THE CITY OF EDMONTON'S OFFICE OF TRAFFIC SAFETY

FINAL REPORT

Speed Limit Reduction on Residential Roads: A Pilot Project

The City of Edmonton's Office of Traffic Safety was tasked with initiating a pilot project to reduce the posted speed limit from 50 km/h to 40 km/h within six residential communities. The pilot project was sponsored by the City of Edmonton's Transportation Department in collaboration with several partners including the Edmonton Police Service and the Edmonton Federation of Community Leagues. This report describes the implementation process and evaluation results of the pilot project. The report highlights the project's major findings including the impact on the frequency and severity of collisions, changes in driver behaviors, and the community perception of traffic safety. The report and its associated components provide a wealth of information regarding the impact of reducing the posted speed limit on the level of safety within the six residential communities.

The Office of Traffic Safety

April 05th, 2011

ABOUT THE OFFICE OF TRAFFIC SAFETY

Traffic safety is important to Edmonton's citizens and a major priority for the City of Edmonton. Like many growing municipalities, the challenge is to maintain safe streets while at the same time accommodating an ever-increasing number of drivers and vulnerable road users. Moreover, the corresponding challenges for law enforcement, education, and engineering are considerable. In February 2004, a Traffic Safety Symposium was held in Edmonton to discuss the City's traffic safety issues and concluded a coordinated approach to traffic safety was required.

In 2006, the City of Edmonton established the first municipal Office of Traffic Safety (OTS) in Canada. In collaboration with the City's Transportation Department and the Edmonton Police Service (EPS), the Office of Traffic Safety analyzes data from a multitude of sources (collision data, speed data, environmental data, etc.) and works with EPS and other stakeholders to develop recommendations and plans regarding education, engineering, and enforcement programs.

The Office of Traffic Safety aims at improving public awareness and creating an open dialogue around several traffic safety issues. The office also works directly with communities to improve traffic safety and address local concerns. The OTS delivers a number of programs to:

- Reduce collisions, especially those involving serious injury;
- Deter risky driver behavior, like speeding or running a red light;
- Reduce impaired driving;
- Increase seat belt use;
- Involve Edmontonians in traffic safety initiatives in their communities;
- Evaluate traffic data to support effective management and enforcement of local traffic.

EXECUTIVE SUMMARY

This section provides an executive summary of the report, highlighting the pilot project's background, problem statement, communication and analysis plans.

ES1. Background and Problem Statement

On October 2009, Edmonton City Council's Transportation and Public Works Committee (TPW) approved work to commence on the Residential Road Speed Reduction Pilot Project. The primary objective of the pilot project was to investigate the effect of lowering the posted speed limit from 50 km/h to 40 km/h on the level of traffic safety within the piloted communities. The Office of Traffic Safety (OTS) was tasked with initiating the process and identifying six communities for the proposed pilot. Work on the project started immediately after the City Council approval (in October 2009) including community selection, communication plans, equipment and enforcement plans, data collection plans, etc. The installation of the new 40 km/h signs started in early April (2010) but the signs remained covered for the remainder of the month until the bylaws came into effect on May 1, 2010. Data collection, surveys and measurements commenced on April 1, 2010 and concluded October 31, 2010.

The pilot project aimed at reducing the posted speed limit on residential roads and determining the associated impacts/outcomes on the level of safety. Since the City of Edmonton is divided into neighbourhoods which belong to a number of community leagues, the project's focus was on the community league level with a particular emphasis on local and collector roads. To be able to test a range of implementation aspects, including operational practicalities, community reaction, likely outcomes and technical feasibility, a pilot project design was proposed and adopted. A pilot project allows for limited implementation of an initiative aimed at testing and evaluating its effectiveness on a small scale and is good for assessing speed management measures.

Six communities were selected to pilot the speed limit reduction project. This number is substantial enough in scope to enable impacts to be measurable but at the same time the number is not so large as to introduce the problems associated with a full scale roll-out. For the balance of this report, the six piloted communities will be referred to as the *treated group* or *treatment group* of communities.

In addition to the treatment group, two other groups of communities were investigated. A *control group* of communities was selected to minimize the unintended influence of other variables in the road network. The rationale behind using a *control group* was to determine if the proposed countermeasure is actually a causal factor of improved safety. If it is true, then logic dictates the safety improvement should manifest itself more significantly in the *treatment group* than in the *control group*. To this end, a *control group* of communities were chosen based on their similarity to the *treated communities* so they experience similar traffic and environmental conditions, but are not subject to any treatment (i.e., speed limits were not reduced in these communities).

An *adjacent group* of communities was used to account for any displacement effects and/or other indirect effects which might occur due to the implementation of the pilot project. Therefore, for *adjacent communities*, the geographic proximity to the *treated*

communities was the main criterion for selection. Again, these communities were not subject to any treatment (i.e., speed limits were not reduced).

To ensure compliance to the new posted speed limit and to reduce speeding, the pilot project utilized a variety of speed management measures such as: i) a pre- and post-communication plan; ii) installation of new speed limit signage and setting up speed display boards (also known as speed trailers), dynamic messaging signs and school dollies; iii) implementing community speed programs (i.e. Speed Watch, Neighbourhood Pace Cars and Safe Speed Community vans) and iv) using covert photo-radar trucks.

Several test indicators were used to determine if lowering the speed limit to 40 km/h had an effect on the level of traffic safety. These test indicators could be grouped into two types: *outcome* and *impact indicators*. *Outcome indicators* involve measuring the actual effects caused by the pilot project. The change in the numbers of i) recorded collisions and/or ii) severe (all fatal and injury) collisions were used as potential *outcomes* of this pilot project. Alternatively, *impact indicators* were used to measure the direct consequence due to the pilot project. In this case, several *impact indicators* were used, namely:

i) *Mean speed*: the sum of the instantaneous or spot-measured speeds at a specific location of vehicles divided by the number of vehicles observed;
ii) *85th percentile speed*: usually referred to as the operating or operation speed, this is the speed (or lower) at which 85% of vehicles travel during a given period;
iii) *Level of compliance*: calculated as the percent of vehicles in compliance to the posted speed limit;
iv) *Vehicle counts*: the number of recorded vehicles and
v) *Number of tailgating vehicles*: calculated as the proportion of tailgating vehicles to the total number of recorded vehicles. Two vehicles were considered tailgating if the time gap (which is the time between the passing of the rear of the leading vehicles and the front of the following vehicle over the same point on the roadway lane) was less than 2 seconds, also known as the 2 second rule.

To capture the community perceptions, a random telephone survey with citizens residing in the piloted project communities was conducted in two phases: i) prior to project initiation and ii) following the end of the project. Specifically, telephone interviews were conducted from March 25th to 31st, 2010 (pre-pilot) and from November 8th to 19th, 2010 (post-pilot) with residents, 18 years of age or older, from the six pilot project communities. Fifty interviews per community were conducted for a total of 300 interviews (in both the pre- and post-pilot surveys).

ES2. Project Plan

Six communities were selected to pilot the residential speed limit reduction project. The Analytic Hierarchy Process (AHP), a well-known multi-criteria decision analysis tool, was used to identify the top 25 neighbourhoods. Additional criteria such as future and present neighbourhood road rehabilitation plans, neighbourhood development, and roadway network types were used to further scrutinize the ranked list and select the top six communities for the pilot project. The six selected communities were:

- 1970's/1980's communities: Twin Brooks and Westridge/Wolf Willow;
- 1950's/1960's communities: Woodcroft and Ottewell;
- Grid pattern: King Edward Park and Beverly Heights.

The community selection process was decided by the OTS senior management staff and the Executive Director of the OTS in consultation with Dr. Khandker M. Nurul Habib, Ph.D., P.Eng., currently an Assistant Professor at the Department of Civil Engineering, University of Toronto (during the selection process, Dr. Habib was an Assistant Professor at the Department of Civil and Environmental Engineering and the School of Mining and Petroleum Engineering, University of Alberta). As a consultant, Dr. Habib provided an independent and non-biased review of the selection criteria and subsequent results.

A communications plan was developed to keep members of the pilot communities, Edmonton Federation of Community Leagues (EFCL) representatives, the public and members of council informed of both the progress of the pilot project and the subsequent findings. The goal was to keep the selected communities well-engaged, to increase people's awareness of the reduced speed limits and to increase adherence to posted speed limits in order to maintain safety and quality of life for those in residential communities. The communication plan included news media coverage (by local TV, print and radio), sharing information with community partners and online coverage (on City of Edmonton's website and city's intranet, Facebook and Twitter accounts) among other communication efforts.

A controlled "Before" and "After" experimental design was used in the analysis. This type of analysis is often the most popular design for evaluating safety-based programs. This design involves observing the outcome of interest (i.e., vehicle speeds, collision rates, violation numbers) "Before" and "After" the intervention for both the sample experimental group undergoing the program and an equivalent control group. Two types of evaluation plans were developed. The first evaluation plan (impact analysis) was developed to estimate the impact of the pilot project on the traffic patterns and speed behavior across the three community groups (i.e., treated, control and adjacent). The second evaluation plan (outcome analysis) focused on evaluating the changes in the number and severity of collisions "Before" and "After" the reduction of the posted speed limit. These two evaluations provided a detailed analysis of the effects of reducing the posted speed limits on the level of safety within the six residential communities.

However, there are a number of disclaimers or cautionary remarks which need to be stated regarding the limitations of the project. With regards to the speed and traffic analysis, the project covered a very short "Before" time period. Also, the winter season was not included either in the "Before" or in the "After" periods. With respect to the collision analysis, the "After" period was relatively short-only six months of "After" data was available. A short "After" period is subject to a number of novelty issues and does not adequately represent collisions occurring during the different seasons of the year. Therefore, the results of the analysis need to be interpreted according to the project's limitations which are mostly time/data related. Notwithstanding these limitations, the findings from this report provide a wealth of information regarding the impact of reducing the posted speed limit on the level of safety within the piloted residential communities.

Five types of evaluations were used to capture the outcomes of the reduced speed limit on the speed and traffic patterns within the six treated communities.

- The first evaluation focused on analyzing the global or overall effects of the pilot project. For the purpose of this evaluation, a detailed speed and traffic analysis was conducted for three distinct groups of communities (i.e., treated, control and adjacent.) To conduct this analysis, all of the six treated communities were grouped

in a single set. Similarly, all the control[1] and adjacent[2] communities were grouped into two separate clusters.

- The second evaluation provided a thorough analysis of treated communities by neighbourhood design. Again recall, the six treated communities could be further clustered into three different types based on community development and roadway networks. The community selection process involved choosing three pairs of communities (old 1950's/60's communities, grid communities and new 1970's/80's communities) with each pair sharing similar characteristics. A detailed speed and traffic analysis was conducted for those three different neighbourhood designs.
- The third evaluation level focused on analyzing each of the neighbourhood designs (old 1950's/60's communities, grid communities and new 1970's/80's communities) separately. For the purpose of this evaluation, only a speed analysis was conducted.

To determine the impact of the pilot project on the number and severity of collisions, a time-series intervention model was developed based on the work by El-Basyouny and Sayed (2011) and Li et al. (2008), where a Hierarchical (full) Bayesian approach was proposed to conduct a "Before" and "After" collision evaluation with matched controls. The intervention model was developed using the Poisson Lognormal distribution which accounts for the randomness and overdispersion typically available in collision data. The model was extended to account for the bivariate nature of the collision data, since for each community, collisions were available by two severity levels (i.e., severe collisions and Property Damage Only {PDO} collisions). The model was further extended to account for seasonal variation (i.e., winter, spring, summer and fall) as well as to account for the treated-control matching process.

ES3. Major Findings

This section provides a comprehensive summary of the major findings and conclusions emanating from the project

ES3.1 Community Perception Survey Results

Banister Research & Consulting Inc. was commissioned to conduct a random and representative telephone survey with citizens residing in the Pilot Project Communities in two phases – prior to project initiation in March 2010 (pre-pilot) and following the end of the project in November 2010 (post-pilot). Randomly selected households within the six specified neighbourhoods were identified from a purchased TELUS directory. The randomized households were separated into two groups for each phase of the survey – all of which were completed before the project fieldwork commenced. Below is a summary of the key findings of the November 2010 results with comparisons to the March data, where applicable.

- The majority (87%) of respondents indicated they were aware their community had been chosen to participate in a pilot project (versus 46% in the pre-pilot).
    - o Respondents residing in Ottewell or Westridge/Wolf Willow were significantly more likely to be aware their community had participated in a pilot project

[1] A control group is used to minimize the unintended influence of other variables in the transportation system

[2] An adjacent group of communities is used to assess the displacement and/or other indirect effects which might be associated with the pilot project.

(96% to 98%) than those in Beverly Heights, King Edward Park or Woodcroft (76% to 84%).

- When asked, 80% of respondents stated they were aware of the speed trailer (also known as a speed display board), 51% were aware of the school dolly and 39% were aware of Speed Watch. These were all significant increases from the pre-pilot (where 50%, 30% and 24%, respectively, were aware).
    - Respondents residing in Ottewell, Twin Brooks or Westridge/Wolf Willow were significantly more likely to be aware of the speed trailer (88% to 92%) than those in King Edward Park and Woodcroft (64% to 70%). Respondents residing in Twin Brooks were significantly more likely to be aware of the school dolly (64%) than those in Westridge/Wolf Willow and Woodcroft (38% to 40%).

- Respondents were asked to anticipate the effectiveness of the three different speed monitors. Respondents were most likely to indicate the speed trailer (also known as a speed display board) would be most effective (59%), followed by the school dolly (45%) and Speed Watch (30%).
    - Respondents in the pre-pilot were significantly more likely to feel the school dolly would be more effective (56%), while they were slightly less likely to feel the speed trailer was effective (55%). A comparable proportion of respondents rated Speed Watch as effective in the pre-pilot (32%).
    - Respondents residing in Ottewell were significantly more likely to rate the effectiveness of the speed trailer as high (76%) than those in Beverly Heights, King Edward Park or Woodcroft (48% to 52%). Respondents residing in Ottewell and Twin Brooks were significantly more likely to rate the effectiveness of the speed dolly as high (52% to 60%) than those in Westridge/Wolf Willow (30%).

- When respondents were asked to anticipate the effectiveness of the pilot project, 48% of respondents believed it would be highly effective in lowering residential speeds. This was slightly higher than in the pre-pilot (41%).
    - Respondents residing in Ottewell were significantly more likely to rate the pilot project as effective (64%) than those in Beverly Heights, Westridge/Wolf Willow or Woodcroft (38% to 44%).

- New to the post-pilot, respondents were asked how the speed of traffic had changed over the last six months, 48% reported it was slower, while 45% stated it was about the same.
    - Respondents residing in Ottewell, Twin Brooks or Westridge/Wolf Willow were significantly more likely to state the traffic is slower (56% to 64%) than those in Woodcroft (30%). Respondents residing in Beverly Heights, King Edward Park and Woodcroft were significantly more likely to feel the traffic remained the same (52% to 60%) than those in Twin Brooks (30%).

- Finally, 70% of respondents indicated the level of community involvement and support for the success of the pilot project in improving traffic safety in their community was important (a slight decrease from 75% in the pre-pilot).

- Respondents residing in Woodcroft were significantly more likely to rate community involvement and support as important (78%) than those in Beverly Heights (58%).

ES3.2 Enforcement Results

Over the course of the pilot project, there were a total of 6,779 speeding violations within the six treated communities. Figure (ES1) depicts the speed violation rate by community.

The highest violation rates[3] were recorded at Woodcroft (94.2), followed by Ottewell (85.0) and Beverly Heights (82.0). The community with the least violation rates was Westridge/Wolf Willow (40.1).

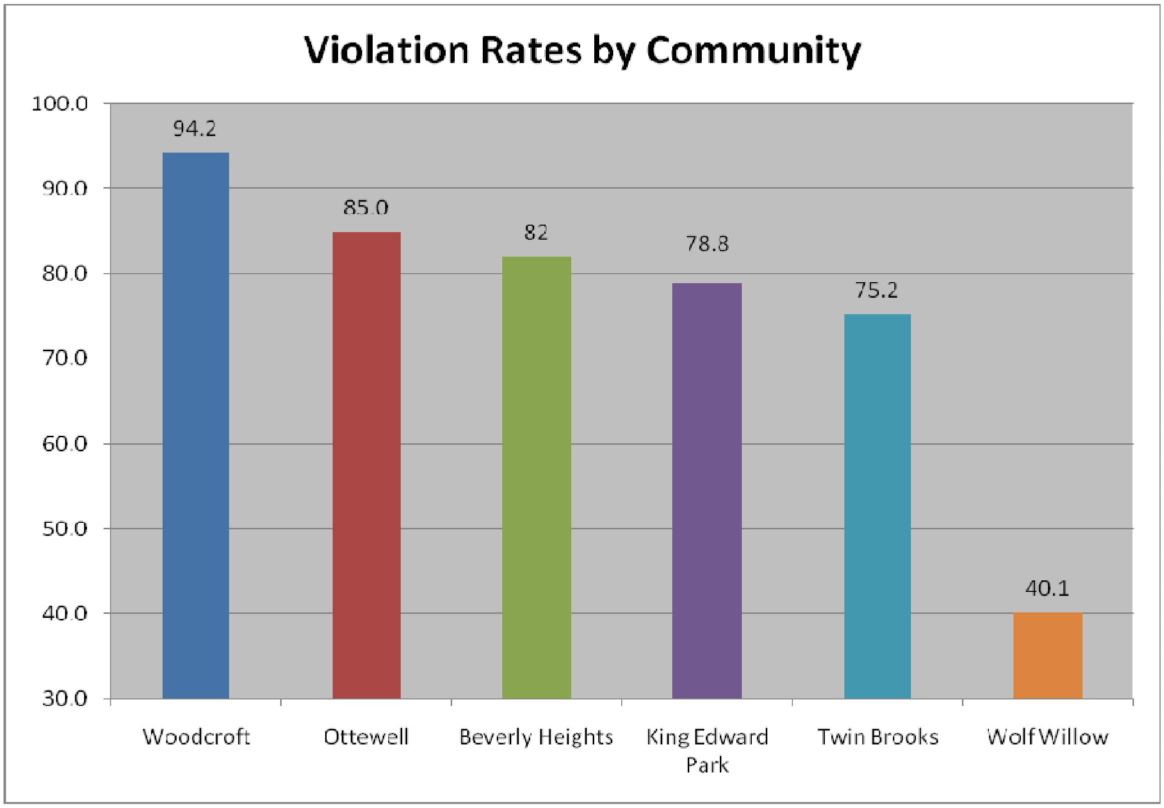

Figure ES1. Speed Violation Rates by Community

In Woodcroft, a total of 187.3 hours of photo radar camera enforcement occurred in four locations (139 St SB between 116 - 115A Ave, 139 St NB between 115A - 116 Ave, 114 Ave EB between 139 - 135 St and 114 Ave WB between 135 - 139 St). During this period a total of 1,153 speed violations were recorded. The speed violation rate (per 1,000 vehicles) was estimated at 94.2.

In Ottewell, a total of 228.0 hours of photo radar camera enforcement occurred in four locations (Ottewell Rd SB between 96A - 95 Ave, 92 Ave EB between 62 - 58 St, 92 Ave

[3] Violation rate was calculated as violation counts per 1,000 recorded vehicles.

WB between 58 - 62 St and 57 St SB between 97 - 95 Ave). During this period a total of 842 speed violations were recorded. The speed violation rate was estimated at 85.0.

In Beverly Heights, a total of 215.6 hours of photo radar camera enforcement occurred in four locations (114 Ave WB between 44 - 46 St, 114 Ave EB between 46 - 44 St, 34 St SB between 113 - 111 Ave and 34 St NB between 111 - 113 Ave). During this period a total of 1,935 speed violations were recorded. The speed violation rate was estimated at 82.0.

In King Edward Park, a total of 137.6 hours of photo radar camera enforcement occurred in three locations (76 Ave WB between 75 - 79 St, 76 Ave between 81 - 78 St and 85 St NB between 80 - 81 Ave). During this period a total of 749 speed violations were recorded. The speed violation rate was estimated at 78.8.

In Twin Brooks, a total of 200.3 hours of photo radar camera enforcement occurred in four locations (12 Ave WB between 111 - 113 St, 12 Ave EB between 113 - 112 St, 9B Ave WB between 116 - 119 St and 9B Ave WB between 119 - 116 St). During this period a total of 1,593 speed violations were recorded. The speed violation rate was estimated at 75.2.

In Westridge/Wolf Willow, a total of 215.2 hours of photo radar camera enforcement occurred in four locations (Wanyandi Rd between Wolf Ridge Way - Wanyandi Way, Wanyandi Rd NB between Wanyandi Way - Wolf Ridge Way, Wolf Willow Rd WB at Westridge Rd and Wolf Willow Rd EB at Westridge Rd). During this period a total of 507 speed violations were recorded. The speed violation rate was estimated at 40.1.

ES3.3 Global Traffic & Speed Analysis

A note on terminology; community groups will be used to refer to the treated, control, and adjacent communities. Alternatively, neighbourhood designs is used to distinguish between the three community classifications i.e., new, old, and grid-based communities.

Operating Speed (85th Percentile Speed)*:* after accounting for the unintended influence of other variables (achieved by using the control group), the operating speed was reduced by 7%. This corresponds to a reduction of 3.95 km/h in operating speed. Since the interaction between the community groups and “Before” and “After” periods was statistically significant, it was concluded the pilot project was successful in reducing the operating speed (by approximately 7%) in the treated communities.

Mean speed: the mean speed was reduced by 7% which corresponds to a reduction of 3.48 km/h in mean speed. Again, since the interaction between the community groups and “Before” and “After” periods was statistically significant, it was concluded the pilot project was successful in reducing the mean speed (by approximately 7%) in the treated communities.

The speed analysis showed the *operating speed* and *mean speed* were consistently decreasing in both the treated and adjacent communities (albeit with varying rates) while increasing gradually in the control communities (Figure ES2). This relationship held, regardless of time of day or day of the week factors.

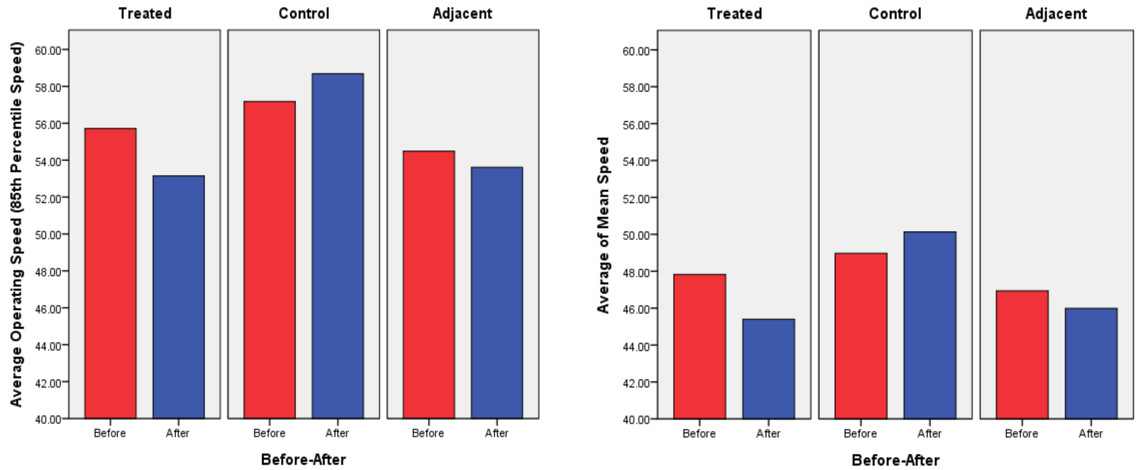

Figure ES2. “Before” and “After” Speed by Community Group
Left: Average Operating Speed (85th Percentile Speed)
Right: Average of Mean Speed

Also, the analysis revealed there were monthly fluctuations in the *operating speed* and *mean speed* for all community groups (Figure ES3). In the treated group the speed was high in April and was reduced in later months, but in the control group the speed increased in later months compared to April. So while the speed was reduced in the treated group over time, it increased in the control group. Also, the speed was marginally reduced for the adjacent group of communities. Note: for the treated communities, the largest reduction in operating speed occurred at the start of the project (from April to June) with the speeds rising slightly in July before dropping and leveling off.

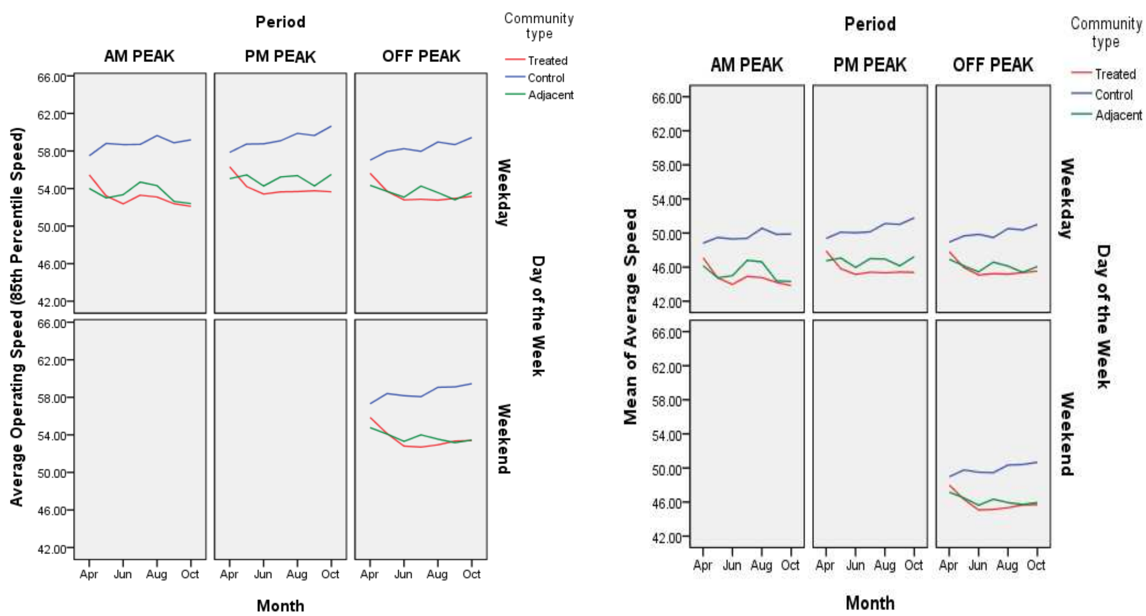

Figure ES3. Monthly Speed by Community Group, Peak Period and Day of Week
Left: Average Operating Speed (85th Percentile Speed)
Right: Average of Mean Speed

After the implementation of the pilot project, the cumulative distribution for the operating and mean speeds in the treated communities shifted to the left indicating a reduction in the speed (Figure ES4). In contrast, the speed distribution for the control communities shifted to the right, whereas the speed distribution for the adjacent communities shifted slightly to the left. This implies the speed increased in the control communities while decreasing slightly in the adjacent communities during the "After" period.

