	15.5	2,100.0	775.0
	Difference	5.3		26.5		1,325.0
	% Difference	63%		63%		63%
Delay (speed)	0:06:18	0:02:19	0:31:30	0:11:35	26:15:00	9:39:10
	Difference	0:03:59		0:19:55		16:35:50
	% Difference	63%		63%		63%
Cost per Trip (fuel)	$ 3.72	$ 3.45	$ 18.60	$ 17.26	$ 929.84	$ 862.87
	Difference	$ 0.27		$ 1.34		$ 66.97
	% Difference	7%		7%		7%