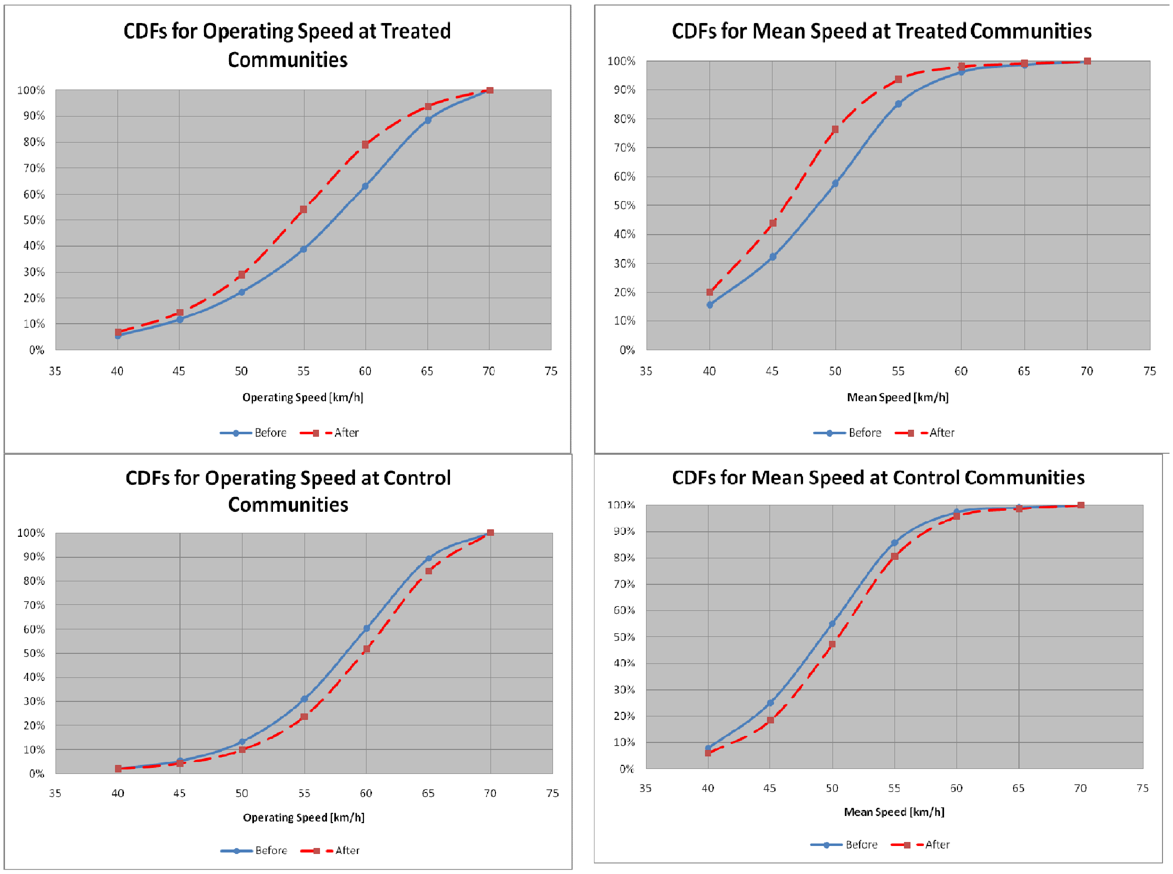

Figure ES4. "Before" and "After" Cumulative Speed Distributions
Top: Average Operating Speed and Average of Mean Speed at Treated Communities
Bottom: Average Operating Speed and Average of Mean Speed at Control Communities

Percent Compliance: the analysis showed drivers in treated communities during the "After" period were much less likely to comply to the posted speed limit than the drivers in other communities or during the "Before" period. This implies there was a significant decrease in the compliance percentages to the posted speed limit in the treated communities as a result of the pilot project. Moreover, the percent compliance was found to be highly correlated with the speed allowance or tolerance level. The highest percentage compliance (90%) was achieved at approximately 15 km/h over the posted speed limit.

Traffic Count: the average number of recorded vehicles was reduced by 4% with respect to the changes in the control communities. The interaction between the community groups and "Before" and "After" periods was statistically significant indicating the number of recorded vehicles was marginally reduced (by approximately 4%) in the treated communities. The reduction in traffic counts in the "After" period is not surprising since

the traffic volumes during April and May and during the second half of September and during October are often used as surrogates for the calculation of the Annual Average Daily Traffic and the period June, July and August are typically below-average. This ‘typical’ pattern might explain the volume reductions.

Proportion of Tailgating Vehicles: the proportion of tailgating vehicles was found to be very small, ranging from 0.005 to 0.009 (i.e., representing 5 to 9 tailgating vehicles per 1,000 vehicles). In addition the analysis revealed drivers in treated communities during the “After” period were a little less likely to tailgate than the drivers in other communities or during the “Before” period. However, the decrease in the proportion of tailgating vehicles in the treated communities was statistically significant.

ES3.4 Traffic & Speed Analysis for Neighbourhood Design

Operating Speed: the operating speed was found to vary with level of community development and type of roadway network. Higher operating speeds were observed in new (1970’s/80’s) communities, followed by grid-based communities and old (1950’s/60’s) communities (Figure ES5). Also, the results show the operating speed decreased consistently (with varying rates) in all of the treated neighbourhood designs regardless of time of day or day of week.

It is worth noting old communities have constrained road dimensions with significant on-street parking. These physical constraints typically feature lower speeds than the communities with a grid or irregular street networks. Such networks have little on-street parking and generous roadway dimensions. It explains, to a certain degree, the most significant speed reduction was experienced in the new communities (operating speed decreasing from about 60 to about 57 km/h), followed by the communities with grid networks (operating speed decreased from about 55 to about 53 km/h) and by the older communities (operating speed decreased from about 53 to about 51 km/h).

There were monthly fluctuations in the operating speed for all treated neighbourhood designs. The speed was consistently high in April and was reduced in later months. The largest reduction in speeds occurred at the start of the project (from April to June) with the speeds rising slightly in July before dropping and leveling off. Again, after the implementation of the pilot project, the cumulative distribution for all types of treated communities shifted indicating a reduction in the speed.

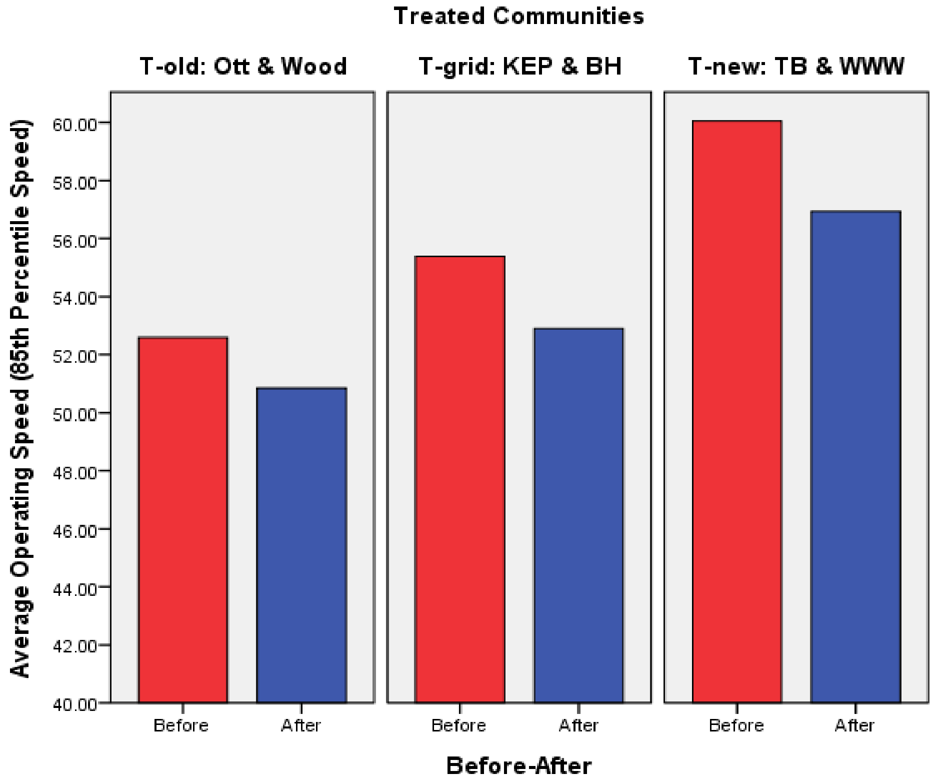

Figure ES5. “Before” and “After” Average Operating Speed (85th Percentile Speed) by Neighbourhood Design

Percent Compliance: the degree of compliance was highest for old communities and lowest for new communities. The analysis indicated drivers in old communities during the “After” period were a little less likely to comply than the drivers in other communities or during the “Before” period. In addition, the drivers in grid communities during the “After” period were a little more likely to comply than the drivers in other communities or during the “Before” period.

Traffic Count: the number of recorded vehicles decreased from the “Before” to the “After” conditions for all neighbourhood designs. The largest decrease occurred for new (1970’s/80’s) and grid-based communities, while there was a slight decrease for the old communities. Overall, the analysis showed the number of recorded vehicles was marginally reduced for all neighbourhood designs. Again, this could be attributed to traffic counts during June, July and August being typically below-average.

Proportion of Tailgating Vehicles: the proportion of tailgating vehicles was again very small ranging from 0.003 to 0.009 (i.e., representing 3 to 9 tailgating vehicles per 1,000 vehicles) and was smallest in old communities. The results indicate there were no statistical differences in the proportion of tailgating vehicles across the different community classifications from the “Before” to the “After” conditions.

ES3.5 Traffic & Speed Analysis for Grid-based Communities

Operating Speed: the operating speed at grid-based community designs was reduced by 4%. This corresponds to a reduction of 2.39 km/h in operating speed. This reduction was statistically significant indicating the pilot project was successful in reducing the operating speeds in the treated grid-based communities. Moreover, the operating speed decreased consistently in the treated communities regardless of time of day or day of week.

Percent Compliance: the analysis showed the drivers in treated grid-based communities during the “After” period were much less likely to comply than the drivers in other grid-based community groups (i.e. control or adjacent) or during the “Before” period and there was a significant decrease in the percent compliance to the posted speed limit in the treated grid-based communities.

ES3.6 Traffic & Speed Analysis for Old Communities

Operating Speed: the operating speed at old (1950’s/60’s) communities was reduced by 6%. This corresponds to a reduction of 2.96 km/h in operating speed. The statistical analysis revealed this reduction was significant, indicating the project was successful in reducing the operating speeds in the treated old communities. When compared to the control or adjacent communities, the operating speed was lowest for the treated old communities regardless of day of week and time of day. In addition, there were monthly fluctuations in the operating speed. However, the operating speeds for the treated old communities were consistently lower than the operating speed in the control and adjacent communities.

Percent Compliance: the analysis showed the drivers in treated old communities during the “After” period were much less likely to comply than the drivers in other old community groups (i.e., control or adjacent) or during the “Before” period. There was a significant decrease in the percent compliance to the posted speed limit in the treated old communities as a result of the pilot project.

ES3.7 Traffic & Speed Analysis for New Communities

Operating Speed: the operating speed in new (1970’s/80’s) communities was reduced by 11%. This corresponds to a reduction of 6.43 km/h in operating speed. Given the statistically significant interaction between the new community groups and the “Before” and “After” periods, it was concluded the project was successful in reducing the operating speeds in the treated new communities. More so, the operating speed decreased consistently in the treated new communities regardless of time of day or day of week. There were monthly fluctuations in the operating speed for the treated and control new communities. The operating speed in the treated communities was reduced while the operating speed in the control group was increasing steadily with time. After the implementation of the pilot project, the operating speed for the treated new communities was consistently lower than the operating speeds in the control community.

Percent Compliance: the statistical analysis revealed the drivers in treated new communities during the “After” period were much less likely to comply than the drivers in the control community or during the “Before” period. This indicates there was a

significant decrease in the percent compliance to the posted speed limit in the treated new communities.

ES3.8 Collision Analysis Results

A rigorous "Before" and "After" analysis of the effects of reduced speed limits on the severity of collisions counts was conducted using a time series intervention model. The intervention model was developed based on the work by El-Basyouny and Sayed (2011) and Li et al. (2008), where a Hierarchical (full) Bayesian approach was proposed to conduct a "Before" and "After" safety evaluation with matched controls.

The intervention model was developed using the Poisson Lognormal distribution which accounts for the randomness and over-dispersion typically available in collision data. The model was extended to account for the bivariate nature of the collision data since for each community collisions were available by two severity levels (i.e., severe collisions and Property Damage Only {PDO} collisions.) The model was further extended to account for seasonal variation (winter, spring, summer and fall) as well as to account for the treated-control matching process.

Figure ES6 shows a time series plot of the actual number of collisions from May to October during the "Before" years (2006 to 2009) and during the "After" year (2010) in all six treated communities. For visualization purposes the maximum value on the y-axis was held fixed to illustrate the observed collision frequencies varied by community.

The figure provides a number of findings:

- Property Damage Only (PDO) collisions were consistently higher than severe collisions in all of the six treated communities;
- The observed collision counts were subject to moderate fluctuation;
- Severe and PDO collisions in Woodcroft were lower when compared to the other communities. In contrast, collisions in King Edward Park were amongst the highest;
- Generally, severe and PDO collisions were slightly declining in all of the treated communities from 2006 to 2010;
- The frequency of severe collisions was lower "After" the pilot project (in 2010) except for Westridge/Wolf Willow which experienced an increase in the number of severe collisions (4 severe collisions);
- The frequency of PDO collisions was lower "After" the pilot project (in 2010) except for Beverly Heights and King Edward Park (which is showing a slight increase).

The above findings revealed an increase in the number of severe collisions during the "After" period in the Westridge/Wolf Willow community (i.e., the number of severe collisions in 2010 was double the number of collisions observed during the same time period (May to October) in the last four years combined.) As a result, a preliminary inspection of the collision types and causes was conducted. The inspection revealed two of the severe collisions involved a cyclist; the causes of these two collisions were: i) stop sign violation and ii) left of centerline collision. The third collision was caused by failure to yield to a pedestrian at an intersection and the last collision involved a ran-off-the-road vehicle. All four collisions occurred in different times of the day and days of the week. Two of these collisions occurred in September and the other two occurred in July and August. The results showed there were no common patterns or consistent causal factors which might have precipitated such an increase. However, given the short "After" period

and considering the numbers of severe collisions in residential areas are typically small and relatively high fluctuations in small-number statistics and probability are not unusual, the observed 4 severe collisions may not be a cause of concern at this time. A subsequent analysis may be proposed in the future to understand the circumstance which resulted in an increase in collisions in this specific community.

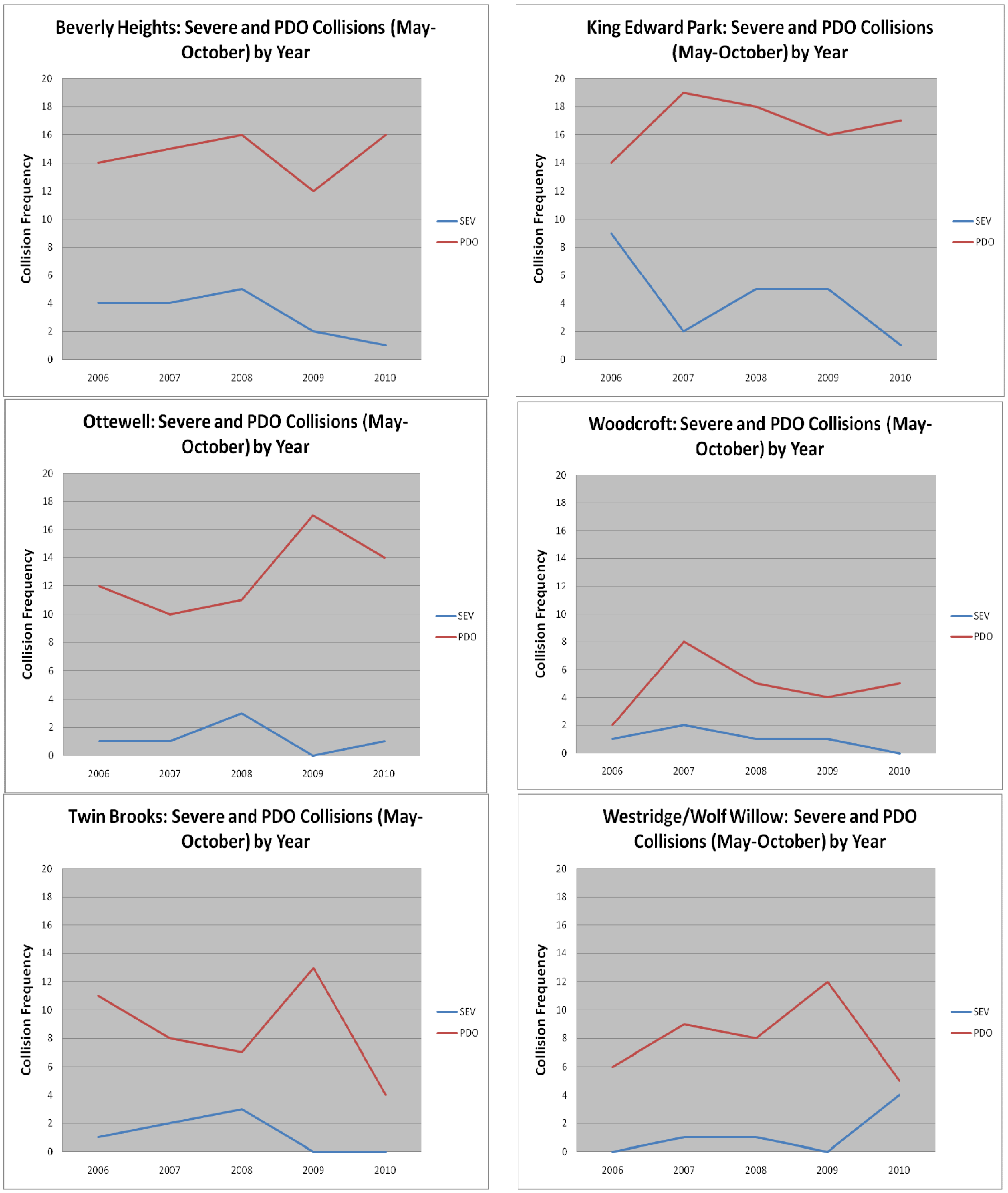

Figure ES6. Time Series Plot of Severe and PDO Collisions (May-October) by Year in each of the Treated Communities

According to the time-series intervention model, the estimates of the overall odds ratio for *severe* collision was 0.75, implying reductions in predicted collision counts of 25% with a 95% confidence interval of -81%, 77%. Alternatively, the estimates of the overall odds ratio for *PDO* collisions was 0.94, implying reductions in predicted collision counts of 6% with a 95% confidence interval of -28%, 21%. The results of the analysis are depicted in Figure ES7.

However, these reductions were not significant, as the 95% confidence interval included zero, implying *no change or no effect*. Generally, when a confidence interval is very wide like this one, it is an indication of an inadequate sample size (i.e. short "After" period) and implies poor precision. Consequently, the results of the collision analysis were inconclusive and additional research will be required to substantiate the impact of the pilot project on the number and frequency of collisions.

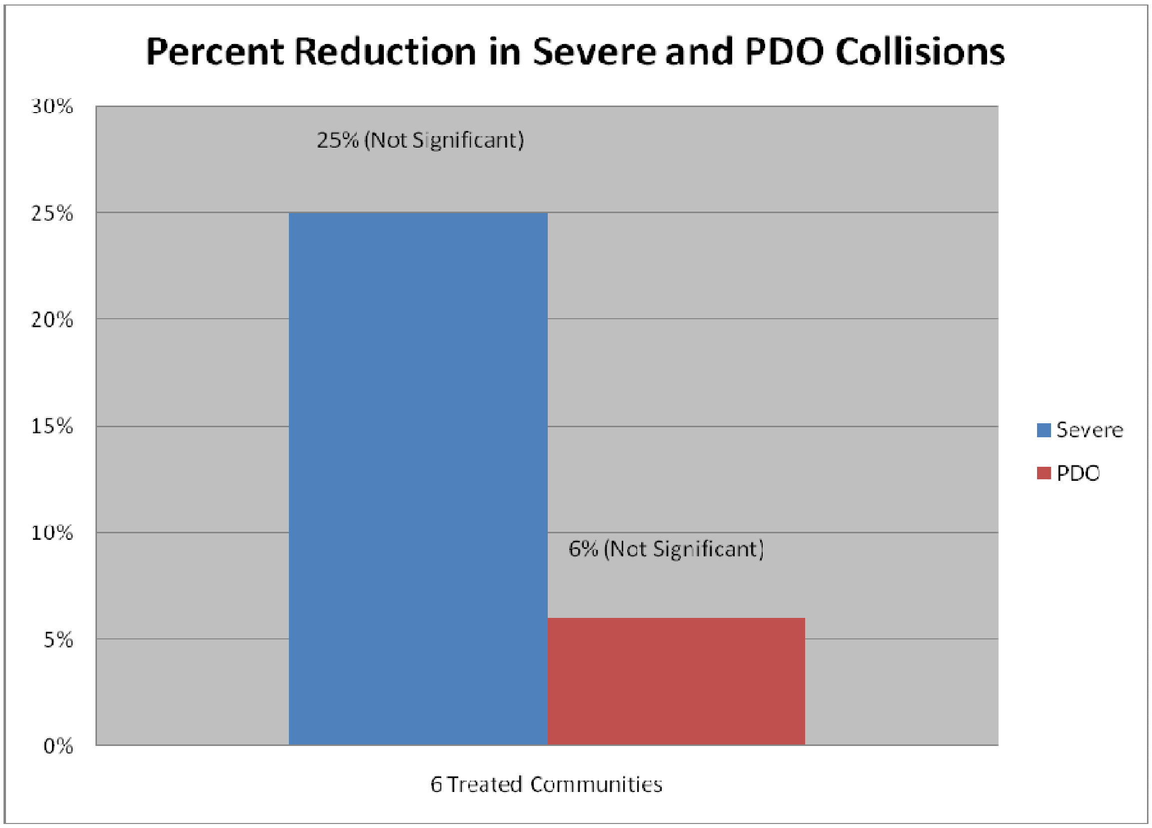

Figure ES7. Percent Reduction in Severe and PDO Collisions

ES4. Concluding Remarks

The result of the community perception survey by Banister Research & Consulting Inc. indicates the majority of respondents were aware of their community's involvement in the pilot project. More so, the awareness rate was highest for residents in Ottewell and Westridge/Wolf Willow. A total of 48% percent of the respondents reported the speeds were lower after the pilot project ended, while 45% felt it was about the same. Moreover, 48% percent of respondents believed the pilot project would be highly effective in lowering residential speeds; in particular, 64% of Ottewell residents felt this. Finally, 70%

of respondents indicated the importance of community involvement and support for the success of the pilot project in improving traffic safety in their community.

The results of the speed and traffic analysis indicated both the operating speed and mean speeds were reduced after the implementation of the new residential speed limit of 40 km/h in the pilot project communities. This decrease was further magnified by the observed increase in speeds of the control communities over the duration of the pilot project. This implies even though there was a general tendency for drivers to exceed the speed limit during the “After” period, the piloted communities were still exhibiting a reduction in speeds. Moreover, the operating speed and mean speed were consistently lower regardless of temporal factors like time of day and day of week.

The operating speed was also found to vary with community development and the type of roadway network. Higher operating speeds were observed in new (1970s/80s) communities, followed by grid-based communities and old (1950s/60s) communities. There were reductions in operating speed in all communities, regardless of network type; the largest reduction in operating speed was observed in new communities, (11% reduction), compared to a 6% reduction in old communities and a 4% reduction in grid-based communities. However, new communities still had the highest recorded speeds in the “After” period when compared to the old and grid-based neighbourhood designs. Again, the results show the operating speed decreased consistently (with varying rates) in all of the treated neighbourhood designs regardless of time of day or day of week.

The analysis of the proportion of drivers complying with the posted speed limit showed drivers in treated communities during the “After” period were much less likely to comply to the lower posted speed limit than drivers in other communities or during the “Before” period. In the treated communities, 65% of drivers exceeded the 40 km/h speed limit compared to 39% exceeding the 50 km/h limit before the study. However, the distribution of driver speeds decreased by approximately 4 km/h compared to the control communities, indicating drivers were slower overall in treated communities. This result is consistent with published studies where the posted speed limit was changed without concurrent changes to roadway geometry such as new markings, land use changes or traffic calming techniques.

Moreover, the percent compliance was found to be highly correlated with the speed allowance or tolerance level. The percent compliance of drivers traveling 15km/h over the 50 km/h speed limit in the control communities was 92.9% (before) and 91.0% (after). The percent compliance of drivers travelling 15 km/h over the posted 40 km/h speed limit in the treated communities was 93.1% (before) and 84.3% (after). The percent compliance was also found to vary with level of community development and type of roadway network. The degree of compliance was highest for old communities and lowest for new communities.

A 4% reduction in the average number of vehicles was observed after the implementation of the new residential speed limit of 40 km/h in the pilot project communities. Once again, the reductions were found to vary with the level of community development and the type of roadway network. Generally, the number of recorded vehicles decreased from the “Before” to the “After” phase for all neighbourhood designs, with the largest decrease in new (1970s/80s) communities and grid-based communities and a smaller decrease in the old communities. This reduction could be attributed to traffic counts done during June, July and August are typically below-average.

The proportion of tailgating vehicles was found to be very small. The analysis revealed drivers in treated communities during the “After” period were slightly less likely to tailgate than the drivers in other communities or during the “Before” period. The results indicated no statistical differences in the proportion of tailgating vehicles across different neighbourhood designs (i.e., grid, new, old) from the “Before” to the “After” phase.

An analysis of collision data in the treated communities showed an overall reduction in collision frequency and severity. There was a larger reduction in severe collisions (i.e. collisions resulting in injury or fatality) than in Property Damage Only (PDO) collisions. This result is consistent with other research showing a reduction in driving speed leads to a reduction in severe collisions at the same time as there is either no change or a slight increase in PDO collisions (Speed Management Report, 2008). However, these reductions were not significant, as the 95% confidence interval was very wide and included zero, implying no change or no effect. Consequently, the results of the collision analysis were inconclusive and additional research will be required to substantiate the impact of the pilot project on the number and frequency of collisions.

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PREFACE

Several local and international factors converged to lend support for a speed limit reduction project. The association between vehicle driving speed and collision risk was extensively discussed within the traffic safety literature. Moreover, there is abundant evidence showing reductions in driving speed can significantly reduce the severity of collisions. Locally, speeding/careless driving was the top problem in the City of Edmonton based on several Citizen Satisfaction Surveys. Directed by Edmonton City Council, the City of Edmonton's Office of Traffic Safety (OTS), in collaboration with Edmonton Police Service (EPS), Edmonton Federation of Community Leagues (EFCL), Edmonton Public School Board, Edmonton Catholic School Board, Alberta Motor Association, and other community stakeholders, undertook a pilot project to reduce the posted speed limit from 50 to 40 km/h on residential roads within the City of Edmonton. This report presents the implementation plan and major findings resulting from the project.

The research team employed an evidence-based approach to evaluate the effectiveness of reducing the posted speed limit on collisions, driver behavior, and community perceptions using a controlled "Before" and "After" experimental design. Six communities were selected to pilot the reduced posted speed limit. By using a pilot project, the research team had the ability to test a range of implementation aspects including operational practicalities, community reaction, and likely outcomes. However, there are a number of disclaimers or cautionary remarks which need to be stated regarding the limitations of the project. With regards to the speed and traffic analysis, the project covered a very short "Before" time period. Also, the winter season was not included in either the "Before" or in the "After" periods. With respect to the collision analysis, the "After" period was relatively short, only 6 months of "After" data was available. A short "After" period is subject to a number of novelty issues and do not adequately represent collisions occurring during the different seasons of the year. Therefore, the results of the analysis need to be interpreted according to the project's limitations which are mostly time and thus data related. Notwithstanding these limitations, the findings from this report provide a wealth of information regarding the impact of reducing the posted speed limit on the level of safety within the piloted residential communities. The report also lays the foundation for future research and serves as a benchmark for other communities that are considering changes to their speed management plans.

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1. INTRODUCTION

This report describes the implementation and evaluation of the Residential Road Speed Limit Reduction Pilot Project in the City of Edmonton. The pilot project was sponsored by the City of Edmonton's Transportation Department in collaboration with several partners. This section provides a general introduction to the report and is divided into four parts. The first part presents background information necessary to understand the significance of the study problem. The second and third parts summarize the project's objectives and scope, respectively. The last part provides a review of the road safety literature pertaining to results of similar speed limit reduction programs.

1.1 Background & Problem Statement

The association between vehicle driving speed and collision risk is well established within traffic safety literature. There is abundant evidence showing higher speeds are associated with an increase in collision risk and the degree of collision severity; specifically in urban environments (Elvik et al., 2004; Kloeden et al., 1997, 2001; Nilsson, 2004; OCED/ECMT, 2006; Speed Management, 2008). Higher speeds increase both the distance travelled during a driver's reaction time and the distance needed to stop which increases collision risk. In addition, the probability of an injury occurring increases with higher speeds since a greater amount of energy must be absorbed by the impact. Moreover, the use of inappropriate vehicle speeds or 'speeding' has been identified in some studies as the single most important contributor to road fatalities around the world (Frith et al., 2005; OCED/ECMT, 2006; Speed Management, 2008).

Several factors converged to lend support for a speed limit reduction pilot project of 40 km/h on residential roads. The 2004, 2007, and 2009 Citizen Satisfaction Surveys conducted by the Edmonton Police Service identified speeding/careless driving as the top community problem in Edmonton. Moreover, City Councilors were receiving ongoing and sustained speeding complaints in their wards which were not being satisfactorily addressed. The City of Edmonton OTS became increasingly involved in addressing these speeding issues since there was a need for a broader systemic solution. Lastly, the first Edmonton International Urban Conference, held in March 2009, showcased leading global practices which supported the reduction of speeds in residential areas.

These factors motivated Edmonton City Council's Transportation and Public Works Committee (TPW) to review the potential of reducing speed limits on residential roads and asked the city administration to consult the public. The OTS was identified as the lead agency for this initiative and worked with community partners including the Edmonton Federation of Community Leagues (EFCL) to obtain their input. In agreement with the OTS, a reduced speed limit workshop was arranged at the EFCL office on June 16, 2009. The OTS, Community Leagues, Edmonton Public School Board, Edmonton Catholic School Board, Alberta Motor Association, Edmonton Police Service (EPS), and other community stakeholders participated in the workshop. The EFCL also conducted an online speed reduction survey to solicit wider community feedback and determine the level of community support for a reduced residential speed limit. One of the recommendations from the workshop and the online survey was to reduce the current limit from 50 km/h to 40 km/h or less on residential roads in the City of Edmonton (EFCL, September 2009).

On October 6, 2009, Edmonton City Council's TPW gave approval to commence work on the residential road speed reduction pilot project. The OTS was tasked with initiating the process and identifying six communities for the proposed pilot. Following City Council approval in October (2009), work on the project began which included community selection, communication plans, equipment and enforcement plans, data collection plans, etc. The installation of the new 40 km/h signs started in early April (2010) but the signs remained covered for the remainder of the month until the bylaws (which are attached in Appendix I) came into effect on May 1, 2010. Data collection, surveys and measurements commenced on April 1, 2010 and concluded October 31, 2010.

1.2 Project Objectives

The primary objective of the pilot project was to investigate the effect of lowering the posted speed limit from 50 km/h to 40 km/h on the level of traffic safety within the piloted communities. The analysis focused on several factors which could be affected by the change of posted speed limit. These include:

1.2.1 Impact on Speed and Traffic

- *Vehicle Speeds:* any change in speeds represents a direct impact of the pilot project. A speed analysis was conducted to determine the extent of the changes in the speed and speed limit compliance due to the implementation of the project.
- *Proportion of Tailgating Vehicles:* a common expectation associated with speed reduction projects is an increase in the number of vehicles following each other too closely. Such adverse behavior might lead to undesirable and unsafe interactions. As a result, the study investigated if there was an increase in the number of tailgating vehicles after the implementation of the project.
- *Traffic Counts:* another common belief associated with speed reduction projects is drivers tend to avoid driving on slower roads and traffic may diverge to surrounding areas. This issue was investigated to determine if there was any change in traffic volume “Before” and “After” the implementation of the pilot project.

1.2.2 Impact on Collisions

- *Collision Frequency*: to determine if the project was successful in improving the safety within the piloted communities, the number of collisions “Before” and “After” the implementation of the project was investigated.
- *Collision Severity*: usually speed reduction projects are associated greater reduction in severe collisions when compared to other severity types. To investigate this issue, a collision analysis by two severity levels, i.e. severe (all fatal and injury) and Property Damage Only (PDO) collisions, was conducted.

1.2.3 Impact on Community Perceptions of Traffic Safety

- *Community Perceptions:* to capture the participating communities' perceptions of traffic safety, Banister Research & Consulting Inc. was commissioned to conduct a random and representative telephone survey with citizens residing in the pilot communities in two phases – before project initiation (March 2010) and following the end of the project in November 2010. A summary of the findings are included in the report.

1.3 Scope of the Project

As indicated above, this pilot project aimed at lowering the posted speed limit on residential roads and determining the associated impacts/outcomes on the level of safety. Since the City of Edmonton is divided into neighbourhoods which belong to a number of community leagues, the project's focus was on the community league level with a particular emphasis on local and collector roads.

To be able to test a range of implementation aspects, including operational practicalities, community reaction, likely outcomes, and technical feasibility, a pilot project design was proposed and adopted. This pilot project allows for a limited implementation of an initiative aimed at testing and evaluating its effectiveness on a small scale and is good for assessing speed management measures.

Six communities were selected to pilot the speed limit reduction project. This number is substantial enough in scope to enable impacts to be measurable but at the same time the number is not so large as to introduce the problems associated with a full scale roll-out. For the balance of this report, the six piloted communities will be referred to as the *treated group* or *treatment group* of communities.

In addition to the treatment group, two other groups of communities were investigated. A *control group* of communities was selected to minimize the unintended influence of other variables in the road network. The rationale behind using a *control group* was to determine if the proposed countermeasure is actually a causal factor of improved safety. If it is true, then logic dictates the safety improvement should manifest itself more significantly in the *treatment group* than in the *control group*. To this end, a *control group* of communities were chosen based on their similarity to the *treated communities* so they experience similar traffic and environmental conditions, but are not subject to any treatment (i.e., speed limits were not reduced in these communities).

An *adjacent group* of communities was used to account for any displacement effects and/or other indirect effects which might occur due to the implementation of the pilot project. Therefore, for *adjacent communities*, the geographic proximity to the *treated communities* was the main criterion for selection. Again, these communities were not subject to any treatment (i.e., speed limits were not reduced).

To ensure compliance to the new posted speed limit and to reduce speeding, the pilot project utilized a variety of speed management measures such as: i) a pre- and post-communication plan; ii) installation of new speed limit signage and setting up speed display boards (also known as speed trailers), dynamic messaging signs, and school

dollies; iii) implementing community speed programs i.e. Speed Watch, Neighbourhood Pace Cars, and Safe Speed Community vans and iv) using covert photo-radar trucks.

Several test indicators were used to determine if lowering the speed limit to 40 km/h had an effect on the level of traffic safety. These test indicators could be grouped into two types: *outcome* and *impact indicators*. *Outcome indicators* involve measuring the actual effects caused by the pilot project. The change in the numbers of i) recorded collisions and/or ii) severe (all fatal and injury) collisions were used as potential *outcomes* of this pilot project. Alternatively, *impact indicators* were used to measure the direct consequence due to the pilot project. In this case, several *impact indicators* were used, namely:

i) *Mean speed*: the sum of the instantaneous or spot-measured speeds at a specific location of vehicles divided by the number of vehicles observed;
ii) *85th percentile speed*: usually referred to as the operating or operation speed, this is the speed (or lower) at which 85% of vehicles travel during a given period;
iii) *Level of compliance*: calculated as the percent of vehicles in compliance to the posted speed limit;
iv) *Vehicles counts*: the number of recorded vehicles; and
v) *Number of tailgating vehicles*: calculated as the proportion of tailgating vehicles to the total number of recorded vehicles. Two vehicles were considered tailgating if the time gap (which is the time between the passing of the rear of the leading vehicles and the front of the following vehicle over the same point on the roadway lane) was less than 2 seconds, also known as the 2 second rule.

To capture the community perceptions, a random telephone survey with citizens residing in the piloted project communities was conducted in two phases: i) prior to project initiation and ii) following the end of the project. Specifically, telephone interviews were conducted from March 25th to 31st, 2010 (pre-pilot) and from November 8th to 19th, 2010 (post-pilot) with residents, 18 years of age or older, from the six pilot project communities. Fifty interviews per community were conducted for a total of 300 interviews (in both the pre- and post-pilot surveys).

1.4 Literature Review

The increase in frequency and severity of collisions can be attributed to one or a combination of: driving behaviour, vehicle characteristics, and/or geometric design of the roadway segment. Driving at excessive speeds is one example of driving behaviour research analysts and road authorities are attempting to manage. Speed management can be done through specifying speed limit, speed enforcement, environmental attributes, and characteristics of the driving population (McCarthy, 1997).

The relationship between actual driving speed (traveling speed) and posted speed limits is hypothesized to have an effect on the safety of a road segment (Renski et al., 1999). The overlap between travel speeds and speed limits exists only when intense enforcement, environmental constraints, or vehicular limitations forcing drivers to follow the speed limit are present (Shinar, 1997). These mitigation measures to manage traveling speeds could be broadly categorized as: (1) engineering initiatives, (2) enforcement initiatives, and (3) education initiatives or combinations of any of them. This section will give a brief overview of each of these initiatives.

Engineering initiatives to manage speed are primarily focused on making changes to the road to encourage drivers to comply with the speed limit (Allan, 1997; Allsbrook, 2000; Aspelin, 1999; Dabkowski; 1998; Davis & Lum, 1998; Ford et al., 1999; Stuster et al., 1998). These initiatives include the introduction of traffic calming or road dieting measures. The practice of traffic calming is now four decades old and has spread around the world from its roots in northern Europe (Hass-Klau et al., 1992; Herrstedt et al., 1993; Schlabbach, 1997; Schnull & Lange, 1992). Several studies have demonstrated the effectiveness of such initiatives in reducing both average and very high speeds as well as the effect on frequency and severity of collisions (Bloch, 1998; Buchholz et al., 2000; Cottrell et al., 2006; Elvik, 2001; Engel & Thomsen, 1992; Ewing, 1999; Leaf & Preusser, 1999; Litman, 1999; Robinson et al., 1998; Vis et al., 1992).

Alternatively, enforcement initiatives are used to penalize offenders who do not comply with the posted speed limits. A variety of enforcement equipment, either stationary or mobile, is typically used to manage speed. These include: photo radar detectors, intelligent vehicle adaptation, speed display boards, and dynamic messaging signs (Ewing, 1999; Insurance Institute for Highway Safety, 1999; Retting, 1999; Stuster et al., 1998; Wiesel, 2004). Generally, enforcement is expensive and is impractical on low-volume streets (Blomerg & Cleven, 2006; Ewing, 1999; Leaf & Preusser, 1999; Stuster et al., 1998). However, in cases where resources are available and speeding is a major source of collisions, studies proved effective enforcement reduces speeding (Ewing, 1999; Insurance Institute for Highway Safety, 1999; Mackie, 1998; Retting; 1999; Stuster et al., 1998).

The impact of educational initiatives alone on speed reduction was hardly investigated in literature. The studies which attempted to isolate the effect of educational campaigns on speed reduction were unsuccessful at finding a direct relationship (Ewing, 1999; Leaf & Preusser, 1999). When used in conjunction with both engineering and enforcement initiatives to inform the public of the dangers of speeding, educational campaigns improved speed reduction at specific sites (Blume et al., 2000; Boulder, 2000; Newman, 2006).

Several studies outlined the various steps authorities should follow to control speeding (Blomberg & Cleven, 2006; Global Road Safety Partnership, 2008; Scott, 2003). Elvik et al. (2009) provided an extensive summary for a diverse number of speed management measures. Given the scope of this project, this literature review will focus on studies involving changes to the posted speed limit combined with speed enforcement. It is important to note changing the posted speed limit is only one of the mitigation measures to manage speed.

The effect of raising and lowering posted speed limits on driver behaviour on urban streets was examined by Parker (1997). The data was collected at sites where speed limits were either raised or lowered and at comparison sites, where no changes in the posted speed limits were made. The posted speed limits change ranged from lowering them by 5, 10, 15, or 20 mph (8, 16, 24, or 32 km/h) to raising them by 5, 10, or 15 mph (8, 16, or 24 km/h). The results suggested raising or lowering posted speed limits alone had no effect on driver travelling speeds. Changing posted speed limits alone, without additional enforcement, educational programs, or other engineering measures, was found to have a minor effect on driver behaviour.

Stuster et al. (1998) prepared a review of changing speed limits on urban roads. In general, the authors concluded speed limit changes on low and moderate speed roads had little or no effect on travel speed. This suggests drivers only travel at speeds they feel are reasonable and suitable to their driving environment regardless of the posted limit. Results from international studies suggested for every 1 km/h decrease in speed, injury collisions are reduced by 3%. However, more research is required to evaluate the net safety effect of changes in posted speed limit on a system wide basis.

Mackie (1998) reached a similar conclusion regarding the use of static posted speed signs only. These static signs were added at locations to increase speed compliance to 20 mph (32 km/h) or at sites where the speed limit was reduced from 30 mph (48 km/h) to 20 mph (32 km/h). These static signs were ineffective at reducing collisions or speeds to 20 mph (32 km/h) in urban areas. If no other engineering measures accompany the static signs, it was recommended to simultaneously use publicity and enforcement campaigns to increase awareness and compliance to the posted signs. Otherwise, travel speeds will not comply with the 20 mph (32 km/h) speed limit.

Alternatively, several studies have shown reducing the speed limit alone was sufficient to achieve safety improvements. Banawiroon and Yue (2003) evaluated the effectiveness of reducing posted speed limits alone from 60 km/h to 40 km/h. The analysis was conducted in the city of Unley, Australia, during rush hours. The new posted speed limit of 40 km/h was successful in slowing the travel speed to acceptable levels (mean travel speed of 40 km/h and 85^{th} percentile speed of 50 km/h).

Sun and Rossy (2009) investigated the effect of reducing the speed limit from 30 mph (48 km/h) to 25 mph (40 km/h) on residential streets in two neighbourhoods in the City of Columbia. The results showed speed reductions which were statistically significant and ranged from 1 mph to 6.21 mph (1.61 km/h to 10 km/h). These results support the hypothesis that significant speed reductions are attainable without additional measures. The addition of an educational campaign resulted in further but smaller reductions in travel speeds.

In 2008, Kloeden and Woolley carried out an observational study to investigate the difference in speed of vehicles traveling across 130 sites from 2007–2008. Data was collected at a number of different road types (local, collector roads with 50–60 km/h to rural roads with posted speed limits of 80–110 km/h). The collector and arterial roads exhibited a decrease in vehicle's speed after the 50 km/h posted speed limit was decreased from 60 km/h. On the contrary, the rural roads with 80 km/h and 110 km/h did not exhibit a decrease in speed. The cause behind the observed speed changes is unclear as there were no significant levels of enforcement during 2008 which might explain the change in the speeds from 2007 to 2008.

Other studies examined the impact of reduced posted speed limits on travel speed and other outcome measures such as collisions. In 2006, Kloeden et al. investigated the implications of reducing the speed limit from 60 km/h to 50 km/h on various road types (i.e., collectors, arterials) in South Australia. On roads where the speed limit was reduced from 60 km/h to 50 km/h, average vehicle speeds decreased by 3.8 km/h after 3 years and casualty collisions fell by 23%. On roads where the speed limit remained at 60 km/h, average vehicle speeds decreased by 2.1 km/h after 3 years and casualty collisions fell by 16%. However, the authors do acknowledge it is unjustifiable to attribute all of the reductions solely to the reduced speed limits.

Hoareau et al. (2006) evaluated the impact of reducing the posted speed limit on the frequency and severity of collisions involving vulnerable road users (i.e., pedestrians, cyclists, and other road users not in vehicles). The evaluation was conducted using zones (as a unit of measurement) where the speed limits were reduced to 50 km/h and compared to roads with unchanged posted speed limits of 60 km/h. The results showed a 12% reduction in casualty collision and a more successful reduction in minor injury collisions rather than fatal or severe. Due to the small number of test sites, there was no statistical significance for the 2–3 km/h reduction in the mean and 85th percentile speeds.

Grundy et al. (2007) quantified the effectiveness of 20 mph (32 km/h) zones on reducing road injuries and deaths in London. The results showed the introduction of the 20 mph zones were associated with a 41.9% reduction in road casualties after adjustment for underlying time trends. There was no evidence of casualty migration to areas adjacent to 20 mph zones, where casualties also fell slightly by an average of 8.0%.

Kamya-Lukoda (2010) investigated the effect of reducing the speed limit from 30 mph (48 km/h) to 20 mph (32 km/h) on residential roads in Portsmouth, United Kingdom. Overall, there was a statistically significant average reduction in the mean speeds on all roads of 1.3 mph (2 km/h). There was a reduction in collision of 13% and a reduction in the number of casualties of 15% although there was no statistical significance. There was insufficient information to deduce any changes in traffic volumes and routes.

Alternatively, Jurewicz (2009) estimated the impacts of substantial speed limit reductions on performance of urban arterial roads by running a micro simulation model using a product called VISSIM. These models were carried out across various states in Australia. If the speed limit in urban areas was reduced by 10 km/h, the simulation results showed a reduction in the mean speed by approximately 2.5-3.0 km/h. The travel times for those roadway segments were expected to increase but were not significant. As for traffic flow parameters, no evidence was found to support any change pending speed limit reductions. The results showed significant speed limit reductions on urban arterials operating under congested conditions are unlikely to produce appreciable safety, operational, environmental, or travel cost impacts. Collision frequency is strongly dependent on traffic volume, so speed limit reductions on low volume roads will produce low absolute collision savings.

Generally, research indicates increases in speed leads to an increase in collision severity (Renski et al. 1999). Soloman (1964) established a relationship between collision and the frequency by measuring the rate of injury and the property damage per collision, where higher speeds implied a higher cost. Pertaining to the selection of an appropriate speed limit, Shinar (1997) concluded drivers were more likely to violate speed limits well below the design limits. The speed limits should be raised to more closely reflect the design speeds to discourage drivers from exceeding the posted speed and increase compliance. Regarding speed limits, studies reached different conclusions regarding whether their reduction was sufficient to have an effect on safety without adequate enforcement or public education (Rossy et al., 2011). Although lowered speed limits seem to have a favourable effect on road safety, it is only effective if they are compatible with design speed of the road (Archer et al., 2008).

In conclusion, there seems to be some contradictory evidence regarding the impacts of changing the posted speed limit on residential roads. A number of studies have discovered changing the posted speed limit effectively reduces the traveling speed and by extension the frequency and severity of collisions. Other studies have suggested other supplementary measures should accompany posted speed limit changes to improve the speed compliance and safety of the road.

2. PROJECT PLAN

This section summarizes the project plan; specifically, the process by which the top six treated communities were selected, the communication plan, and the equipment and enforcement deployment schedules.

2.1 Community Selection

This section reports the communities' ranking and selection criteria for piloting the new residential road speed limit of 40 km/h. The community selection process started in October of 2009 and ended in February 2010.

The demographic data used in the selection process was available only at the neighbourhood level. Therefore, the analysis focused on the neighbourhood-level and at the end, an adjustment was made to represent the selected communities. Below is a brief explanation to illustrate the difference between a neighbourhood and a community. Neighbourhood boundaries are set by the City. Alternatively, the community (or Community League) boundaries are set by each individual community in consultation with the Edmonton Federation of Community Leagues. As a result, one community may include residents from multiple neighbourhoods. By October 2010, 154 community leagues had been established in the City of Edmonton in contrast to 252 neighbourhoods.

Four criteria were used to rank the neighbourhoods.

First, a collision severity number was used to weight the number of collisions by severity, i.e., fatality and injury collisions were given more importance than Property Damage Only (PDO) collisions[4]. Collision data was provided by the Edmonton Police Service through the Motor Vehicle Collisions Information System (MVCIS) which is maintained by the City of Edmonton's Office of Traffic Safety. A spatial analysis was conducted to select collision events occurring from January 2006 to December 2008 within the neighbourhood residential roads with the following assumptions:

- All collisions occurring within the boundaries of a neighbourhood were counted except collisions on arterial roads. Arterial collisions were included only if it was in close proximity (within 15 meters) to a school;
- Collisions occurring at collector/arterial intersections where the collector roadways would bring traffic into the neighbourhood were included;
- If the collision occurred on a collector road and shared boundaries with more than one neighbourhood, the collision was counted in all of the surrounding neighbourhoods;
- Collisions occurring on back alleys were excluded.

Second, the characteristics of traffic operations for each neighbourhood were assessed through the estimated Annual Average Daily Traffic (AADT) and the speed differential between the posted speed limit plus 10% (i.e., 55 km/h) and the 85th-percentile speed. A

[4] An arbitrary weight of 10 was assigned to a fatal collision, 5 to an injury collision, and 2 to a PDO collision. The sum of these weighted numbers is known as the collision severity number or the equivalent-property-damage-only (EPDO) number. For example, a community that had 260 PDO collisions, 86 injury collisions, and 1 fatal collision will have a collision severity number of 960.

worst case scenario was adopted to evaluate the sub-criterion. The highest AADT as well as the highest value of 85^{th}-percentile speed were selected whenever multiple speed surveys were available. Equal weights were assigned to the AADT and the speed differential criteria.

Third, information regarding population age groups was extracted from the 2009 City of Edmonton municipal census to assess the vulnerability level of pedestrians for each neighbourhood. Safe Kids Canada reported in 2007–2008, children 10–14 years had the highest rate of child pedestrian casualties, followed by age groups 5–9 and 0–4 (Safe Kids Canada, 2009). Furthermore, it is widely recognized children 10-14 and seniors over 60 are the two most vulnerable groups of pedestrians (Tight et al., 1989). Consequently, the population of age groups 10–14 and 60+ were given higher weights than the other age groups.

Fourth, to assess driver behaviors within the residential roads for each neighbourhood, three components were investigated. First, the number of speed complaints or speed surveys (conducted by the Transportation Department) was examined. These complaints/surveys are based on a resident's request after witnessing or feeling there were speeding issues in their neighbourhood. These speeding issues could be classified as either drivers traveling at speeds higher than the speed limit or at a speed not appropriate for prevailing conditions. To capture this aspect, speed-related complaint data from January 2009 to November 2009 and speed surveys conducted from May 2008 to July 2009 were examined. Only speed data (complaints or surveys) gathered on collector or local roads were included. Also, non-speed-related complaints, such as vehicles not paying attention in cul-de-sacs or blind curves requesting additional signs were excluded. Recommendations from the Edmonton Federation of Community Leagues (EFCL), Edmonton Public School Public Board (EPSB), and the Edmonton Catholic School Board (ECSB) were considered. Each recommendation was given a value of one; a neighbourhood which had recommendations from EFCL, EPSB, and ECSB was given a score (or weight) of 3. Third, the number of impaired driving calls occurring within each neighbourhood where at least one police unit was dispatched (but not necessarily intercepted) to respond to the call were also considered. The same spatial rules used for the collision data were applied to filter the impaired driving call data from May 2007 to October 2009. All three components were assumed to have similar weights.

A summary of the criteria used to select and rank the neighbourhoods is shown in Figure 2.1.

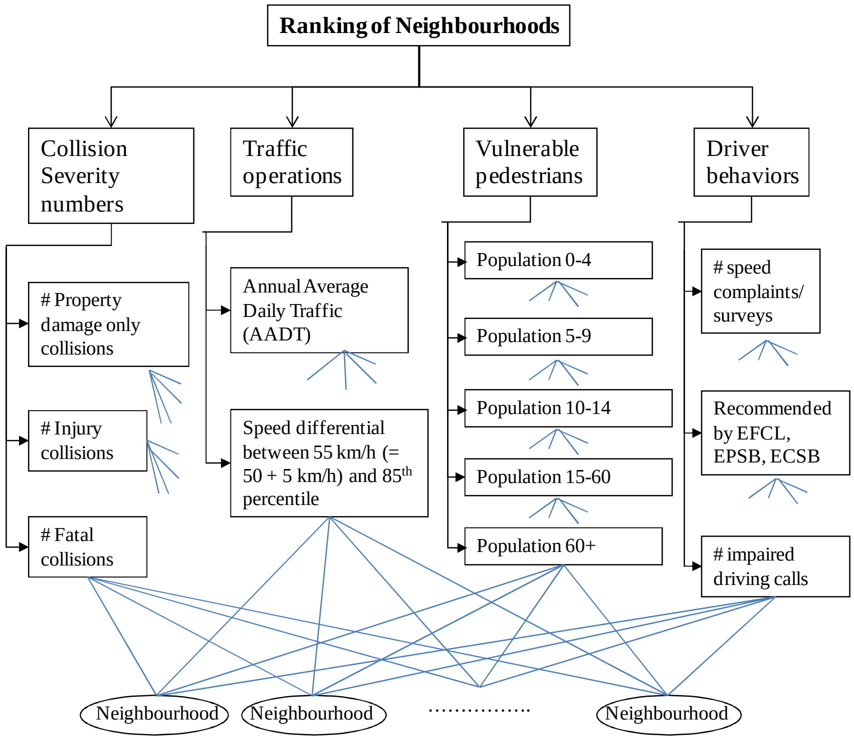


Figure 2.1 Decision Hierarchy for Ranking Neighbourhoods

To create a preliminary list of neighbourhoods, the Analytic Hierarchy Process (AHP), a well-known multi-criteria decision analysis tool, was used to identify the top 25 neighbourhoods based on the above-mentioned criteria. Additional criteria such as future and present neighbourhood road rehabilitation plans, neighbourhood development, and roadway network types were used to further scrutinize the ranked list and select the top six communities for the pilot project.

For example, neighbourhoods undergoing redevelopment or included in the future road neighbourhood rehabilitation plan were excluded from the lists. Moreover, partially or under-developed neighbourhoods were also excluded. Finally, the selection was made to allow for different neighbourhood development (i.e., 1950’s/60’s versus 1970’s/80’s) and roadway network types (i.e., grid, cul-de-sac, 3-way offset) to be included in the analysis. As such, three pairs of neighbourhoods with each pair sharing similar characteristics were considered. Also, the geographic coverage by i) the Edmonton Police Service (EPS) and ii) the census wards were also considered. The selection ensured one census ward per community.

The above criteria, along with the weights and scores, were decided by the OTS senior management staff and the Executive Director of the OTS in consultation with Dr. Khandker M. Nurul Habib, Ph.D., P.Eng., currently an Assistant Professor at the Department of Civil Engineering, University of Toronto (during the selection process, Dr. Habib was an Assistant Professor at the Department of Civil and Environmental Engineering and the School of Mining and Petroleum Engineering, University of Alberta). As a consultant, Dr. Habib provided an independent and non-biased review of the selection criteria and subsequent results.

After several meetings with EFCL and community representatives, it was decided to select six communities for the pilot instead of neighbourhoods. Figure 2.2 shows the names and locations of the six communities selected for the 40 km/h speed limit reduction pilot project. Figures 2.3 to 2.5 show a detailed map of the six treated communities based on the three clusters: old (1950's/60's), new (1970's/80's), and grid-based communities.

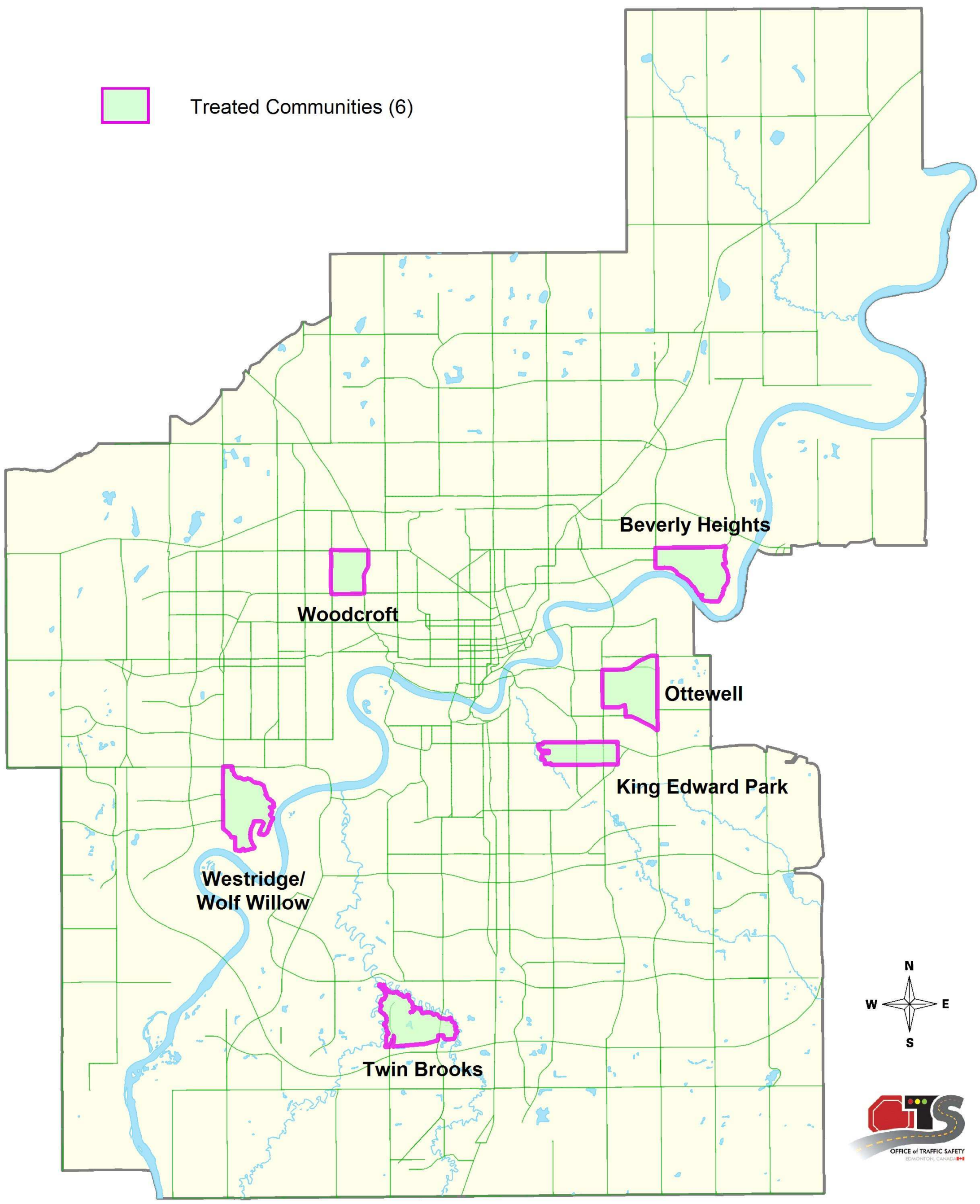


Figure 2.2 Map of the Piloted Communities

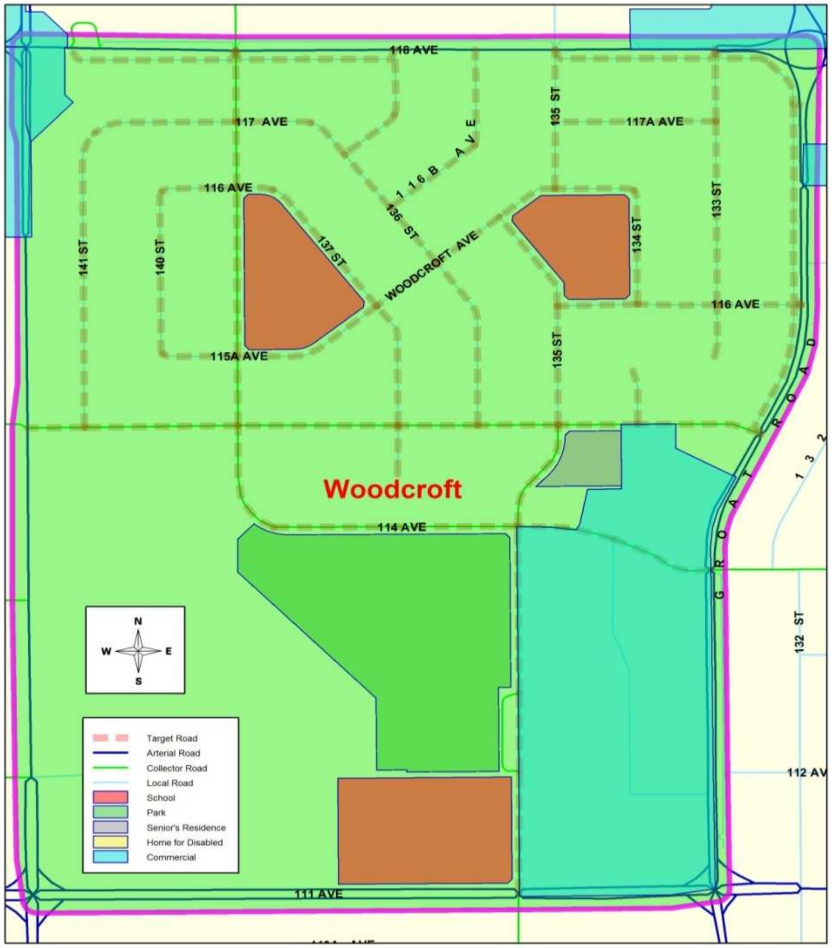


Figure 2.3 Aerial View of the Piloted Old (1950's/1960's) Communities
Left: Woodcroft
Right: Ottewell

Figure 2.4 Aerial View of the Piloted Grid-based Communities
Left: King Edward Park
Right: Beverly Heights

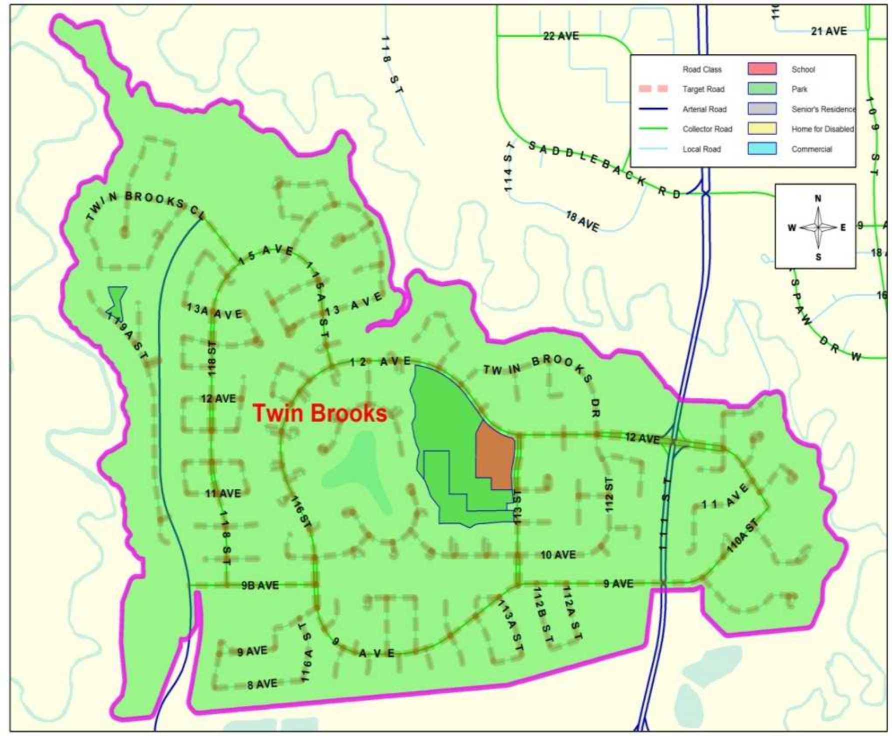


Figure 2.5 Aerial View of the Piloted New (1970's/1980's) Communities
Left: Westridge/Wolf Willow
Right: Twin Brooks

2.2 Communications Plan

A communications plan was developed to keep members of the pilot communities, Edmonton Federation of Community Leagues (EFCL) representatives, the public, and members of council informed of both the progress of the pilot project and the subsequent findings. The goal was to keep the selected communities well-engaged, to increase people's awareness of the reduced speed limits, and to increase adherence to posted speed limits in order to maintain safety and quality of life for those in residential communities.

2.2.1 Strategic Approach

The purpose of this plan was to ensure consistent messaging from all of the stakeholders. Due to the high level of interest from community groups, tax payers, the media, and motorists, a communications strategy was developed to clearly communicate:

- The progress of the pilot project;
- The results of the analysis, and;
- Subsequent recommendations to City Council.

The strategy was to proactively communicate the impacts, progress, and results:

1. At the beginning of implementation;
2. As the project progressed; and
3. At the conclusion of the project life cycle.

This approach was reassessed mid-way through the pilot project. Rather than share partial results which could be misleading, it was decided to wait until results had been finalized.

2.2.2 News Media

The speed reduction pilot was covered by local TV, print, and radio since it was proposed in October 2009.

Since then, the OTS fielded many media inquiries about the project. They continued to field media inquiries as they arose.

In addition, the OTS shared information with the media proactively:

- Prior to implementation, a news conference (February 17, 2010) was held to provide each key audience with an informed understanding of the details of the speed reduction pilot.
- A media kick-off (May 4, 2010) was held when the 40 km/h signage was installed to remind stakeholders, through the media, about the pilot project.
- A news release will also be shared when this report becomes publicly available.

For added exposure, a Road Tips article in the Edmonton Sun was scheduled for publication at the beginning of the project. In addition, an interview will be scheduled on the Edmonton This Week radio show on 630 CHED to inform the public of the findings in the spring of 2011.

2.2.3 Community Partners

The OTS worked closely with the EFCL on the project, regularly supplying them with pertinent information to share with stakeholders and to pass along to participating community leagues.

In addition, the OTS consulted with the Edmonton Public School Board and the Edmonton Catholic School Board.

The following events were held:

- As part of the 2nd International Conference on Urban Traffic Safety, on April 27, 2010 community members were invited to a community forum to discuss ways to manage residential speeding issues including the Residential Speed Reduction Pilot Project.
- The OTS and EFCL also hosted a public meeting on June 17, 2010 to provide a project update.

2.2.4 Online

The speed reduction pilot had a strong online presence, including a page on the City of Edmonton website:
http://www.edmonton.ca/transportation/roads_traffic/speed-reduction-pilot.aspx.
This page was promoted on the Transportation Branch landing page and on several web pages with related content.

Content was also shared on the City's intranet:
http://www.edmonton.ca/transportation/roads_traffic/speed-reduction-pilot.aspx.

A web video was produced to remind people about the changes in specific communities and reiterate the importance of responsible motorist habits in residential areas. This video was shared on the City's website and intranet and was also posted on the City's You Tube channel:
www.youtube.com/CityEdmonton#p/u/0/HqjUFcc8i1A.

Updates were also shared on the City's Facebook:
www.facebook.com/cityofedmonton?v=wall#!/cityofedmonton?v=wall
and Twitter accounts: twitter.com/cityofedmonton.

2.2.5 Other Communication Efforts

- A dynamic messaging sign was placed in each community to remind citizens about the speed limit change and provide any pertinent updates about the project.
- Community speed programs like Speed Watch, Neighbourhood Pace Cars, and Safe Speed Community Vans were used to educate motorists about their speeds in pilot communities.
- A citizen survey was conducted in the pilot communities by an independent third-party consultant before the project was launched. A follow-up survey was conducted after the pilot ended.
- Project information was provided to 311, the City's general information line, so operators could field citizen questions about the pilot.

2.3 Analysis Plan

A controlled "Before" and "After" experimental design was used in the analysis. This type of analysis is often the most popular design for evaluating safety-based programs. This design involves observing the outcome of interest (i.e., vehicle speeds, collision rates, violation numbers) "Before" and "After" the intervention for both the sample experimental group undergoing the program and an equivalent control group. A control group was used to minimize the unintended influence of other variables in the road network. An adjacent group of communities were also examined to consider any displacement effects. As a result, the sampling strategy and analysis distinguished three groups of communities:

- "*Treatment*" communities: six communities which participated in the pilot project and implemented the new speed limit of 40 km/h.
- "*Control*" communities: communities similar to the six treatment communities that retained the speed limit of 50 km/h. These controls were used to account for any changes occurring as a result of external factors.
- "*Adjacent*" communities: communities in close proximity to the treatment communities that retained the speed limit of 50 km/h. These adjacent communities were used to capture any displacement and/or other indirect effects.

Two types of evaluation plans were developed. The first evaluation plan was developed to estimate the impact of the pilot project on the speed and traffic patterns across the three community groups identified above (impact analysis). The second evaluation plan focused on evaluating the changes in the number and severity of collisions "Before" and "After" the reduction of the posted speed limit (outcome analysis). These two evaluations provided a detailed analysis of the effects of reducing the posted speed limits on the level of safety within the six residential communities.

However, there are a number of disclaimers or cautionary remarks which need to be stated regarding the limitations of the project. With regards to the speed and traffic analysis, the project covered a very short "Before" time period. Also, the winter season was not included either in the "Before" or in the "After" periods. With respect to the collision analysis, the "After" period was relatively short. Only 6 months of "After" data was available. A short "After" period is subject to a number of novelty issues and do not adequately represent collisions occurring during the different seasons of the year. Therefore, the results of the analysis need to be interpreted according to the project's limitations which are mostly time/data related. Notwithstanding these limitations, the findings from this report provide a wealth of information regarding the impact of reducing the posted speed limit on the level of safety within the piloted six residential communities.

2.3.1 Speed and Traffic Analysis Plan

Five types of evaluations were used to capture the outcomes of the reduced speed limit on the six treated communities.

The first evaluation focused on analyzing the global or overall effects of the pilot project. For the purpose of this evaluation, a detailed speed and traffic analysis was conducted for three distinct groups of communities (i.e., treated, control, and adjacent). To conduct

this analysis, all of the six treated communities were grouped in a single set. Similarly, all the control and adjacent communities were grouped into two separate clusters.

The second evaluation provides a thorough analysis of treated communities by type. Recall the six treated communities could be further clustered into three different types based on community development and roadway networks. The community selection process involved choosing three pairs of communities (old 1950's/60's communities, grid communities, and new 1970's/80's communities) with each pair sharing similar characteristics. A detailed speed and traffic analysis was conducted for those three different neighbourhood designs.

The third evaluation level focuses on analyzing each of the neighbourhood designs (old 1950's/60's communities, grid communities, and new 1970's/80's communities) separately. For the purpose of this evaluation, only a speed analysis was conducted. Given the project's submission deadline, the time available for the analytical work was very short and did not allow for a more disaggregate analysis.

Figure 2.6 shows the location of the treated, control, and adjacent communities selected for the speed and traffic analysis. Table 2.1 lists the three community classifications (also referred to as types) and their corresponding information. A note on terminology; community groups will be used to refer to the treated, control, and adjacent communities. Alternatively, neighbourhood designs is used to distinguish between the three community classifications i.e., new, old, and grid-based communities.

To conduct the analysis, the data set was analyzed by community group, streets within each community, month of the year, "Before" and "After" conditions, days of the week, and times of the day.

- *Communities*: the pilot project included a total of 11 communities and they were divided into three categories:
    - 6 Treated Communities (Speeds reduced from 50 to 40 km/h);
    - 3 Control Communities (with no speed reduction; speed limit 50 km/h);
    - 2 Adjacent Communities (very close to the treated communities with no speed reduction; speed limit 50 km/h).
- *Streets*: within each community, speed surveys were conducted on a number of locations. For each community the number of locations ranged from 7 to 23.
- *Month*: 7 months of data were collected. April (baseline), May, June, July, August, September, and October.
- *"Before" and "After" conditions*: there were two time periods representing the "Before" and "After" conditions:
    - Before (April)
    - After (May to October)
- *Day of Week*: the days of the week were grouped into two categories:
    - Weekday;
    - Weekends.
- *Time of Day*: was grouped into three categories:
    - AM Peak: 7–9 am;
    - PM Peak: 4–6 pm;
    - Off Peak: all other time periods.

The following factors were considered:

- *Fixed factors*: community, month, day of week, and time of day;
- *Random factors*: streets within communities;
- *Exposure factors:* number of vehicles.

The analysis of the mean speed and 85th percentile speed involved:

1. Providing a summary of means and plots;
2. Conducting a Mixed Analysis of Variance (ANOVA) analysis. Since the fixed effects of treatment and time (whether it is a month, day, or "Before" and "After" periods) were mixed with the random speed variation along with the random variation among sites selected within each community, a mixed ANOVA model was used to analyze the operating speed data. For each interaction a table of means, plot, and comments was provided.

The analysis of the number of recorded vehicles involved:

1. Providing a summary of means and plots;
2. Conducting a Negative Binomial Regression analysis for the number of recorded vehicles. Vehicle counts were assumed to follow a Poisson distribution and the Negative Binomial is used to account for extra-Poisson variation (just in case one exists). The Negative Binomial regression was done to assess the significance among communities and the various time periods, as well as their respective interactions.
3. A Negative Binomial model was fitted linking the natural logarithm of the number of recorded vehicles to various covariates representing treatment, time, and their interactions. A detailed report of regression coefficients, *t*-tests/*p*-values statistics, and goodness-of-fit measures was presented.

The analysis of the percent compliance and proportion of vehicles tailgating involved:

1. Providing a summary of means and plots;
2. Conducting a Logistic Regression Analysis of the percent of vehicles in compliance with the posted speed limit and the proportion of vehicles tailgating. The results of the Logistic Regression are interpreted using the Odds Ratio. A detailed report of regression coefficients, *p*-values, odds ratios, and goodness-of-fit measures was presented**.**

Table 2.1 Summary of Community Group and Classification

Neighbourhood Design	**Group**	**Community League**
Old (1950's/1960's) Communities	Treated	Ottewell
		Woodcroft
	Adjacent	Dovercourt
	Control	Delwood
Grid-based Communities	Treated	King Edward Park
		Beverly Heights
	Adjacent	Hazeldean
	Control	Forest/Terrace Heights
New (1970's/1980's) Communities	Treated	Twin Brooks
		Westridge/Wolf Willow
	Control	Brintnell

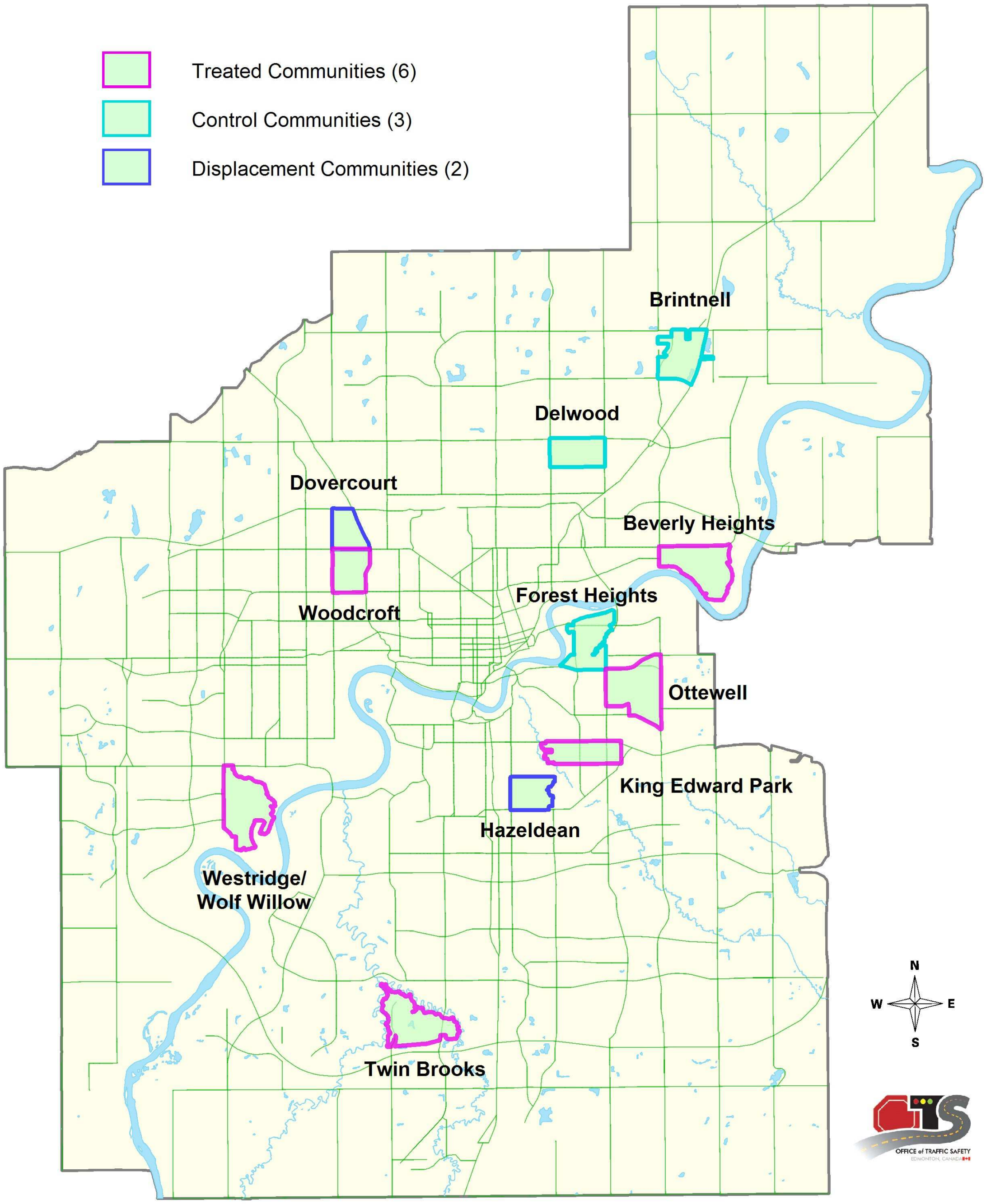


Figure 2.6 Map Showing the Location of the Community Groups Selected for the Speed and Traffic Analysis

2.3.2 Collision Analysis Plan

An impact evaluation was conducted to determine the effects of the pilot project on the frequency and severity of collisions within the treated communities.

Under the pilot project, a group of $N_T=6$ communities were selected for treatment within a before-after experiment. Each treated community was matched with a comparison group of communities satisfying the proximity conditions indicated in the safety literature. The treated communities were matched with $N_C=6$ comparison groups comprising 37 communities. The comparison groups range in size from 6 to 7 communities. The sample size is $n = 43$ intersections. Tables 2.2 to 2.7 summarize the results of the matching process for each of the six piloted communities. Figure 2.7 shows the location of the treated and control communities selected for the collision analysis. Note: the collision analysis did not investigate the impacts of the pilot project on adjacent communities.

Since the number of collisions occurring on residential roads was relatively small, the analysis was conducted on the community level by aggregating (or summing) all of the collisions occurring on local or collector roads within the boundaries of each community. The aggregation addresses several modeling issues which would arise if the analysis was limited to a smaller unit of measurement (i.e., road segment or intersection). Because of the short after period and the small number of collisions, the analysis only considered changes in the total number of collisions and did not separate out individual collision types.

Monthly data on collision counts by severity levels were collected for the period January 2006 to October 2010. The new reduced speed limit was enforced in May 2010. Thus, whereas the before period is adequate, the after period is rather short for proper evaluation (besides it also excludes the winter months). Typically, this period is subject to a number of confounding factors such as the novelty issues. Nevertheless, these initial estimates were useful to provide a general sense of the pilot project's impact on collision frequency and severity. The $K=2$ severity levels were severe (all fatal and injury) and Property Damage Only (PDO).

The evaluation methodology was based on the Hierarchical 'full' Bayesian approach to collision intervention modeling. The application of the full Bayesian approach in controlled "Before" and "After" studies has been proposed and extensively investigated in the safety literature (Aul & Davis 2006; Carriquiry & Pawlovich, 2005; El-Basyouny & Sayed, 2010, 2011; Lan et al., 2009; Li et al., 2008; Park et al., 2010; Pawlovich et al., 2006; Persaud et al., 2009; Yanmaz-Tuzel & Ozbay, 2010). The methodology has several advantages over the traditional approaches since: (a) it requires less data; (b) it better accounts for uncertainty in the data (including model parameters); (c) it provides more detailed inference (credible intervals and parameter distributions); (d) it adds more flexibility in selecting collision distributions, such as Poisson-Gamma and Poisson-Lognormal; (e) when formulated hierarchically, the models allow inference at more than one level (i.e., at the community level, at the treatment group level) and (f) it efficiently integrates the estimation of the safety performance function (SPF) and treatment effects in a single step, whereas these are separate tasks in the traditional approaches.

Given the above advantages, a time-series intervention model was developed based on the work by El-Basyouny and Sayed (2011) and Li et al. (2008), where a Hierarchical

(full) Bayesian approach was proposed to conduct a “Before” and “After” safety evaluation with matched controls. The intervention model was developed using the Poisson-Lognormal distribution which accounts for the randomness and overdispersion typically available in collision data. The model was extended to account for the bivariate nature of the collision data, since for each community collisions were available by two severity levels (i.e., severe collisions and Property Damage Only {PDO} collisions). The model was further extended to account for seasonal variation (winter, spring, summer and fall) as well as to account for the treated-control matching process.

The Univariate Poisson Lognormal Intervention Seasonal (PLNIS) Model

Let Y_{it} denote the collision count observed at community *i* (*i = 1, 2, …, n*) during month *t* (*t = 1,2, …, m=58*). For each collision count, a *Poisson Lognormal Intervention Seasonal* model is used to address over-dispersion for unobserved or unmeasured heterogeneity. According to this model, it is assumed that

$$Y_{it} \sim Poisson(\theta_{it}), \qquad (1)$$

$$ln(\theta_{it}) = ln(\mu_{it}) + \varepsilon_i, \qquad (2)$$

$$ln(\mu_{it}) = \beta_o + \beta_1 T_i + \beta_2 t + \beta_3 (t - t_{0i}) I_{it} + \beta_4 T_i t + \beta_5 T_i (t - t_{0i}) I_{it} + \alpha_1 X_{1t} + \alpha_2 X_{2t} + \alpha_3 X_{3t}, \qquad (3)$$

$$\varepsilon_i \sim N(0, \sigma^2), \qquad (4)$$

where T_i is a treatment indicator (equals 1 for treated communities, zero for comparison communities), t_{0i} is the intervention date for the i^{th} treated community and its matching comparison group, I_{it} is a time indicator (equals 1 in the after period, zero in the before period), (X_{1t}, X_{2t}, X_{3t}) are smoothly evolving and periodic variables used to represent seasonal effects on collisions as defined below, ($ß_0,…,ß_5,\alpha_1\ \alpha_2,\alpha_3$) are the regression coefficients and σ^2 represents the extra-Poisson variation. To represent the seasonality effects, let

S_t = 1 if *t* is a winter month (December, January and February),
= 2 if *t* is a spring month (March, April and May),
= 3 if *t* is a summer month (June, July and August),
= 4 if *t* is a fall month (September, October and November),

and define $X_{1t} = \cos(2\pi S_t/4)$, $X_{2t} = \cos(4\pi S_t/4)$ and $X_{3t} = \sin(2\pi S_t/4)$.

In Equation (3), the parameter $ß_1$ represents the countermeasures effect (the difference in log collision count between treated and comparison communities), $ß_2$ represents a linear time trend, $ß_3$ represents the slope due to the intervention, $ß_4$ and $ß_5$ allow for different time trends and different intervention slopes across the treated and comparison communities, whereas the remaining regression coefficients represent the seasonality effects on log collision counts.

The Multivariate Poisson Lognormal Intervention Seasonal (MVPLNIS) Model

For a collision count of severity level *k* (*k = 1, 2, …, K)*, let Y_{it}^{k} denote the observed count at community *i* during month *t*. Under the *Multivariate Poisson Lognormal Intervention Seasonal* model, equations (1)–(3) remain the same except for adding the superscript *k*

to indicate the collision severity level. However, in order to account for the correlations among collision counts of different severity levels at community *i*, it is now assumed

$$\varepsilon_i = (\varepsilon_i^1, \varepsilon_i^2, ..., \varepsilon_i^K) \sim N_K(0, \Sigma), \quad (5)$$

where Σ is a covariance matrix (the diagonal element σ_{kk} represents the variance of ε_i^k, whereas the off-diagonal element σ_{jk} represents the covariance of ε_i^j and ε_i^k).

The MVPLNIS Model with Random Parameters among Pairs

Since the matched comparison communities were selected to be as similar to treatment communities as possible, this may induce a correlation in collision count between communities within comparison-treatment pairs (Li et al., 2008). To account for this correlation, suppose the i^{th} community belongs to the pair $p(i) \in \{1,2,..., N_C\}$. The variation due to the comparison-treatment pairing can be represented by allowing the regression coefficients $(\beta_0, ..., \beta_5)$ in Equation (3) to vary randomly from one pair to another. Thus,

$$ln(\mu_{it}) = \beta_{p(i),o} + \beta_{p(i),1} T_i + \beta_{p(i),2} t + \beta_{p(i),3}(t - t_{0i}) I_{it} + \beta_{p(i),4} T_i t + \beta_{p(i),5} T_i (t - t_{0i}) I_{it} + \alpha_1 X_{1t} + \alpha_2 X_{2t} + \alpha_3 X_{3t}, \quad (6)$$

and

$$\beta_{p(i),j} \sim N(\beta_j, \sigma_j^2), \quad j = 0, 1, ..., 5. \quad (7)$$

The random parameters *Poisson Lognormal Intervention* model is given by equations (1)–(2), (6)–(7) and (4), whereas the random parameters *Multivariate Poisson Lognormal Intervention* model is given by (1)–(2), (6)–(7), with an added superscript *k* and (5). Further, these models permit a pair-level inference, using Equation (6) and an overall-level inference using Equation (3).

It should be noted Equation (5) holds for *=1,2,…n*, whereas equations (6)–(7) hold for *p(i)* Є {*1,2,…,*N_C}. This ensures the identifiability the random parameters in *Multivariate Poisson Lognormal Intervention* model with respect to the two multivariate normal structures for the random effects as well as the coefficients.

Interpretation of the Seasonal Variables

The interpretation of the seasonal variables (X_{1t}, X_{2t}, X_{3t}) follows directly from the contrasts presented below.

Season	**Winter**	**Spring**	**Summer**	**Fall**	**Contrast**
S_t	1	2	3	4	
X_{1t}	0	-1	0	1	Fall - Spring
X_{2t}	-1	1	-1	1	(Spring + Fall) - (Winter + Summer)
X_{3t}	1	0	-1	0	Winter - Summer

Table 2.2 Summary of the Community Groups for Ottewell

Community Group	Community	
Treated	Ottewell	
Control	Capilano	Forest/Terrace Heights
	Fulton Place	Holyrood
	Gold Bar	Kenilworth

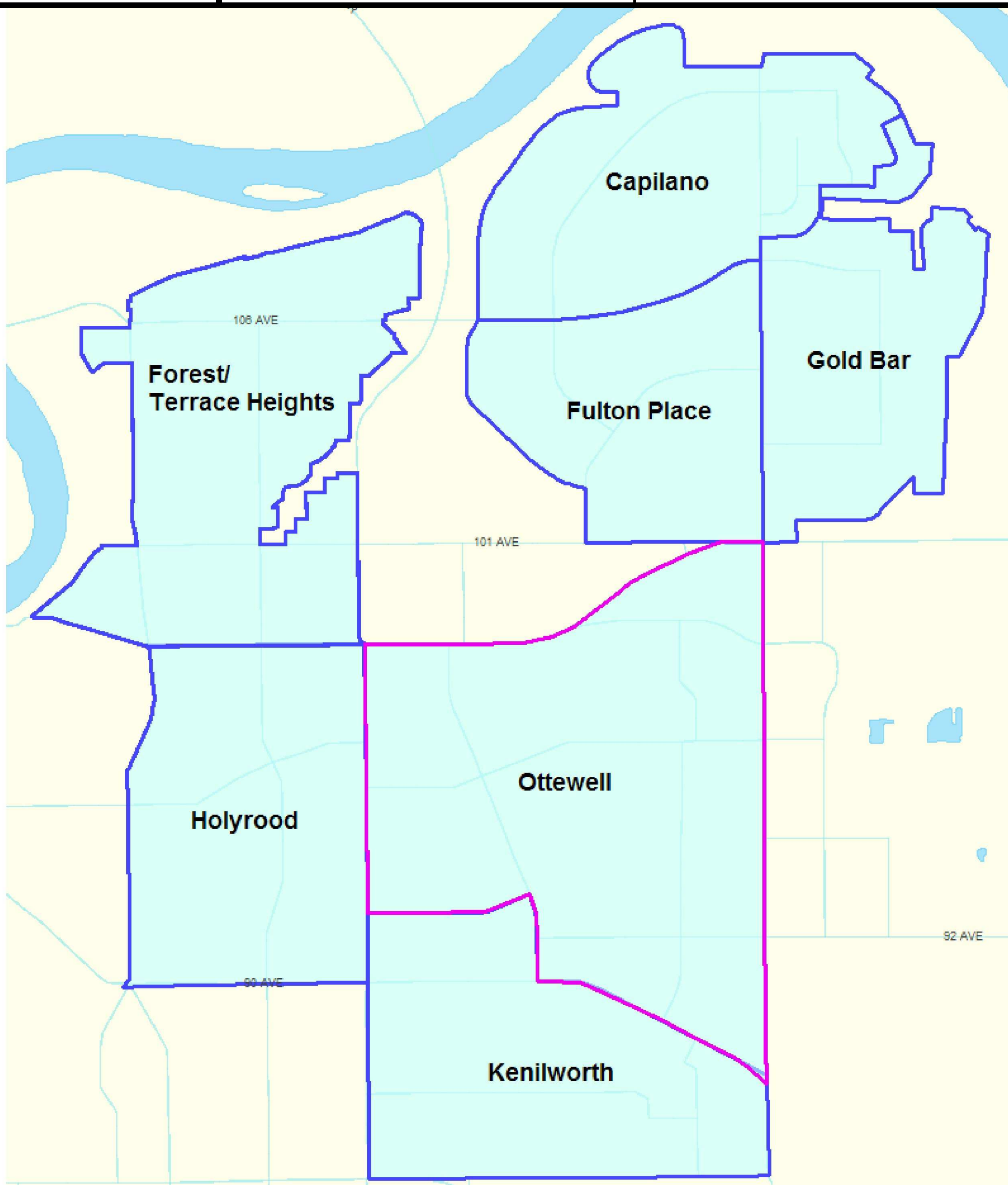


Table 2.3 Summary of the Community Groups for Woodcroft

Community Group	Community	
Treated	Woodcroft	
Control	Dovercourt	McQueen
	Inglewood	North Glenora
	High Park	Westmount

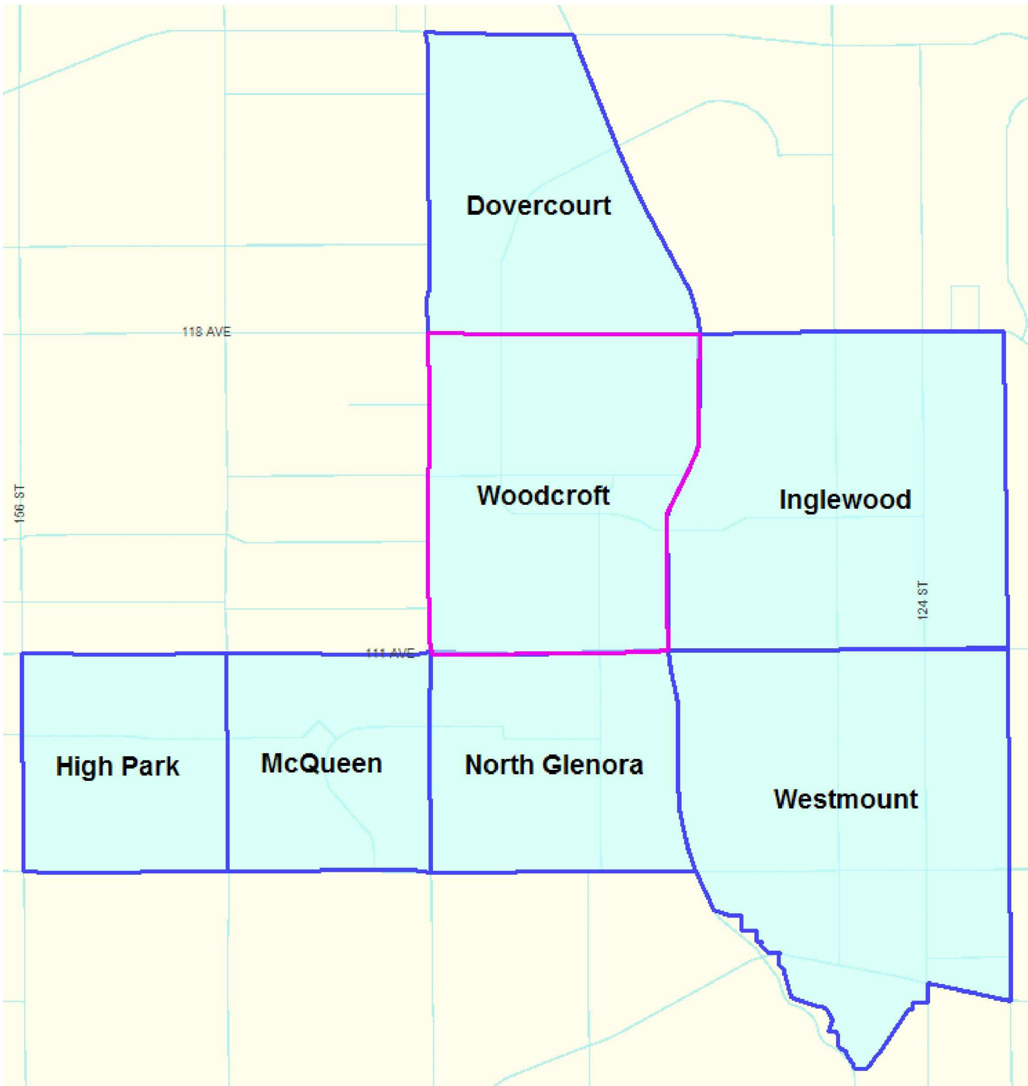


Table 2.4 Summary of the Community Groups for King Edward Park

Community Group	Community	
Treated	King Edward Park	
Control	Bonnie Doon	Idylwylde
	Ritchie	Avonmore
	Hazeldean	Argyll

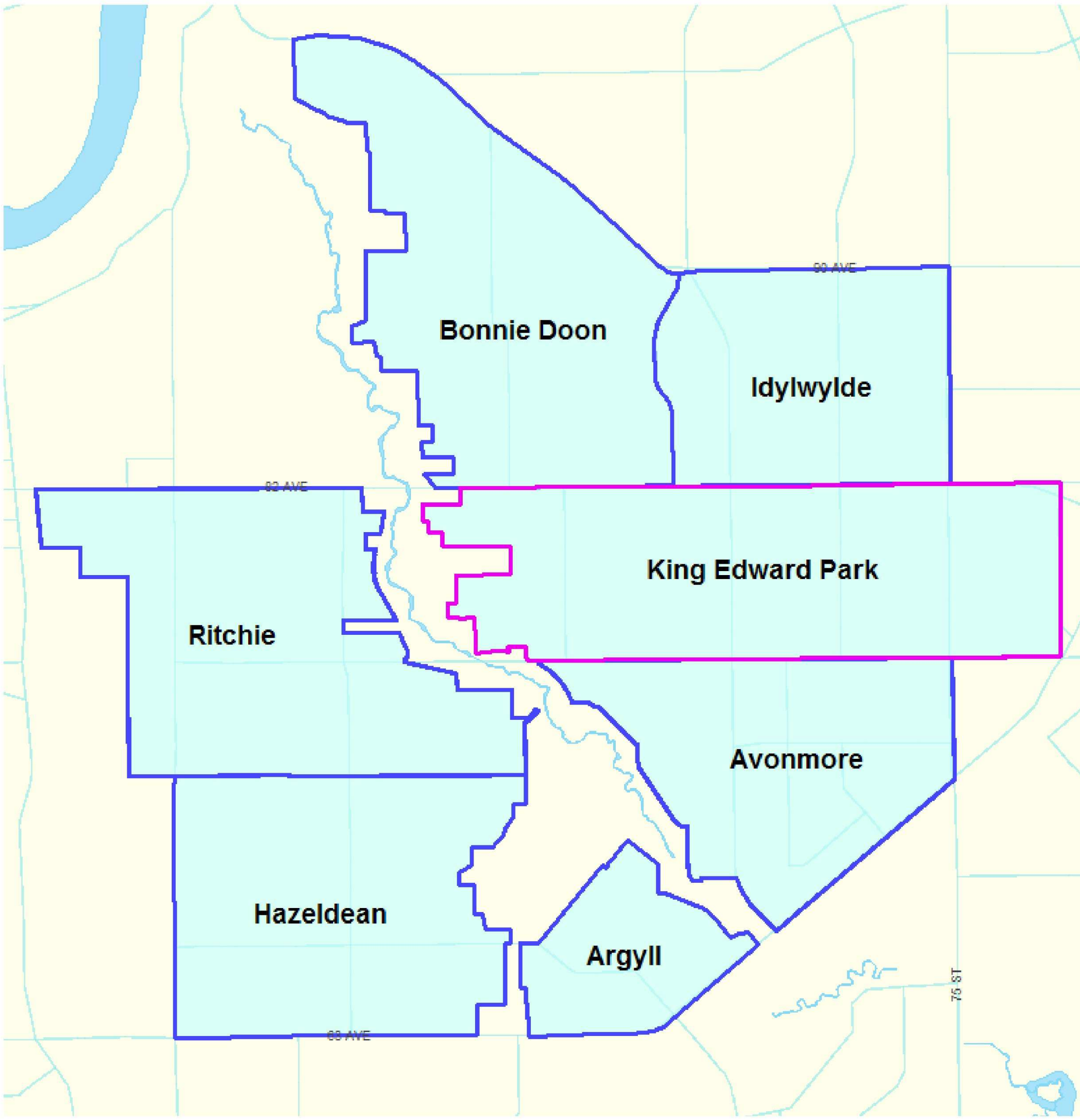


Table 2.5 Summary of the Community Groups for Beverly Heights

Community Group	Community	
Treated	Beverly Heights	
Control	Brintnell	Highlands and District
	Delwood	Beacon Heights
	Montrose	Homesteader
	Newton	

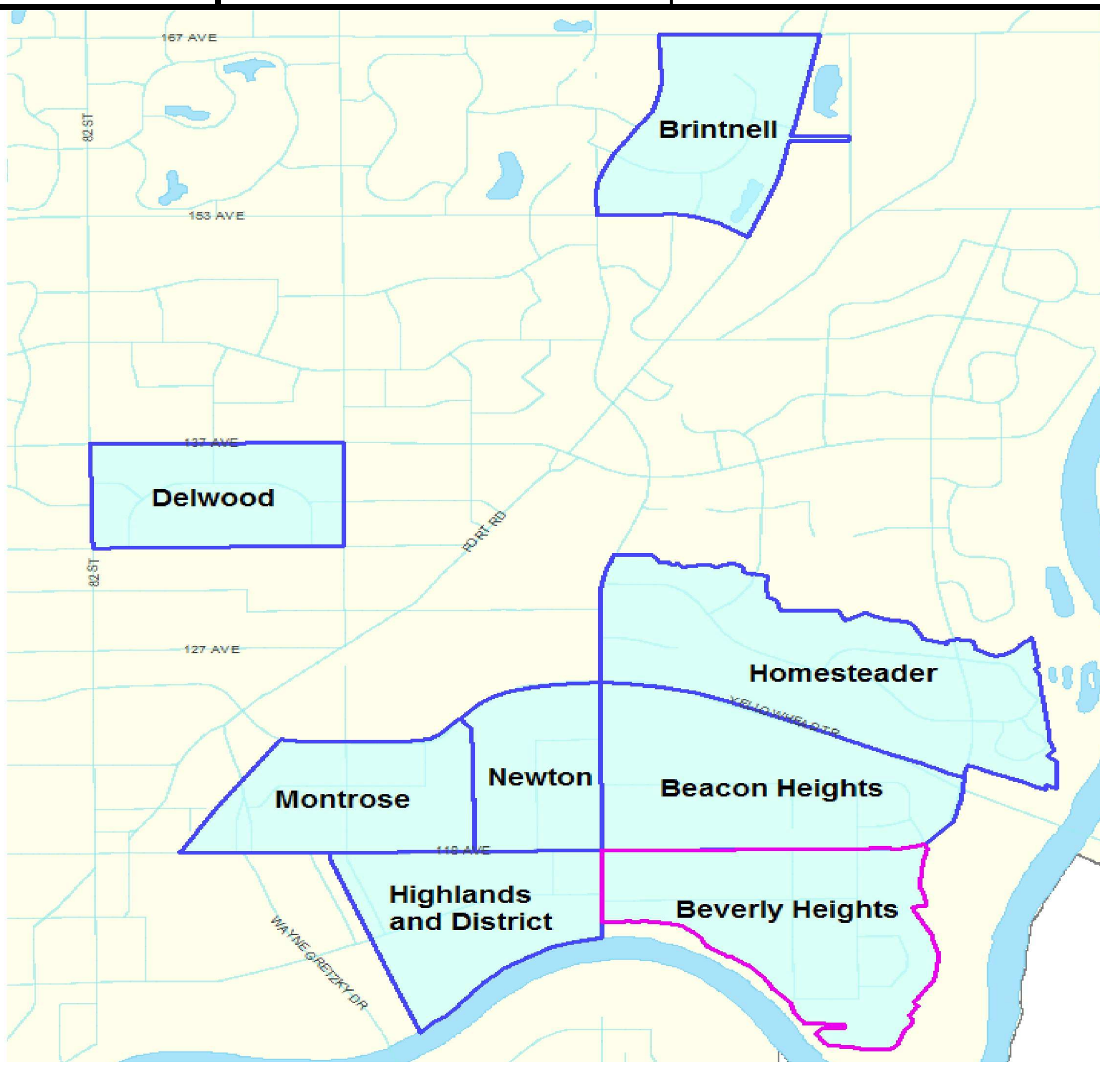


Table 2.6 Summary of the Community Groups for Twin Brooks

Community Group	Community	
Treated	Twin Brooks	
Control	Aspen Gardens	Blue Quill
	Ogilvie Ridge	Ermineskin
	Hodgson	Yellowbird (East)

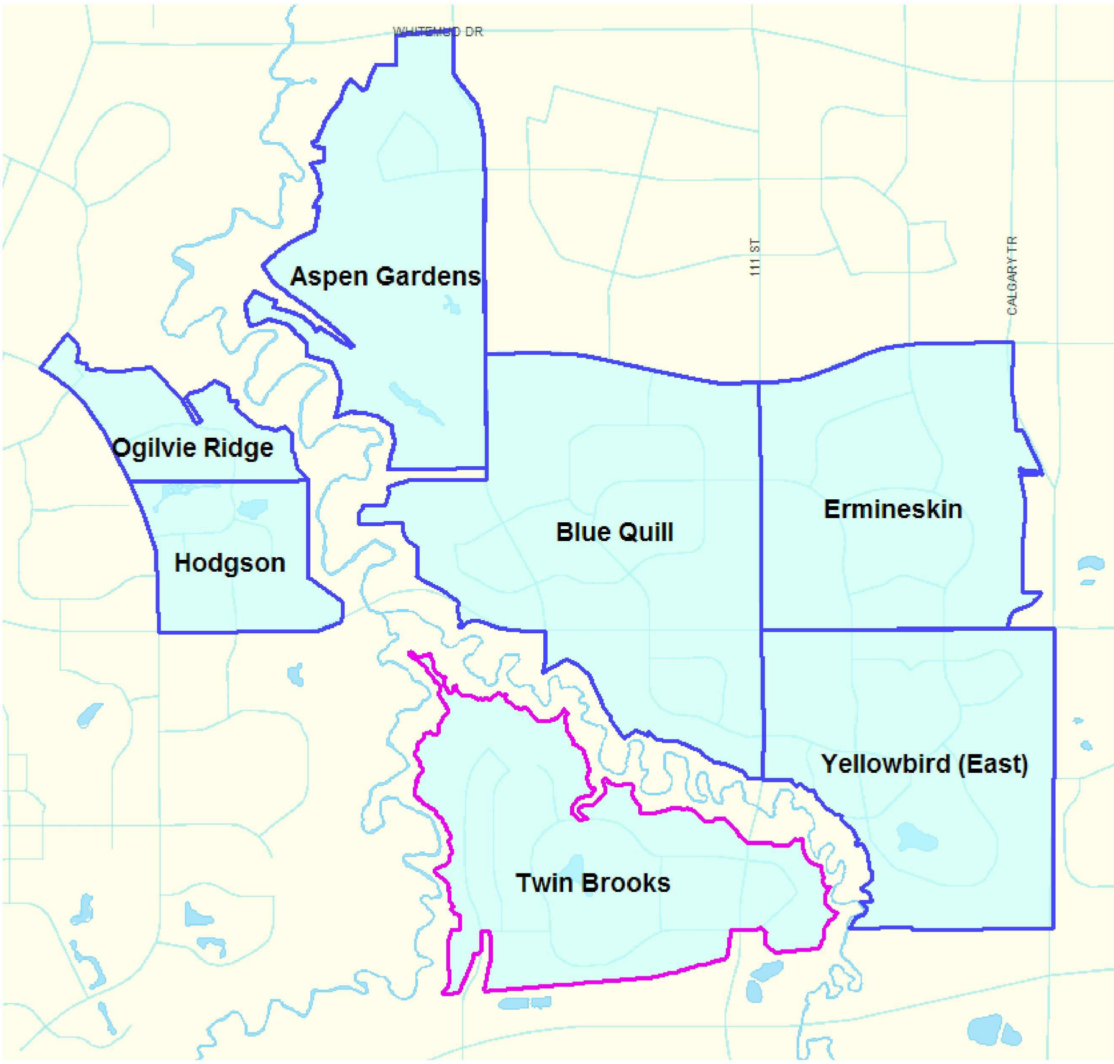
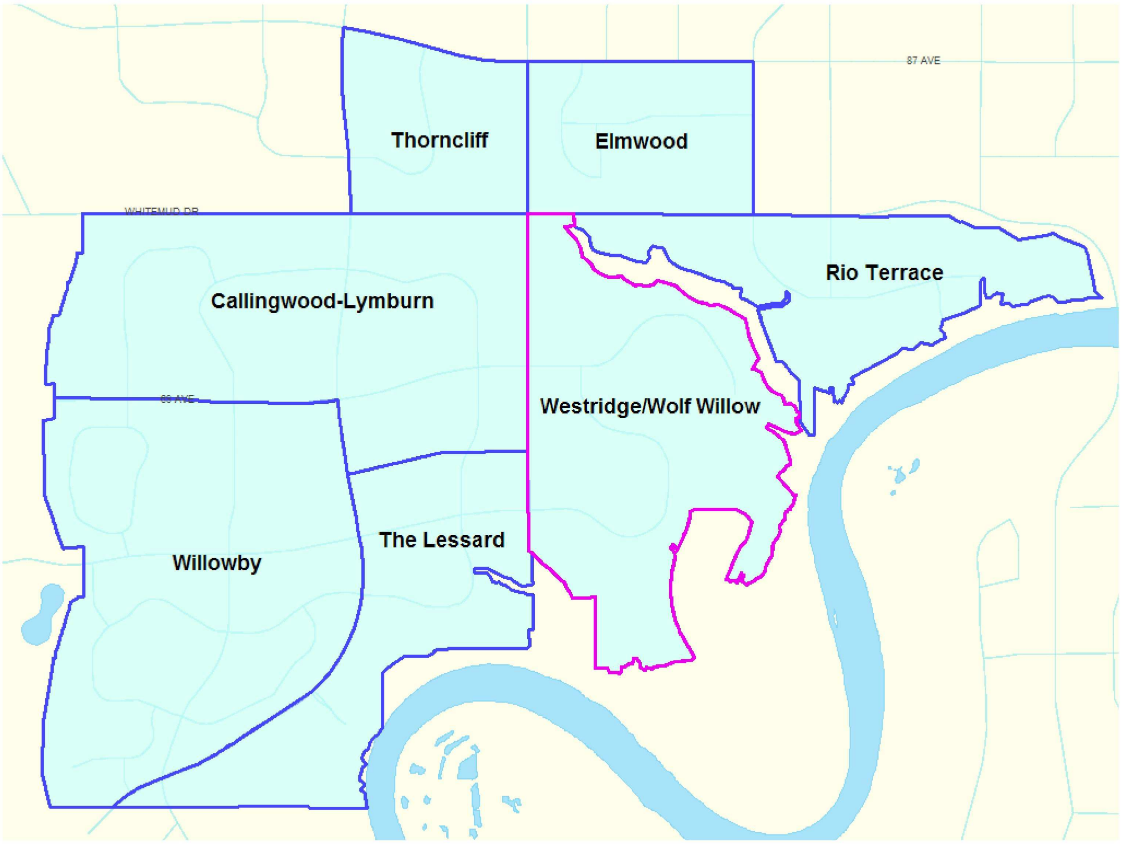


Table 2.7 Summary of the Community Groups for Westridge/Wolf Willow

Community Group	Community	
Treated	Westridge/Wolf Willow	
Control	Thorncliff	The Lessard
	Callingwood-Lymburn	Elmwood
	Willowby	Rio Terrace



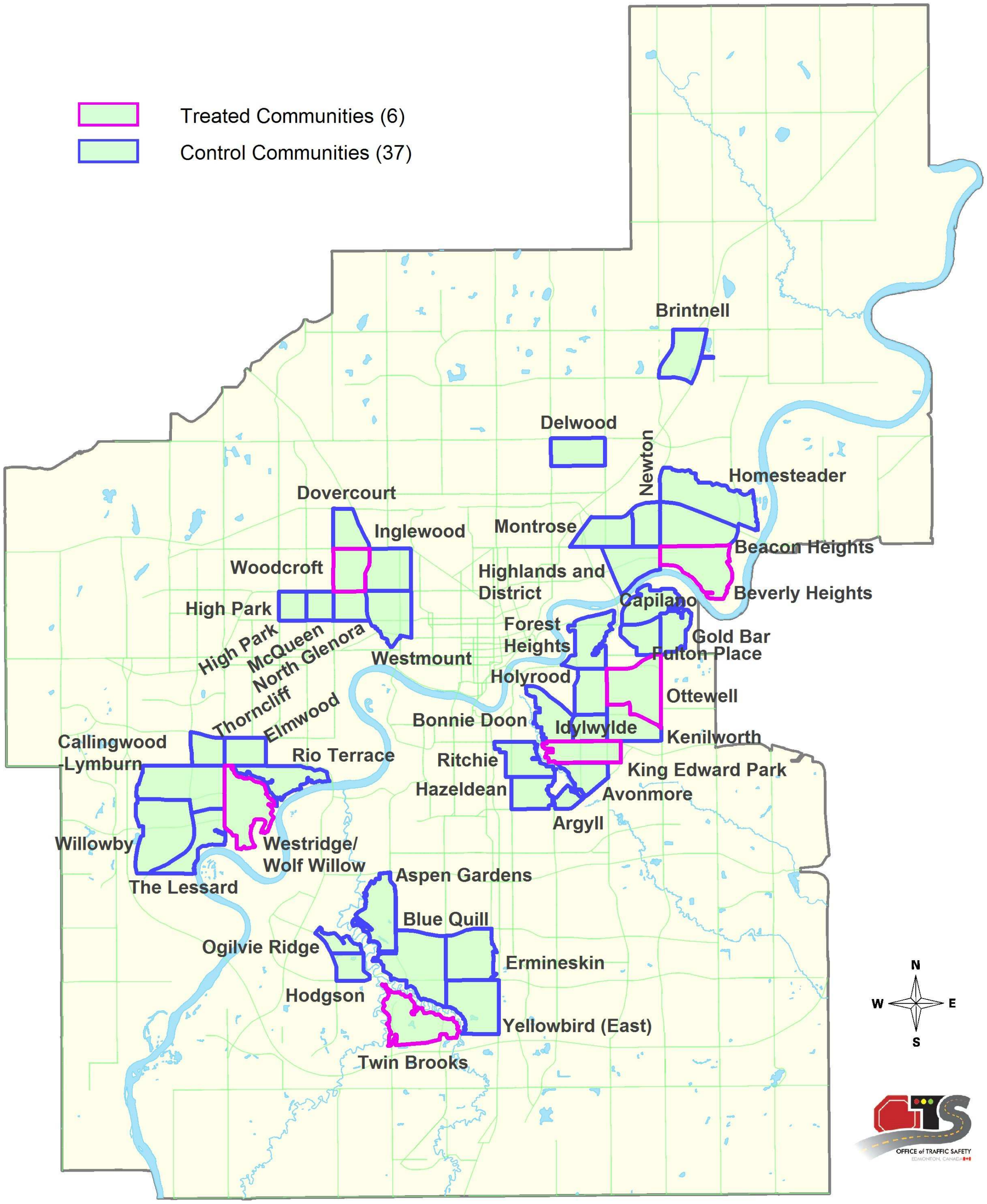


Figure 2.7 Map Showing the Location of the Community Groups Selected for the Collision Analysis

2.4 Implementation: Signage, Equipment, and Enforcement Deployment

2.4.1 Signage, Speed Display Boards, Dynamic Messaging Signs, and School Dolly

A variety of signs and equipment were utilized during the course of the pilot project. A total of 1,100 speed limit signs were installed in the pilot communities to inform motorists about the new 40 km/h speed limit (Figure 2.8).

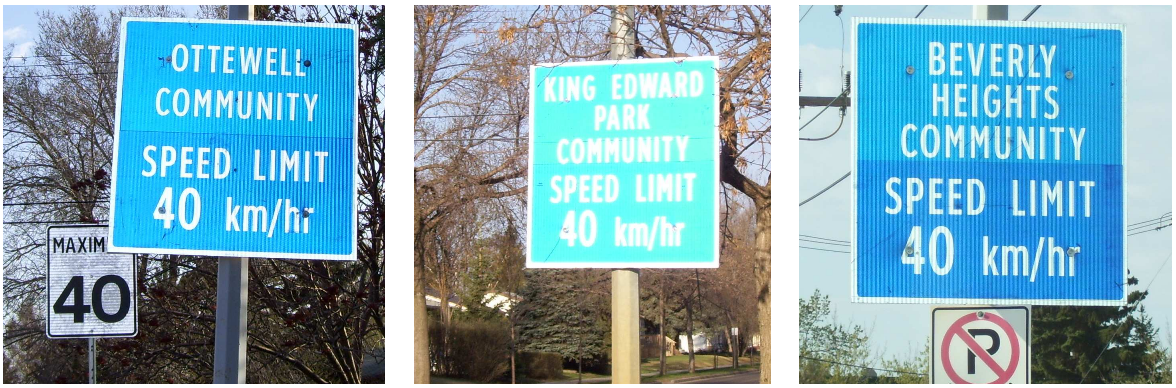


Figure 2.8 Images of the New Speed Limit Signage

Alternatively, Speed Display Boards or Speed Trailers (Figure 2.9) were used to remind drivers of their driving speeds. Speed Display Boards are mounted on a trailer and equipped with radar speed detectors and an LED display. The boards are capable of detecting the approaching speed of a vehicle and displaying it back to the driver.

Figure 2.9 Images of the Speed Display Boards

Several Dynamic Messaging Signs were also used to convey certain messages about the pilot project, see for example Figure 2.10. This family of signs can change the message they display to reflect conditions or inform motorists of important information.

Figure 2.10 Images of the Dynamic Messaging Signs

A school dolly is used to convey the traveling speed as well as the speed limit to the drivers. The dollies are typically administered by schools within each community. As seen in Figure 2.11, a School Dolly is a portable, low cost radar speed display sign. The dollies are designed for easy positioning in areas where speeding is a concern. Children are easily seen around the sign's tubular frame design, while the wide base is built to withstand adverse weather conditions. This dolly is mounted with an LED radar display which is easy to read at a glance.

Figure 2.11 Images of the School Dolly

Tables 2.8 to 2.13 summarize the equipment deployment dates for each of the six treated communities.

2.4.2 Speed Watch and Pace Car

Two speed management programs were implemented to monitor and manage speeds within the six treated communities. These two programs are community-based initiatives which aim at addressing traffic and, more importantly, speeding problems.

The Speed Watch program was initiated by the Edmonton Police Service North Division in spring of 2009. Speed Watch is a collaborative project between the Edmonton Police Service and the City of Edmonton Office of Traffic Safety and community volunteers. This program is a community-driven traffic safety program aiming to raise public

awareness with regard to vehicles speeding through neighbourhoods, schools zones, and playground zones. For the participating communities, a guideline on the proper implementation procedure is available on the City's website. Generally, Speed Watch volunteers are trained by Police, or qualified operators, on how to run a Speed Watch site. On-site, the volunteers use portable radar equipment and an electronic digital board to show drivers how fast vehicles are travelling. Volunteers record all vehicles travelling through the Speed Watch site. In addition, they record the license plate number of vehicles exceeding the speed limit by 10 km/h. This information is recorded on a Speed Watch License Plate Recording form. Figure 2.12 shows images of the equipment typically used by the volunteers administering the Speed Watch program.

Figure 2.12 On-site Images of the Speed Watch Equipment

Another community-based speed management program administered by the Office of Traffic Safety is the Neighbourhood Pace Car program. This educational program is easy and simple to implement. Basically, residents sign the Pace Car Supporter's Pledge and display the official Pace Car emblems (Figure 2.13) on their cars. By being part of the program, residents are committed to driving at the posted speed limit making their vehicles a mobile speed bump, slowing speeding traffic, and calming traffic not only on one street but throughout the neighbourhood.

Figure 2.13 Images of the Neighbourhood Pace Car Emblems

Tables 2.8 to 2.13 summarize the speed management programs' implementation dates for each of the six treated communities.

Table 2.8 Equipment and Program Deployment Dates in Beverly Heights

Date Range	Dynamic Message Signs	Speed Display Boards	Pace Car	Speed Watch	School Dolly
3 May-17 May	34 St & 117 Av				
17 May-31 May	34 St & 117 Av	34 St & 116 Av	Introduce	Introduce	38 St & 114 Av
31 May-14 Jun	34 St & 117 Av	114 Av & 44 St (WB)	Continue	Continue	34 St & 109 Av
14 Jun-28 Jun	34 St & 117 Av	111 Av & 38 St (SB)	Continue	Continue	40 St & 116 Av
28 Jun-11 Jul	34 St & 117 Av	34 St & 114 Av	Continue	Continue	Remove
11 Jul-31 Jul	34 St & 117 Av	Not Activated	None	None	N/A
1 Aug-30 Aug	34 St & 117 Av	Ada Bl & 108 Av	Continue	Continue	N/A
30 Aug-30 Sep	34 St & 117 Av	34 St & 109 Av	Continue	Continue	38 St & 116 Av
30 Sep-31 Oct	34 St & 117 Av	114 Av & 38 St	Continue	Continue	34 St & 110 Av

Table 2.9 Equipment and Program Deployment Dates in Woodcroft

Date Range	Dynamic Message Signs	Speed Display Boards	Pace Car	Speed Watch	School Dolly
3 May-17 May	139 St & 115 Av				
17 May-31 May	139 St & 115 Av	115 Av & 134 St (WB)	Introduce	Introduce	139 St & 116 Av
31 May-14 Jun	139 St & 115 Av	115 Av & 141 St (EB)	Continue	Continue	134 St & 116 Av
14 Jun-28 Jun	139 St & 115 Av	139 St & 117 Av (SB)	Continue	Continue	139 St & 116 Av
28 Jun-11 Jul	139 St & 115 Av	114 Av & 137 St	Continue	Continue	Remove
11 Jul-31 Jul	139 St & 115 Av	Not Activated	None	None	N/A
1 Aug-30 Aug	139 St & 115 Av	136 St & Woodcroft Rd (NB)	Continue	Continue	N/A
30 Aug-30 Sep	139 St & 115 Av	115 Av EO 135 St (WB)	Continue	Continue	134 St & 116 Av
30 Sep-31 Oct	139 St & 115 Av	115 Av & 141 St (EB)	Continue	Continue	139 St & 116 Av

Table 2.10 Equipment and Program Deployment Dates in Westridge/Wolf Wollow

Date Range	Dynamic Message Signs	Speed Display Boards	Pace Car	Speed Watch	School Dolly
3 May-17 May	Wolf Willow Rd & Wanyandi Rd				
17 May-31 May	Wolf Willow Rd & Wanyandi Rd	Wolf Willow Rd & Westridge Rd (EB)	Introduce	Introduce	N/A
31 May-14 Jun	Wolf Willow Rd & Wanyandi Rd	Wanyandi Rd (SB) by Walker Rd	Continue	Continue	N/A
14 Jun-28 Jun	Wolf Willow Rd & Wanyandi Rd	Wanyandi Rd & Wanyandi Way (NB)	Continue	Continue	N/A
28 Jun-11 Jul	Wolf Willow Rd & Wanyandi Rd	Wolf Willow Rd & Westridge Rd (WB)	Continue	Continue	N/A
11 Jul-31 Jul	Wolf Willow Rd & Wanyandi Rd	Not Activated	None	None	N/A
1 Aug-30 Aug	Wolf Willow Rd & Wanyandi Rd	South end of Wanyandi Rd & Walker Rd (SB)	Continue	Continue	N/A
30 Aug-30 Sep	Wolf Willow Rd & Wanyandi Rd	Wanyandi Rd & South end of Wakina Dr (SB)	Continue	Continue	N/A
30 Sep-31 Oct	Wolf Willow Rd & Wanyandi Rd	Wanyandi Rd & Wanyandi Way (SB)	Continue	Continue	N/A

Table 2.11 Equipment and Program Deployment Dates in Ottewell

Date Range	Dynamic Message Signs	Speed Display Boards	Pace Car	Speed Watch	School Dolly
3 May-17 May	71 St & 98 Av				
17 May-31 May	71 St & 98 Av	Ottewell Rd & 93A Av (NB)	Introduce	Introduce	94 Ave & 73 St
31 May-14 Jun	71 St & 98 Av	57 St SO 97A Av (SB)	Continue	Continue	96A Av & 74 St
14 Jun-28 Jun	71 St & 98 Av	Ottewell Rd & 96A Av (SB)	Continue	Continue	58 St & 93A Av
28 Jun-11 Jul	71 St & 98 Av	92 Av & 62 St (EB)	Continue	Continue	Remove
11 Jul-31 Jul	71 St & 98 Av	Not Activated	None	None	N/A
1 Aug-30 Aug	71 St & 98 Av	Ottewell Rd & 92 Av (NB)	Continue	Continue	N/A
30 Aug-30 Sep	71 St & 98 Av	94B Av & 73 St (EB)	Continue	Continue	62 St & Austin O'Brien Rd
30 Sep-31 Oct	71 St & 98 Av	95 Av & Ottewell Rd (SB)	Continue	Continue	93A Av & 67A St

Table 2.12 Equipment and Program Deployment Dates in King Edward Park

Date Range	Dynamic Message Signs	Speed Display Boards	Pace Car	Speed Watch	School Dolly
3 May-17 May	76 Av & 91 St				
17 May-31 May	76 Av & 91 St	76 Av & 78 St (WB)	Introduce	Introduce	87 St & 78 Av
31 May-14 Jun	76 Av & 91 St	76 Av & 89 St (EB)	Continue	Continue	80 St & 76 Av
14 Jun-28 Jun	76 Av & 91 St	89 St & 78 Av (SB)	Continue	Continue	78 Av & 85 St
28 Jun-11 Jul	76 Av & 91 St	79 St & 79 Av (NB)	Continue	Continue	Remove
11 Jul-31 Jul	76 Av & 91 St	Not Activated	None	None	N/A
1 Aug-30 Aug	76 Av & 91 St	76 Av & 81 St (WB)	Continue	Continue	N/A
30 Aug-30 Sep	76 Av & 91 St	89 St & 78 Av (SB)	Continue	Continue	76 Ave & 79 St
30 Sep-31 Oct	76 Av & 91 St	76 Av & 81 St (EB)	Continue	Continue	87 St & 78 Av

Table 2.13 Equipment and Program Deployment Dates in Twin Brooks

Date Range	Dynamic Message Signs	Speed Display Boards	Pace Car	Speed Watch	School Dolly
3 May-17 May	West Side of 111 St & 12 Av (SB)				
17 May-31 May	West Side of 111 St & 12 Av (SB)	12 Av & Twin Brooks Dr (WB)	Introduce	Introduce	113 St & 12 Av
31 May-14 Jun	West Side of 111 St & 12 Av (SB)	118 St & 9B Av (EB)	Continue	Continue	113 St & 12 Av
14 Jun-28 Jun	West Side of 111 St & 12 Av (SB)	116 St & 11 Av (NB)	Continue	Continue	113 St & 12 Av
28 Jun-11 Jul	West Side of 111 St & 12 Av (SB)	9 Av & 112 St (WB)	Continue	Continue	Remove
11 Jul-31 Jul	West Side of 111 St & 12 Av (SB)	Not Activated	None	None	N/A
1 Aug-30 Aug	West Side of 111 St & 12 Av (SB)	113 St & 10 Av (NB)	Continue	Continue	N/A
30 Aug-30 Sep	West Side of 111 St & 12 Av (SB)	12 Av & West end of Twin Brooks Dr	Continue	Continue	113 St & 12 Av
30 Sep-31 Oct	West Side of 111 St & 12 Av (SB)	9B Av & 118 St (EB)	Continue	Continue	113 St & 12 Av

Given the dynamic nature of the project and due to unforeseen circumstances, the above schedules were not strictly followed.

2.4.3 Speed and traffic Survey Information

Speed and traffic surveys were conducted using the Vaisala Nu-Metrics Portable Traffic Analyzer NC200 (Figure 2.14). These devices have built-in sensors which can detect, count, classify, and measure vehicular speeds. The device can be installed and removed in minutes and is less noticeable to traffic, which results in more accurate information.

Figure 2.14 Images of the NC200

Using the NC200, speed and traffic data were collected on a 24/7 basis for a period of 7 months from April 1st until October, 30th 2010. The data collected during April was used as a baseline representing the "Before" conditions. Alternatively, the 6 months of data from May to October were used to represent the "After" conditions. Note that for each location two or more NC200s were required depending on the number of lanes for each approach. In addition to the existing NC200, a total of 160 NC200s were purchased for this project.

Surveys were conducted on a total of 73 locations within the 11 selected communities. There were a total of 51, 14, and 8 locations surveyed within the treated, control, and adjacent communities, respectively. These 73 locations provide a sufficiently large number and range of sites to provide a good assessment of changes which could be attributed to the pilot project.

Tables 2.14 to 2.24 summarize the deployment of the NC200s within each of the 11 communities. Note some surveys were not conducted for certain locations and time periods. This could be attributed to equipment failure and/or unscheduled road development.

Treated Communities

Table 2.14 Speed Survey Locations within Ottewell

Speed Survey Location	Lane	Apr-10	May-10	Jun-10	Jul-10	Aug-10	Sep-10	Oct-10	Total
57 ST NO 97 AV	NB 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**7**
	SB 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**7**
58 ST NO 92C AV	NB 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**7**
	SB 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**7**
93A AV WO 58 ST	EB 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**7**
	WB 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**7**
94B AV WO 61 ST	EB 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**7**
	WB 1	Yes	No	Yes	Yes	Yes	Yes	Yes	**6**
95 AV WO 57 ST	EB 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**7**
	WB 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**7**
95 AV WO AOB RD	EB 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**7**
	WB 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**7**
AOB RD WO 57 ST	EB 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**7**
	WB 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**7**
AOB RD WO 64 ST	EB 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**7**
	WB 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**7**
Ottewell RD NO 94 AV	NB 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**7**
	SB 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**7**
Ottewell Total		**18**	**17**	**18**	**18**	**18**	**18**	**18**	**125**

Table 2.15 Speed Survey Locations within Woodcroft

Speed Survey Location	Lane	Apr-10	May-10	Jun-10	Jul-10	Aug-10	Sep-10	Oct-10	Total
114 AV WO 135 ST	EB 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**7**
	WB 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**7**
115 AV WO 136 ST	EB 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**7**
	WB 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**7**
115 AV WO 139 ST	EB 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**7**
	WB 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**7**
115 AV WO Groat RD	EB 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**7**
	WB 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**7**
135 ST NO 115 AV	NB 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**7**
	SB 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**7**
135 ST NO 117 AV	NB 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**7**
	SB 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**7**
139 ST NO 117 AV	NB 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**7**
	SB 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**7**
139 ST NO Woodcroft AV	NB 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**7**
	SB 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**7**
Woodcroft AV WO 135 ST	EB 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**7**
	WB 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**7**
Woodcroft Total		**18**	**18**	**18**	**18**	**18**	**18**	**18**	**126**

Table 2.16 Speed Survey Locations within King Edward

Speed Survey Location	Lane	Apr-10	May-10	Jun-10	Jul-10	Aug-10	Sep-10	Oct-10	**Total**
76 AV WO 78 ST	EB 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**7**
	WB 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**7**
76 AV WO 81 ST	EB 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**7**
	WB 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**7**
76 AV WO 85 ST	EB 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**7**
	WB 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**7**
76 AV WO 89 ST	EB 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**7**
	WB 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**7**
79 AV WO 89 ST	EB 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**7**
	WB 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**7**
79 ST NO 77 AV	NB 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**7**
	SB 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**7**
81 ST NO 80 AV	NB 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**7**
	SB 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**7**
85 ST NO 77 AV	NB 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**7**
	SB 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**7**
89 ST NO 79 AV	NB 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**7**
	SB 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**7**
King Edward Total		**18**	**18**	**18**	**18**	**18**	**18**	**18**	**126**

Table 2.17 Speed Survey Locations within Beverly Heights

Speed Survey Location	Lane	Apr-10	May-10	Jun-10	Jul-10	Aug-10	Sep-10	Oct-10	**Total**
113 AV WO 30 ST	EB 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**7**
	WB 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**7**
114 AV WO 40 ST	EB 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**7**
	WB 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**7**
114 AV WO 44 ST	EB 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**7**
	WB 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**7**
34 ST NO 111 AV	NB 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**7**
	SB 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**7**
34 ST NO 113 AV	NB 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**7**
	SB 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**7**
34 ST NO 114 AV	NB 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**7**
	SB 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**7**
34 ST NO 116A AV	NB 1	No	No	No	Yes	No	Yes	Yes	**3**
	NB 2	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**7**
	SB 1	Yes	Yes	No	No	Yes	Yes	No	**4**
	SB 2	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**7**
38 ST NO 109 AV	NB 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**7**
	SB 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**7**
40 ST NO 115 AV	NB 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**7**
	SB 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**7**
Ada BLVD SO 108 AV	NB 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**7**
	SB 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**7**
Beverly Heights Total		**21**	**21**	**20**	**21**	**21**	**22**	**21**	**147**

Table 2.18 Speed Survey Locations within Twin Brooks

Speed Survey Location	Lane	Apr-10	May-10	Jun-10	Jul-10	Aug-10	Sep-10	Oct-10	**Total**
116 ST NO 11 AV	NB 1	Yes	Yes	Yes	No	Yes	Yes	Yes	**6**
	SB 1	Yes	Yes	Yes	No	Yes	Yes	Yes	**6**
118 ST NO 11B AV	NB 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**7**
	SB 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**7**
119 ST NO Anthony Henday DR	NB 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**7**
	SB 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**7**
12 AV WO 111 ST	EB 1	Yes	Yes	No	No	Yes	Yes	Yes	**5**
	EB 2	Yes	Yes	Yes	No	Yes	Yes	Yes	**6**
	WB 1	No	Yes	Yes	No	No	No	Yes	**3**
	WB 2	Yes	Yes	Yes	No	Yes	Yes	Yes	**6**
12 AV WO 112 ST	EB 1	Yes	Yes	Yes	No	Yes	Yes	Yes	**6**
	WB 1	Yes	Yes	Yes	No	Yes	Yes	Yes	**6**
12 AV WO 113 ST	EB 1	Yes	Yes	Yes	No	No	Yes	Yes	**5**
	WB 1	Yes	Yes	Yes	No	No	Yes	Yes	**5**
9 AV WO 111 ST	EB 1	Yes	Yes	Yes	No	No	Yes	Yes	**5**
	WB 1	Yes	Yes	Yes	No	No	Yes	Yes	**5**
9 AV WO 112A ST	EB 1	Yes	Yes	Yes	No	Yes	Yes	Yes	**6**
	WB 1	Yes	Yes	Yes	No	Yes	Yes	Yes	**6**
9 AV WO 114A ST	EB 1	Yes	Yes	Yes	No	Yes	Yes	Yes	**6**
	WB 1	Yes	Yes	Yes	No	Yes	Yes	Yes	**6**
9B AV WO 116 ST	EB 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**7**
	WB 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**7**
Twin Brooks Total		**21**	**22**	**21**	**6**	**17**	**21**	**22**	**130**

Table 2.19 Speed Survey Locations within Westridge/Wolf Willow

Speed Survey Location	Lane	Apr-10	May-10	Jun-10	Jul-10	Aug-10	Sep-10	Oct-10	**Total**
Wanyandi RD NO 62 AV	NB 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**7**
	SB 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**7**
Wanyandi RD WO Walker RD	EB 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**7**
	WB 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**7**
Wolf Willow RD NO Wolf Crescent	NB 1	Yes	Yes	Yes	Yes	No	No	Yes	**5**
	NB 2	No	No	No	No	Yes	Yes	Yes	**3**
	SB 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**7**
	SB 2	No	No	No	No	Yes	Yes	Yes	**3**
Wolf Willow RD WO Westridge	EB 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**7**
	EB 2	No	No	No	No	Yes	Yes	Yes	**3**
	WB 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**7**
	WB 2	No	No	No	No	Yes	Yes	Yes	**3**
Westridge/Wolf Willow Total		**8**	**8**	**8**	**8**	**11**	**11**	**12**	**66**

Control Communities

Table 2.20 Speed Survey Locations within Brintnell

Speed Survey Location	Lane	Apr-10	May-10	Jun-10	Jul-10	Aug-10	Sep-10	Oct-10	**Total**
160 AV WO Manning DR	EB 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**7**
	WB 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**7**
162A AV WO 48 ST	EB 1	Yes	No	No	No	No	No	No	**1**
	WB 1	Yes	No	No	No	No	No	No	**1**
Brintnell BLVD NO 158 AV	NB 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**7**
	SB 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**7**
Brintnell BLVD SO 157A AV	NB 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**7**
	SB 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**7**
Brintnell BLVD WO 45 ST	EB 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**7**
	WB 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**7**
Brintnell Total		**10**	**8**	**8**	**8**	**8**	**8**	**8**	**58**

Table 2.21 Speed Survey Locations within Delwood

Speed Survey Location	Lane	Apr-10	May-10	Jun-10	Jul-10	Aug-10	Sep-10	Oct-10	**Total**
135 AV WO 80A ST	EB 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**7**
	WB 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**7**
70 ST NO Delwood RD	NB 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**7**
	SB 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**7**
74 ST NO 135A AV	NB 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**7**
	SB 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**7**
Delwood RD WO 67 ST	EB 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**7**
	WB 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**7**
Delwood RD WO 77 ST	EB 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**7**
	WB 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**7**
Delwood Total		**10**	**10**	**10**	**10**	**10**	**10**	**10**	**70**

Table 2.22 Speed Survey Locations within Forest Heights

Speed Survey Location	Lane	Apr-10	May-10	Jun-10	Jul-10	Aug-10	Sep-10	Oct-10	**Total**
101 AV WO 81 ST	EB 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**7**
	WB 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**7**
79 ST NO 101 AV	NB 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**7**
	SB 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**7**
79 ST NO 104 AV	NB 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**7**
	SB 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**7**
79 ST NO 98A AV	NB 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**7**
	SB 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**7**
Forest Heights Total		**8**	**8**	**8**	**8**	**8**	**8**	**8**	**56**

Adjacent Communities

Table 2.23 Speed Survey Locations within Dovercourt

Speed Survey Location	Lane	Apr-10	May-10	Jun-10	Jul-10	Aug-10	Sep-10	Oct-10	**Total**
118 AV WO 135 ST	EB 2	Yes	No	No	No	No	No	No	**1**
	WB 1	Yes	No	No	No	No	No	No	**1**
	WB 2	Yes	No	No	No	No	No	No	**1**
122 AV WO 136 ST	EB 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**7**
	WB 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**7**
139 ST NO 119 AV	NB 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**7**
	SB 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**7**
Dovercourt AV WO 135 ST	EB 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**7**
	WB 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**7**
Dovercourt Total		**9**	**6**	**6**	**6**	**6**	**6**	**6**	**45**

Table 2.24 Speed Survey Locations within Hazeldean

Speed Survey Location	Lane	Apr-10	May-10	Jun-10	Jul-10	Aug-10	Sep-10	Oct-10	**Total**
66 AV WO 91 ST	EB 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**7**
	WB 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**7**
93 ST NO 64 AV	NB 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**7**
	SB 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**7**
96 ST NO 67 AV	NB 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**7**
	SB 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**7**
97 ST NO 66 AV	NB 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**7**
	SB 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**7**
Hazeldean Total		**8**	**8**	**8**	**8**	**8**	**8**	**8**	**56**

2.4.4 Enforcement Deployment

Two types of mobile photo enforcement were used to ensure compliance to the 40 km/h posted speed limit, namely: Safe Speed Community Vans and Covert Photo-radar Trucks.

A Safe Speed Community Van (Figure 2.15) is a mobile photo-radar enforcement unit used by the City of Edmonton to educate its residents about speeding concerns in their neighbourhoods. Typically, these vans are parked at locations that communities have identified as a hot spot for speeding. Each van is covered with photos of people who work, live, and play in Edmonton, making them easy to see and recognize. The vans have photo radar equipment so police can enforce speed limits and promote safe driving in neighbourhoods. If a vehicle drives over the speed limit in the presence of a Safe Speed Community Van, it will receive a photo radar ticket. The Safe Speed Community Vans Program helps police support residents who are concerned about the incidents of speeding in their neighbourhood. They also increase awareness about safe driving and encourage motorists to slow down in school zones, playgrounds, residential areas, and construction sites. The Edmonton Police Service runs the program in partnership with the City's Office of Traffic Safety and the Edmonton Federation of Community Leagues.

Figure 2.15 Images of the Safe Speed Community Vans

Covert Photo-Radar Trucks (Figure 2.16) have been used by the Edmonton Police Service since 1993. This covert mobile unit has proven to be an accurate and effective means of traffic enforcement. Violators are photographed as they pass by a photo radar location enabling police to produce valid evidence in court. Currently the Edmonton Police Service contracts Photo Radar Operators, who are appointed Peace Officers from the Corps of Commissionaires, to conduct photo radar enforcement at various locations throughout the city. The Registered Owner of a vehicle involved in a speed infraction is charged under Section 160(1) of the Traffic Safety Act which states, "If a vehicle is involved in an offence referred to in Section 157 or a bylaw, the owner of that vehicle is guilty of an offence."

Figure 2.16 Image of a Deployed Covert Photo-Radar Truck

Enforcement within the six treated communities was planned to occur in three waves. The first wave started in June and involved the deployment of safe speed community vans to heighten awareness that the new speed (i.e., 40 km/h) was being enforced within the six residential communities. The second and third waves involved the introduction of covert enforcement in addition to the community vans.

Tables 2.25 to 2.30 summarize the enforcement deployment schedule for each of the six communities indicating the location, date, and type of photo enforcement tactic utilized. Note: some locations within the six communities received varying degrees of enforcement. Increased enforcement occurred due to increased community concerns whereas reduced enforcement could be attributed to scheduling and/or resourcing issues.

Table 2.25 Enforcement Deployment Schedules for Ottewell

Location	Date	Safety Intervention
Ottewell Rd SB between 96A - 95 Ave	June September October	Community Van Community Van & Covert Truck Community Van & Covert Truck
92 Ave EB between 62 - 58 St	June September October	Community Van Community Van & Covert Truck Community Van & Covert Truck
92 Ave WB between 58 - 62 St	June September October	Community Van Community Van & Covert Truck Community Van & Covert Truck
57 St SB between 97 - 95 Ave	September October	Community Van & Covert Truck Community Van & Covert Truck

Table 2.26 Enforcement Deployment Schedules for Woodcroft

Location	Date	Safety Intervention
139 St SB between 116 - 115A Ave	June September October	Community Van Community Van & Covert Truck Community Van & Covert Truck
139 St NB between 115A - 116 Ave	June September October	Community Van Community Van & Covert Truck Community Van & Covert Truck
114 Ave EB between 139 - 135 St	June August September October	Community Van Community Van Community Van & Covert Truck Community Van & Covert Truck
114 Ave WB between 135 - 139 St	June September October	Community Van Community Van & Covert Truck Community Van & Covert Truck

Table 2.27 Enforcement Deployment Schedules for King Edward

Location	Date	Safety Intervention
76 Ave WB between 75 - 79 St	June September October	Community Van Community Van & Covert Truck Community Van & Covert Truck
76 Ave between 81 - 78 St	June	Community Van
85 St NB between 80 - 81 Ave	June September October	Community Van Community Van & Covert Truck Community Van & Covert Truck

Table 2.28 Enforcement Deployment Schedules for Beverly Heights

Location	Date	Safety Intervention
114 Ave WB between 44 - 46 St	June September October	Community Van Community Van & Covert Truck Community Van & Covert Truck
114 Ave EB between 46 - 44 St	June September October	Community Van Community Van & Covert Truck Community Van & Covert Truck
34 St SB between 113 - 111 Ave	June September October	Community Van Community Van & Covert Truck Community Van & Covert Truck
34 St NB between 111 - 113 Ave	June September October	Community Van Community Van & Covert Truck Community Van & Covert Truck

Table 2.29 Enforcement Deployment Schedules for Twin Brooks

Location	Date	Safety Intervention
12 Ave WB between 111 - 113 St	June September October	Community Van Community Van & Covert Truck Community Van & Covert Truck
12 Ave EB between 113 - 112 St	June September October	Community Van Community Van & Covert Truck Community Van & Covert Truck
9B Ave WB between 116 - 119 St	June September October	Community Van Community Van & Covert Truck Community Van & Covert Truck
9B Ave WB between 119 - 116 St	June September October	Community Van Community Van & Covert Truck Community Van & Covert Truck

Table 2.30 Enforcement Deployment Schedules for Westridge/Wolf Willow

Location	Date	Safety Intervention
Wanyandi Rd between Wolf Ridge Way - Wanyandi Way	June	Community Van
	July	Community Van
	September	Community Van & Covert Truck
	October	Community Van & Covert Truck
Wanyandi Rd NB between Wanyandi Way - Wolf Ridge Way	June	Community Van
	September	Community Van & Covert Truck
	October	Community Van & Covert Truck
Wolf Willow Rd WB at Westridge Rd	June	Community Van
	September	Community Van & Covert Truck
	October	Community Van & Covert Truck
Wolf Willow Rd EB at Westridge Rd	June	Community Van
	September	Community Van & Covert Truck
	October	Community Van & Covert Truck

3. COMMUNITY PERCEPTION RESULTS

This section summarizes the results of the community perception survey conducted by Banister Research and Consulting Inc. (Banister). Telephone interviews were conducted from March 25th to 31st, 2010 (pre-pilot) and from November 8th to 19th, 2010 (post-pilot) with residents, 18 years of age or older, from the six pilot project communities. Banister conducted 50 interviews per community for a total of 300 interviews (in both the pre- and post-pilot surveys). Overall results are accurate to within ±5.6% at the 95% confidence level (both pre- and post-pilot surveys).

Banister Research & Consulting Inc. was commissioned to conduct a random and representative telephone survey with citizens residing in the Pilot Project Communities in two phases – prior to project initiation (March 2010) (pre-pilot) and following the end of the project in November 2010 (post-pilot). Randomly selected households within the six specified neighbourhoods were identified from a purchased TELUS directory. The randomized households were separated into two groups for each phase of the survey before the project fieldwork began. Below is a summary of the key findings of the November 2010 results with comparisons to the March data, where applicable. The full report and a sample of the survey questionnaire are included in Appendix II.

3.1 Current Habits and Concerns

- To begin the survey, respondents were asked to identify how often they, or a member of their family, drives, walks, and cycles in their community. Respondents most frequently stated they drive in their community daily (83%), walk in the community daily (46%), or a few times a week (28%), and rarely or never cycle in their community (68%).
  - o The “After” results for driving and walking were comparable to the pre-pilot, with 85% driving daily (versus 83% in the post-pilot), 40% and 31% walking daily and a few times a week, respectively (versus 46% and 28%, respectively). However, in the post-pilot, fewer respondents cycled (68% stating rarely or never versus 57% in the pre-pilot).
  - o Respondents residing in Ottewell, Twin Brooks, or Westridge/Wolf Willow were significantly more likely (88% to 96%) to drive daily than respondents in Woodcroft (72%). Respondents residing in Beverly Heights, King Edward Park, Ottewell, Westridge/Wolf Willow, or Woodcroft were significantly more likely (44% to 58%) to walk daily than those in Twin Brooks (24%).

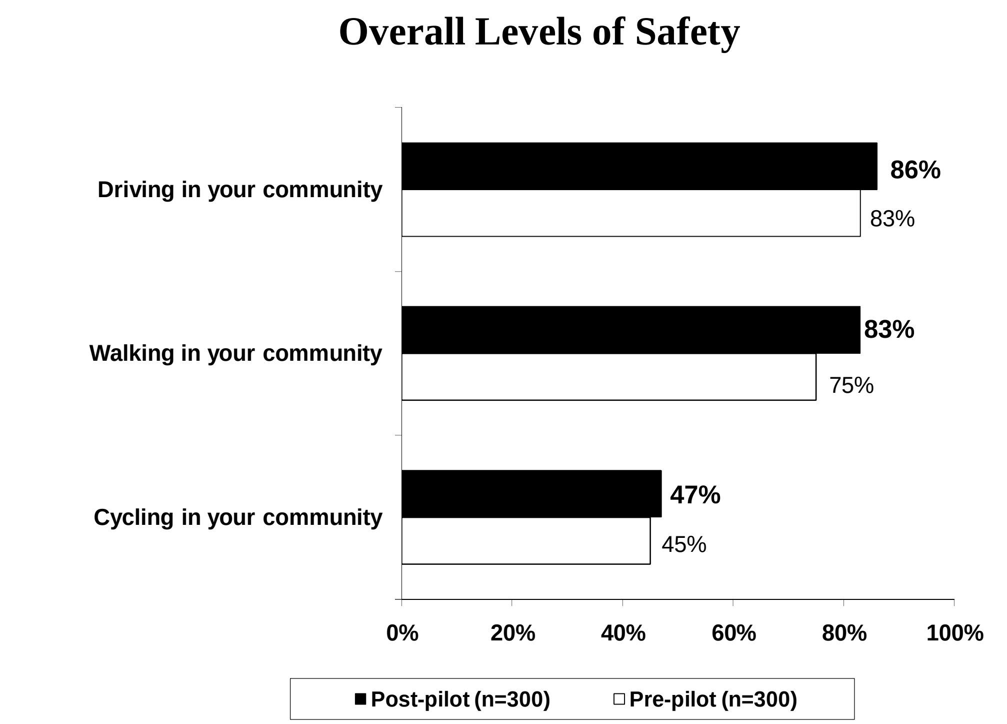
Table 3.1 Summary of Responses to “*How often do you or members of your family ….?*”

(n=300)	**Percent of Respondents**											
	Daily		**Few Times a Week**		**Once a Week**		**Once Every Few Weeks**		**Rarely / Never**		**Refuse/ Don’t Know**	
	Post-Pilot	**Pre-Pilot**	**Post-Pilot**	**Pre-Pilot**	**Post-Pilot**	**Pre-Pilot**	**Post-Pilot**	**Pre-Pilot**	**Post-Pilot**	**Pre-Pilot**	**Post-Pilot**	**Pre-Pilot**
Drive	83	85	9	9	2	1	1	1	4	4	--	--
Walk	46	40	28	31	8	14	6	4	12	10	--	<1
Cycle	5	8	8	18	7	9	11	8	68	57	1	1

- Respondents were most likely to indicate they felt safe driving in their community (86%), followed by walking in their community (83%), and cycling in their community (47%). Within the context of this report, the term “feeling safe” is meant from a traffic point of view and not “personal security.” The terms *safety* and *security* are often

confused or misunderstood. Given the scope of this project all the questions were intended to reflect the respondents' views on traffic safety.

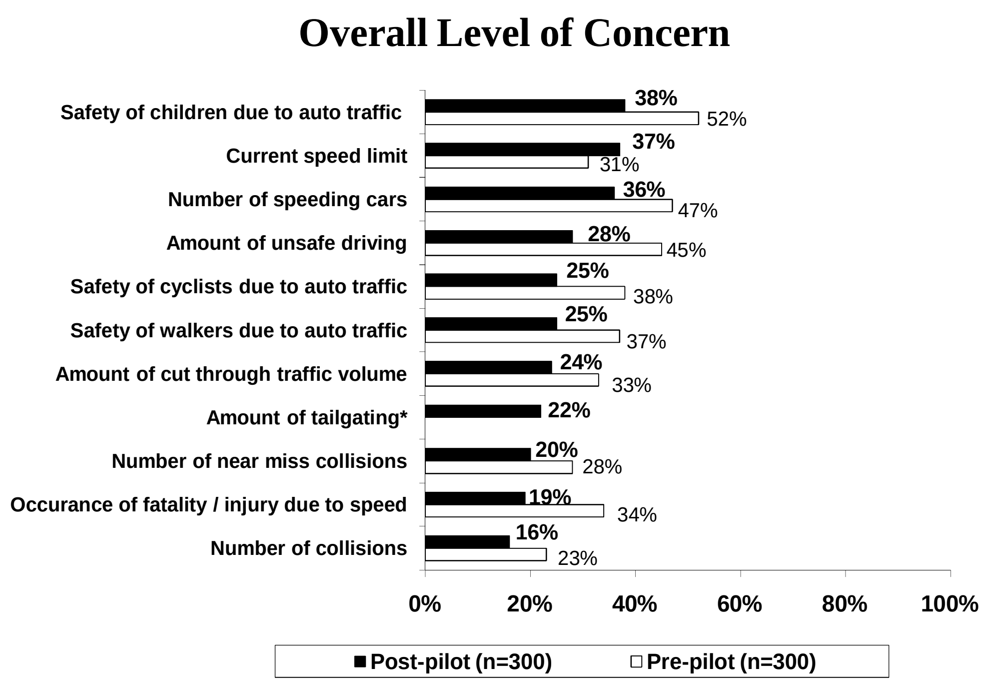
- Significantly more respondents felt safe walking in their community in the post-pilot (83% versus 75% in the pre-pilot). While the proportions for driving and cycling in the post-pilot (86% and 47%, respectively) remained comparable to the pre-pilot (83% and 45%, respectively).
- Respondents residing in King Edward Park, Ottewell, Twin Brooks, or Westridge/Wolf Willow were significantly more likely to feel safe walking in their community (84% to 94%) than those in Beverly Heights (60%).
- Respondents residing in Twin Brooks were significantly more likely to feel safe cycling in their community (64%) than those in Beverly Heights or King Edward Park (38% and 40% respectively).
- Respondents residing in Ottewell or Westridge/Wolf Willow were significantly more likely to feel safer driving in their community (94% to 98%) than of respondents residing in King Edward Park (80%)).



Base: Respondents that selected 4 or 5 out of 5

Figure 3.1 Community Perceptions of Overall Levels of Safety

- Respondents were asked to rate their level of concern with a number of factors. Respondents were most concerned with the safety of children due to auto traffic (38%) and least concerned (16%) with the number of collisions in their community. While in the pre-pilot, safety of children due to auto traffic and number of collisions were the areas of most (52%) and least (23%) concern, respectively, the proportion of respondents concerned decreased in the post-pilot.
    - Respondents residing in King Edward Park or Woodcroft were significantly more likely to be concerned with the safety of children due to auto traffic (44% to 46%) than those residing in Westridge/Wolf Willow (24%).
    - Respondents residing in Beverly Heights, King Edward Park or Woodcroft were significantly more likely to be concerned with the number of collisions (22% to 24%) than those in Twin Brooks or Westridge/Wolf Willow (8%).



*Not asked in pre-pilot

**Respondents that rated their concern as 4 or 5 out of 5

Figure 3.2 Community Perceptions of Overall Levels of Concern

- The vast majority of respondents in the post-pilot drove (94%), comparable to the proportion in the pre-pilot (95%). Respondents in Ottewell or Westridge/Wolf Willow were significantly more likely to drive (98%) than those in Woodcroft (86%).

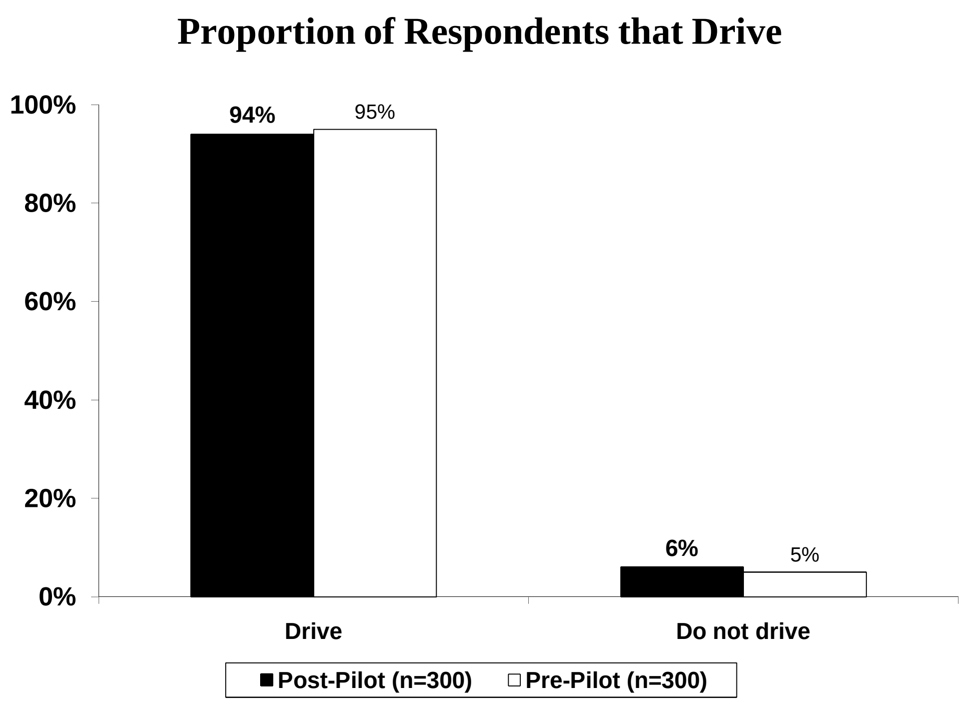


Figure 3.3 Community Perceptions of Proportion of Respondents that Drive

- Considering their driving in the past 6 months, respondents were most likely to indicate they drive right at the speed limit daily (81%) and rarely or never under the speed limit (44%), and up to 5 km/h (42%), 6 to 10 km/h (79%), or more than 10 km/h (95%) over the speed limit.
    - Respondents indicating they drive right at the speed limit daily (81%) increased compared to the pre-pilot (64%). Respondents who rarely or never drove under the speed limit (44%) increased from the pre-pilot (18%), while those who drove up to 5 km/h (42%) or 6 to 10 km/h (79%) decreased from the pre-pilot (56% and 87%, respectively) and respondents who drove more than 10 km/h (95%) over the speed limit remained the same (95% in the pre-pilot).
    - Respondents in Ottewell or Twin Brooks were significantly more likely to drive right on the speed limit daily (88% to 90%) than those in Beverly Heights or King Edward Park (70% to 72%). Respondents residing in Twin Brooks or Westridge/Wolf Willow were significantly more likely to indicate they rarely or never drive under the speed limit (50% to 67%) than those in Ottewell (29%).
    - Respondents residing in Ottewell or Woodcroft were significantly more likely to rarely or never drive up to 5 km/h over the speed limit (51% to 54%) than those in Twin Brooks or Beverly Heights (28% to 31%). Respondents residing in King Edward Park or Woodcroft were significantly more likely to never or

rarely drive 6 to 10 km/h over the speed limit (87% to 88%) than those in Westridge/Wolf Willow (67%).

Table 3.2 Summary of Responses to "*How often do you drive at the following speeds in your community?*"

Overall: Respondents that drive (n=284 Pre-Pilot; n=282 Post-Pilot)	Percent of Respondents											
	Daily		Few Times a Week		Once a Week		Once Every Few Weeks		Rarely / Never		Refuse/ Don't Know	
	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot
Under the speed limit	36	57	13	17	5	4	3	3	44	18	--	2
Right on the speed limit	81	64	11	17	3	4	1	3	4	12	<1	1
Up to 5 km/h over the speed limit	18	14	19	17	13	8	7	5	42	56	1	1
6 to 10 km/h over the speed limit	3	3	6	2	7	4	4	4	79	87	1	1
More than 10 km/h over the speed limit	<1	<1	1	2	1	1	1	1	95	95	1	<1

- When respondents were asked if they were aware of the current speed limit in their community, the vast majority (98%) of respondents were aware the speed limit was 40 km/h, representing a significant increase from 80% who knew it was 50 km/h in the pre-pilot.
    - Respondents residing in King Edward Park, Ottewell or Westridge/Wolf Willow were significantly more likely to be aware of the current speed limit (100%) than those in Beverly Heights (92%).

Table 3.3 Summary of Responses to "*Are you aware of the current speed limit in your community?*"

(n=300)	Percent of Respondents	
	Post-Pilot	Pre-Pilot
40 km/h	98	4
60 km/h	1	4
20 km/h	<1	--
50 km/h	--	80
35 km/h	--	<1
30 km/h	--	4
No/Not aware	1	6
Refuse, Don't know	--	1

- Post-pilot more than half of respondents (57%) felt the speed limit was just right, while 39% felt it was too low. In the pre-pilot 71% felt it was just right (significantly more than the post-pilot), while 1% felt it was too low (significantly less that the post-pilot).
    - Respondents residing in Beverly Heights, Twin Brooks, or Westridge/Wolf Willow were significantly more likely to feel the speed limit is too low (42% to 58%) than those in Woodcroft (18%). Respondents residing in King Edward Park, Ottewell, or Woodcroft were significantly more likely to feel the speed limit is just right (62% to 74%) than those in Westridge/Wolf Willow (42%).

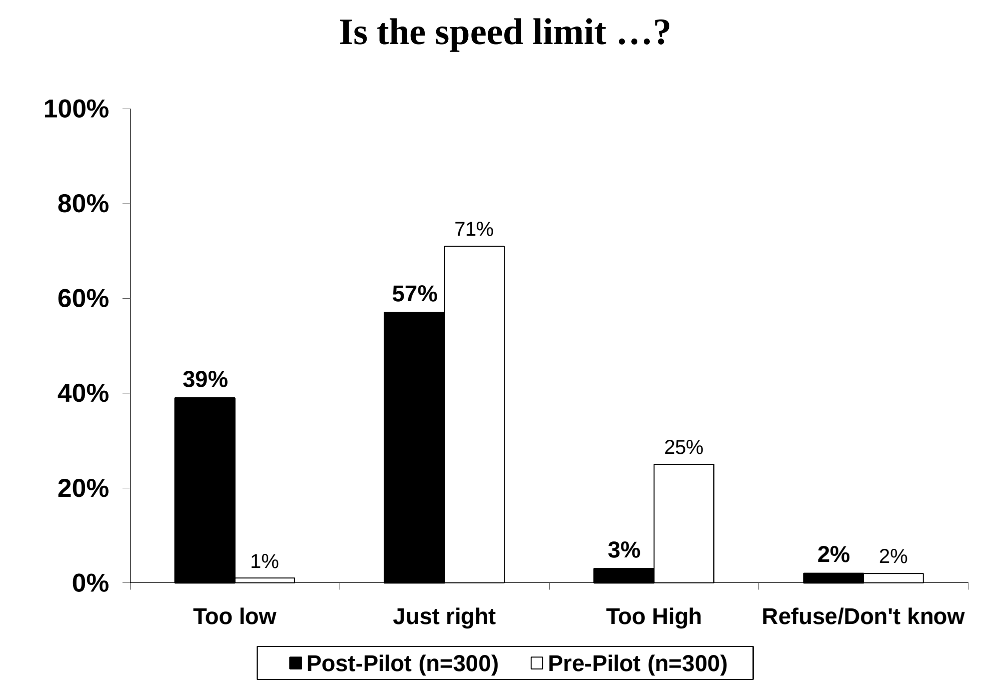


Figure 3.4 Community Perceptions of Appropriateness of Current Speed Limit

- Forty-four percent (44%) of the respondents felt reducing the speed limit from 50 km/h to 40 km/h was effective in improving traffic safety in their community, while 35% believed the reduction was not effective.
  - In the pre-pilot, significantly fewer respondents felt reducing the speed limit would be effective (31%), while significantly more felt it would not be effective (46%). Respondents residing in Ottewell were significantly more likely to feel the speed limit reduction was effective (54%) than those in King Edward Park (34%).

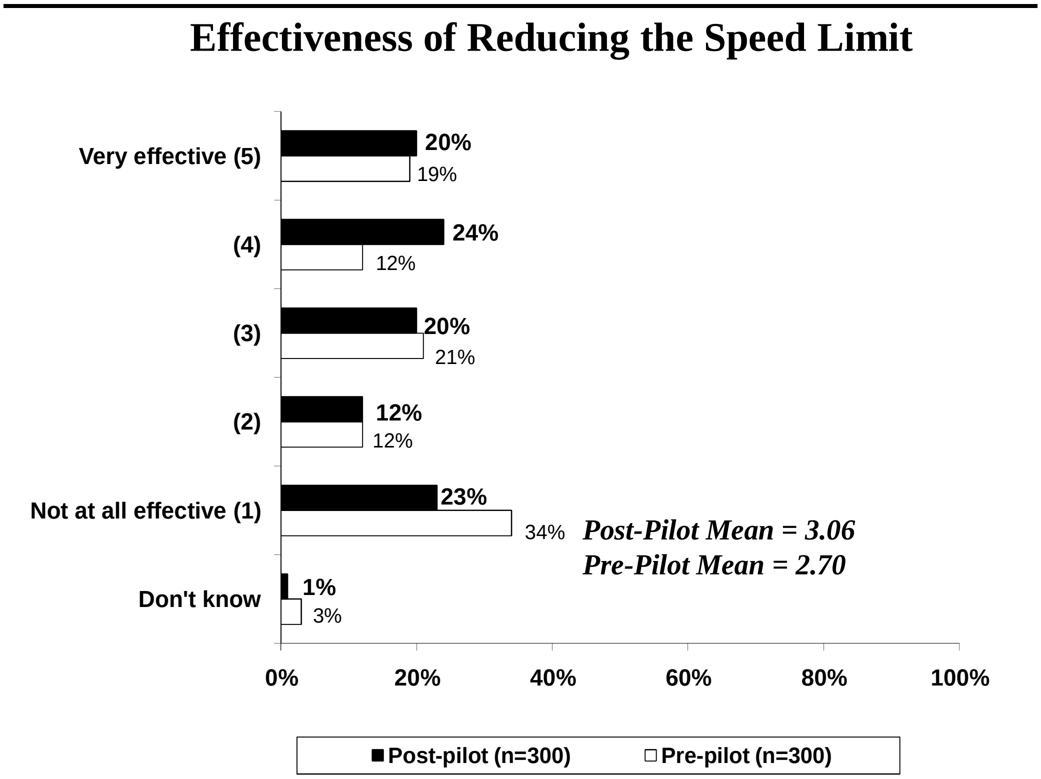


Figure 3.5 Community Perceptions of the Effectiveness of Reducing the Speed Limit

3.2 Pilot Project

- The majority (87%) of respondents indicated they were aware their community had been chosen to participate in a pilot project (versus 46% in the pre-pilot).
    - o Respondents residing in Ottewell or Westridge/Wolf Willow were significantly more likely to be aware their community had participated in a pilot project (96% to 98%) than those in Beverly Heights, King Edward Park, or Woodcroft (76% to 84%).

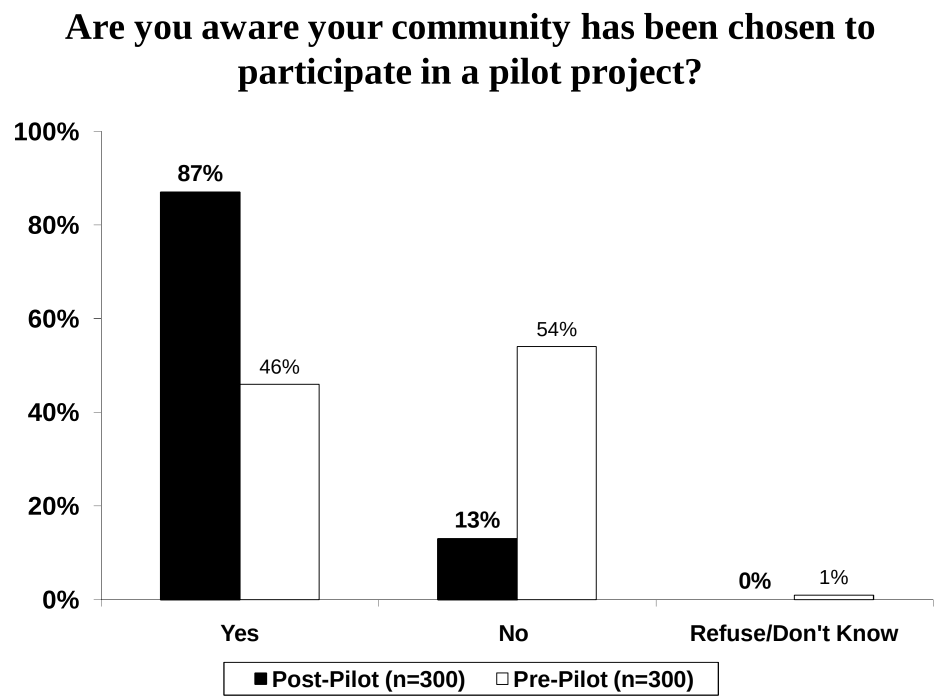
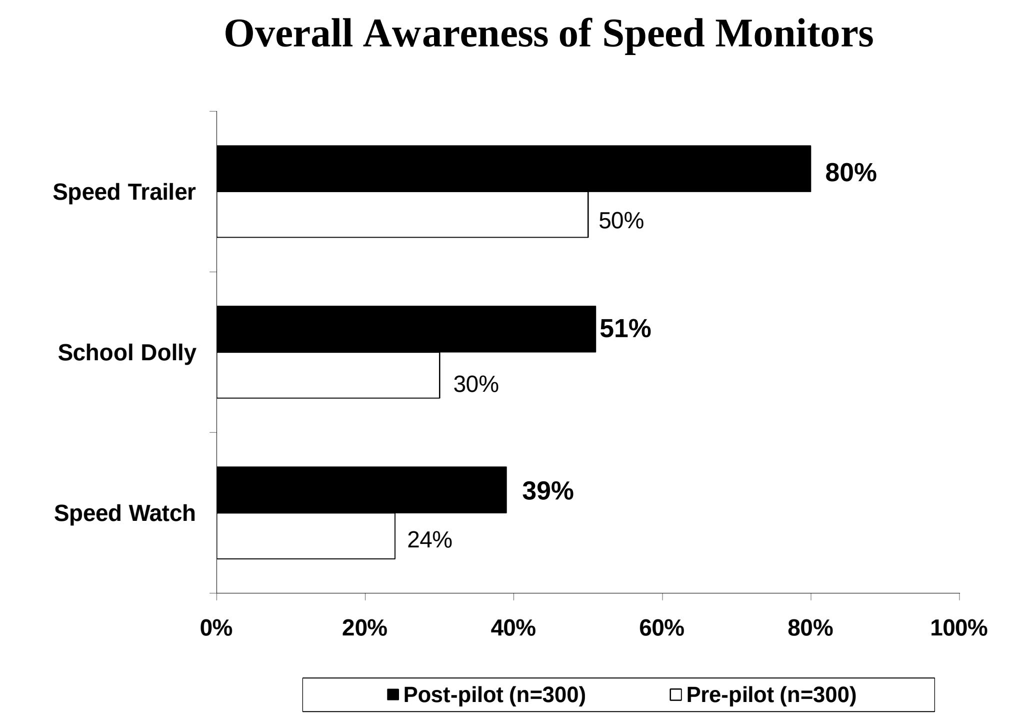


Figure 3.6 Community Awareness of the Pilot Project

- When asked, 80% of respondents stated they were aware of the speed trailer (also known as a speed display board), 51% were aware of the school dolly, and 39% were aware of Speed Watch. All were significant increases from the pre-pilot (where 50%, 30%, and 24%, respectively, were aware).
    - o Respondents residing in Ottewell, Twin Brooks, or Westridge/Wolf Willow were significantly more likely to be aware of the speed trailer (88% to 92%) than those in King Edward Park and Woodcroft (64% to 70%). Respondents residing in Twin Brooks were significantly more likely to be aware of the school dolly (64%) than those in Westridge/Wolf Willow and Woodcroft (38% to 40%).

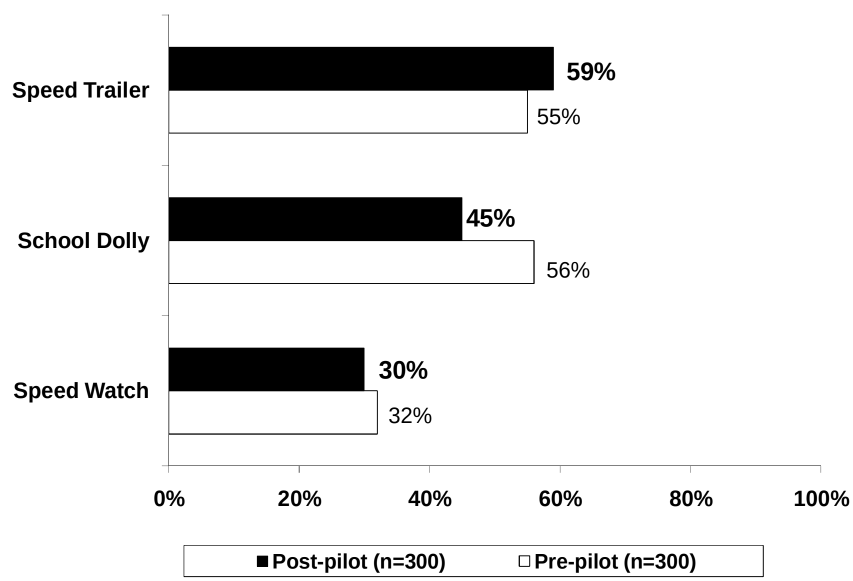


Base: Respondents that stated they were aware

Figure 3.7 Community Awareness of the Speed Monitors

- Respondents were asked to anticipate the effectiveness of the three different speed monitors. Respondents were most likely to indicate the speed trailer (also known as a speed display board) would be most effective (59%), followed by the school dolly (45%), and Speed Watch (30%).
  - Respondents in the pre-pilot were significantly more likely to feel the school dolly would be more effective (56%), while they were slightly less likely to feel the speed trailer was effective (55%). A comparable proportion of respondents rated Speed Watch as effective in the pre-pilot (32%).
  - Respondents residing in Ottewell were significantly more likely to rate the effectiveness of the speed trailer as high (76%) than those in Beverly Heights, King Edward Park, or Woodcroft (48% to 52%). Respondents residing in Ottewell and Twin Brooks were significantly more likely to rate the effectiveness of the speed dolly as high (52% to 60%) than those in Westridge/Wolf Willow (30%).

Overall Effectiveness of Speed Monitors



*Respondents that selected 4 or 5 out of 5

Figure 3.8 Community Perceptions of Overall Effectiveness of Speed Monitors

- When respondents were asked to anticipate the effectiveness of the pilot project, 48% of respondents believed it would be highly effective in lowering residential speeds. This was slightly higher than in the pre-pilot (41%).
    - o Respondents residing in Ottewell were significantly more likely to rate the pilot project as effective (64%) than those in Beverly Heights, Westridge/Wolf Willow, or Woodcroft (38% to 44%).

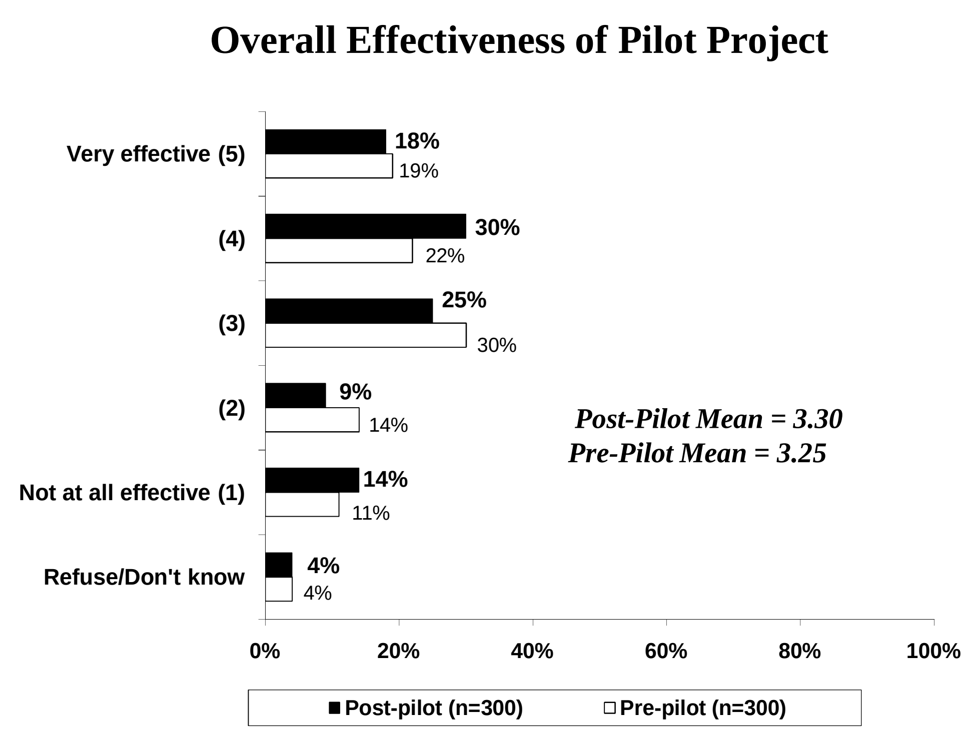


Figure 3.9 Community Perceptions of Overall Effectiveness of Pilot Project

- New to the post-pilot, respondents were asked how the speed of traffic had changed over the last 6 months, 48% reported it was slower, while 45% stated it was about the same.
    - Respondents residing in Ottewell, Twin Brooks, or Westridge/Wolf Willow were significantly more likely to state the traffic is slower (56% to 64%) than those in Woodcroft (30%). Respondents residing in Beverly Heights, King Edward Park, and Woodcroft were significantly more likely to feel the traffic remained the same (52% to 60%) than those in Twin Brooks (30%).

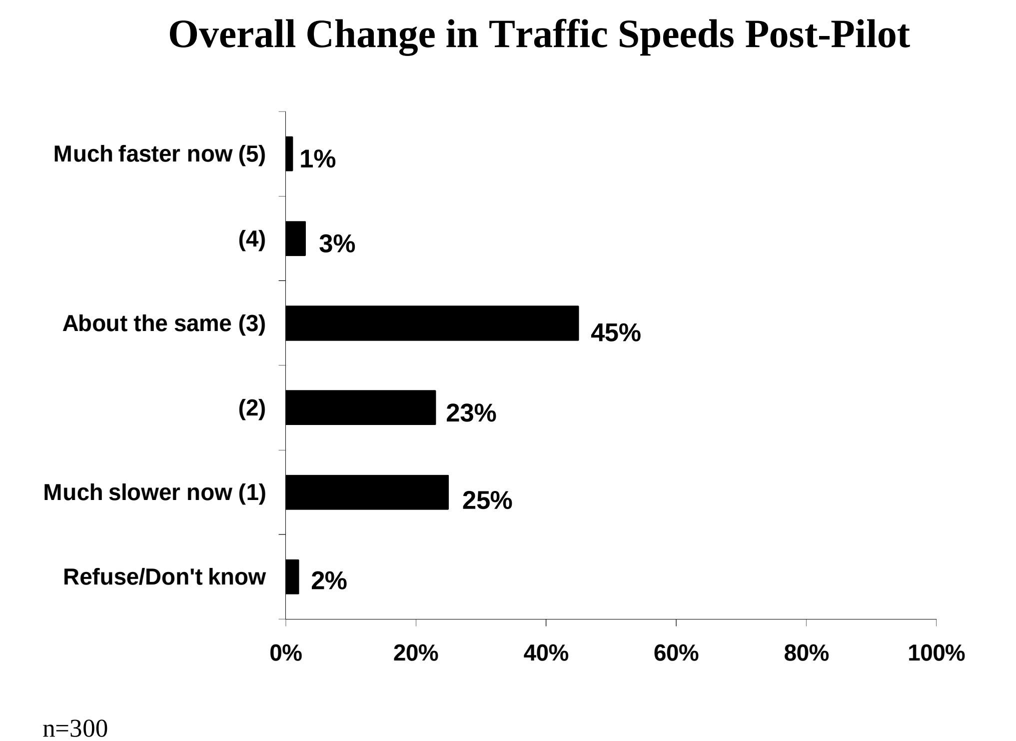


Figure 3.10 Community Perceptions of Overall Change in Traffic Speeds Post-Pilot Project

- Finally, 70% of respondents indicated the level of community involvement and support for the success of the pilot project in improving traffic safety in their community was important (a slight decrease from 75% in the pre-pilot).
    - Respondents residing in Woodcroft were significantly more likely to rate community involvement and support as important (78%) than those in Beverly Heights (58%).

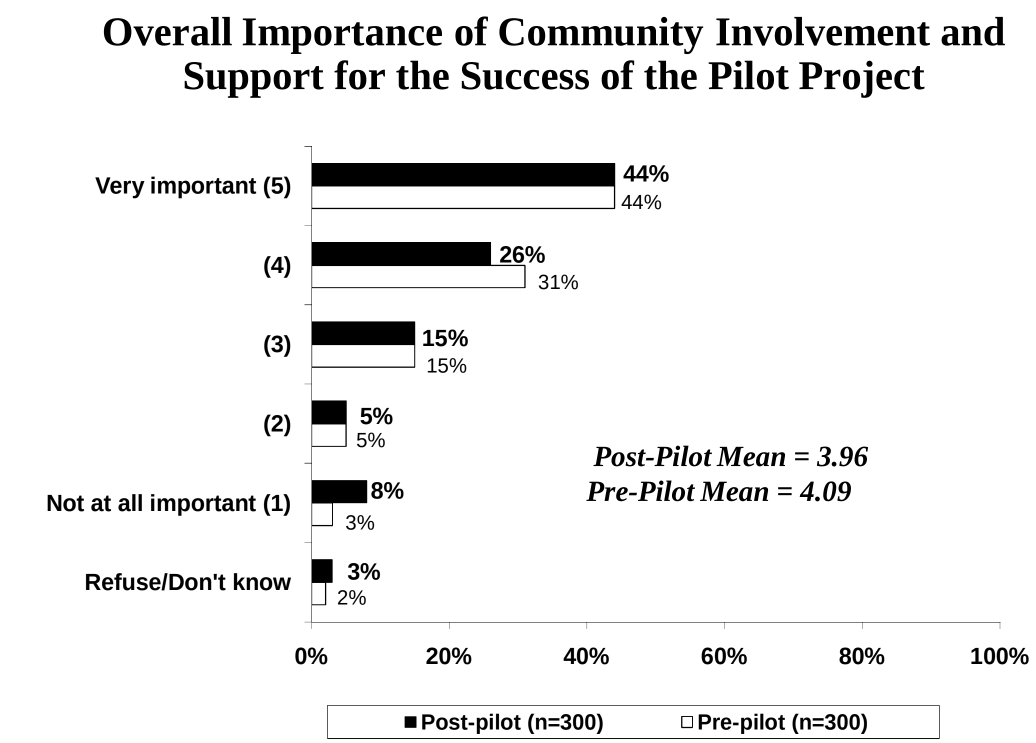


Figure 3.11 Community Perceptions of Overall Importance of Community Involvement and the Success of the Pilot Project

4. ENFORCEMENT RESULTS

Over the course of the pilot project, there were a total of 6,779 speeding violations within the six treated communities. Tables 4.1 to 4.6 summarize the number of violations, total traffic counts, and number of operating hours by month and community. Traffic rate was calculated as traffic count per hour of enforcement. Violation rate was calculated as violation counts per 1,000 recorded vehicles.

Figure 4.1 shows that the highest violation rates were recorded at Woodcroft (94.2), followed by Ottewell (85.0), and Beverly Heights (82.0). The community with the least number of violation rates was Westridge/Wolf Willow (40.1).

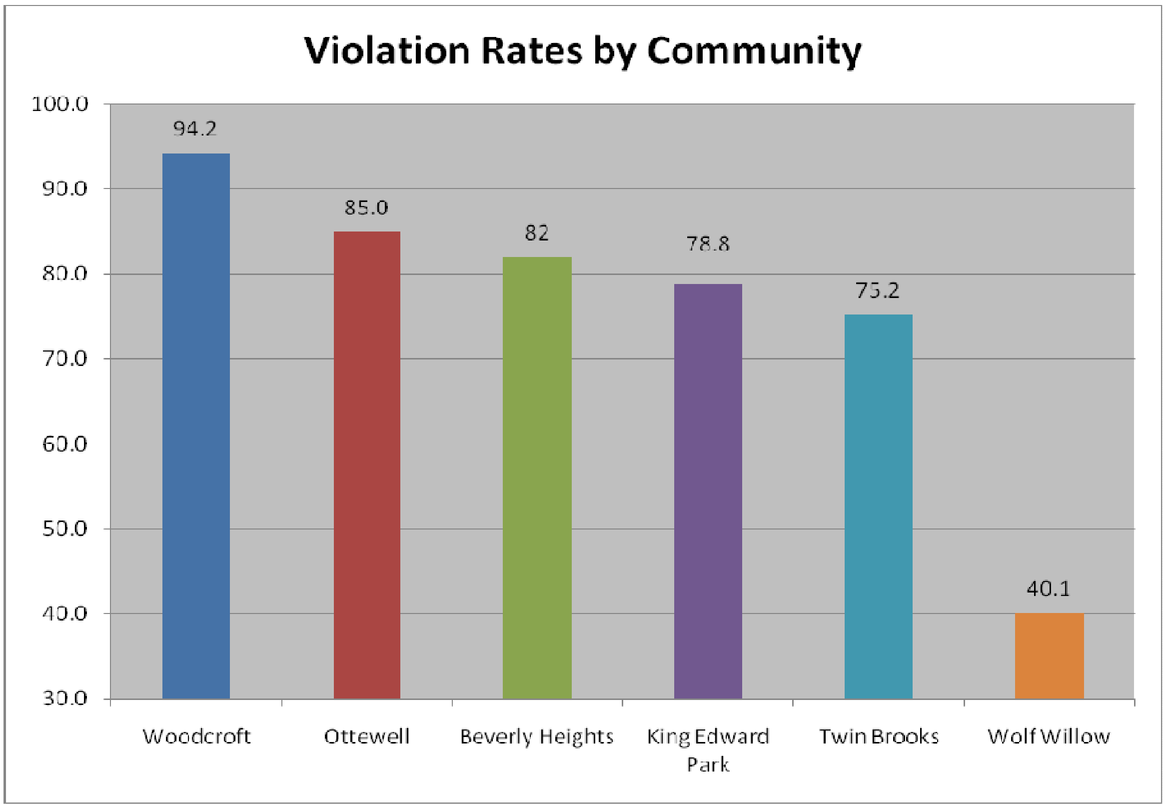


Figure 4.1 Speed Violation Rates by Community

Table 4.1 Enforcement Statistics for Ottewell

Location	Date	Enforcement Hours	Traffic Counts	Violations	Traffic Rate*	Violation Rate**
Ottewell Rd SB between 96A - 95 Ave	June	4.0	412	8	103.0	19.4
	September	29.6	2377	337	80.3	141.8
	October	31.9	2683	274	84.2	102.1
92 Ave EB between 62 - 58 St	June	5.6	211	6	37.7	28.4
	September	19.4	711	44	36.6	61.9
	October	30.8	926	68	30.0	73.4
92 Ave WB between 58 - 62 St	June	22.7	415	5	18.3	12.0
	September	18.1	312	14	17.3	44.9
	October	28.6	618	47	21.6	76.1
57 St SB between 97 - 95 Ave	September	16.2	584	15	36.0	25.7
	October	21.1	660	24	31.3	36.4
	Total	**228.0**	**9909**	**842**	**43.6**	**85.0**

*Traffic rate was calculated as traffic count per hour of enforcement
** Violation rate was calculated as violation counts per 1,000 recorded vehicles

- In Ottewell, a total of 228.0 hours of photo radar camera enforcement occurred in four locations. During this time period a total of 842 speed violations were recorded. The speed violation rate (per 1,000 vehicles) was estimated at 85.0.

Table 4.2 Enforcement Statistics for Woodcroft

Location	Date	Enforcement Hours	Traffic Counts	Violations	Traffic Rate*	Violation Rate**
139 St SB between 116 - 115A Ave	June	18.1	903	21	50.0	23.3
	September	14.1	835	72	59.1	86.2
	October	16.1	661	81	41.2	122.5
139 St NB between 115A - 116 Ave	June	6.8	401	5	59.1	12.5
	September	10.7	274	12	25.6	43.8
	October	22.4	791	67	35.3	84.7
114 Ave EB between 139 - 135 St	June	3.2	446	4	140.1	9.0
	August	4.6	250	1	54.3	4.0
	September	19.5	1190	218	61.0	183.2
	October	19.5	1774	159	91.2	89.6
114 Ave WB between 135 - 139 St	June	17.4	1987	76	114.0	38.2
	September	10.1	789	119	78.2	150.8
	October	24.9	1934	318	77.6	164.4
	Total	**187.3**	**12235**	**1153**	**65.3**	**94.2**

*Traffic rate was calculated as traffic count per hour of enforcement
** Violation rate was calculated as violation counts per 1,000 recorded vehicles

- In Woodcroft, a total of 187.3 hours of photo radar camera enforcement occurred in four locations. During this time period a total of 1,153 speed violations were recorded. The speed violation rate was estimated at 94.2.

Table 4.3 Enforcement Statistics for King Edward Park

Location	Date	Enforcement Hours	Traffic Counts	Violations	Traffic Rate*	Violation Rate**
76 Ave WB between 75 - 79 St	June	7.5	1228	13	163.7	10.6
	September	35.9	3640	396	101.3	108.8
	October	38.4	3913	335	101.8	85.6
76 Ave between 81 - 78 St	June	2.5	345	5	138.0	14.5
85 St NB between 80 - 81 Ave	June	4.0	22	0	5.5	0.0
	September	22.9	163	0	7.1	0.0
	October	26.4	192	0	7.3	0.0
	Total	**137.6**	**9503**	**749**	**69.0**	**78.8**

*Traffic rate was calculated as traffic count per hour of enforcement
** Violation rate was calculated as violation counts per 1,000 recorded vehicles

- In King Edward Park, a total of 137.6 hours of photo radar camera enforcement occurred in three locations. During this time period a total of 749 speed violations were recorded. The speed violation rate was estimated at 78.8.

Table 4.4 Enforcement Statistics for Beverly Heights

Location	Date	Enforcement Hours	Traffic Counts	Violations	Traffic Rate*	Violation Rate**
114 Ave between 44 - 46 St	June	4.0	265	7	66.0	26.4
	September	16.2	2366	267	146.4	112.8
	October	32.2	3601	308	111.7	85.5
114 Ave EB between 46 - 44 St	June	23.8	2586	85	108.8	32.9
	September	14.5	1344	157	92.9	116.8
	October	35.0	4218	419	120.5	99.3
34 St SB between 113 - 111 Ave	June	2.0	164	1	82.0	6.1
	September	17.2	1664	144	96.8	86.5
	October	24.5	2789	204	113.8	73.1
34 St NB between 111 - 113 Ave	June	2.5	207	6	82.3	29.0
	September	17.7	1733	153	98.0	88.3
	October	26.0	2665	184	102.5	69.0
	Total	**215.6**	**23602**	**1935**	**109.5**	**82.0**

*Traffic rate was calculated as traffic count per hour of enforcement
** Violation rate was calculated as violation counts per 1,000 recorded vehicles

- In Beverly Heights, a total of 215.6 hours of photo radar camera enforcement occurred in four locations. During this time period a total of 1,935 speed violations were recorded. The speed violation rate was estimated at 82.0.

Table 4.5 Enforcement Statistics for Twin Brooks

Location	Date	Enforcement Hours	Traffic Counts	Violations	Traffic Rate*	Violation Rate**
12 Ave WB between 111 - 113 St	June	6.0	1290	2	213.8	1.6
	September	11.7	2012	259	172.7	128.7
	October	25.1	3823	189	152.1	49.4
12 Ave EB between 113 - 112 St	June	5.8	1054	22	182.2	20.9
	September	20.5	2948	375	144.2	127.2
	October	24.1	3638	236	151.0	64.9
9B Ave WB between 116 - 119 St	June	31.1	1313	29	42.2	22.1
	September	12.7	634	50	50.1	78.9
	October	19.2	852	53	44.3	62.2
9B Ave WB between 119 - 116 St	June	2.1	163	0	77.0	0.0
	September	15.8	1609	262	101.7	162.8
	October	26.2	1844	116	70.4	62.9
	Total	**200.3**	**21180**	**1593**	**105.8**	**75.2**

*Traffic rate was calculated as traffic count per hour of enforcement
** Violation rate was calculated as violation counts per 1,000 recorded vehicles

- In Twin Brooks, a total of 200.3 hours of photo radar camera enforcement occurred in four locations. During this time period a total of 1,593 speed violations were recorded. The speed violation rate was estimated at 75.2.

Table 4.6 Enforcement Statistics for Westridge/Wolf Willow

Location	Date	Enforcement Hours	Traffic Counts	Violations	Traffic Rate*	Violation Rate**
Wanyandi Rd between Wolf Ridge Way - Wanyandi Way	June	34.8	1469	26	42.3	17.7
	July	14.1	595	10	42.2	16.8
	September	11.9	472	16	39.7	33.9
	October	22.1	791	35	35.8	44.2
Wanyandi Rd NB between Wanyandi Way - Wolf Ridge Way	June	3.3	232	4	71.0	17.2
	September	14.2	845	81	59.6	95.9
	October	17.6	836	77	47.6	92.1
Wolf Willow Rd WB @ Westridge Rd	June	27.8	2281	26	82.0	11.4
	September	17.3	1457	123	84.4	84.4
	October	22.3	1686	75	75.5	44.5
Wolf Willow Rd EB @ Westridge Rd	June	3.9	379	2	97.2	5.3
	September	10.3	602	19	58.7	31.6
	October	15.6	1003	13	64.4	13.0
	Total	**215.2**	**12648**	**507**	**58.8**	**40.1**

*Traffic rate is calculated as traffic count per hour of enforcement
** Violation rate is calculated as violation counts per 1,000 recorded vehicles

- In Wolf Willow, a total of 215.2 hours of photo radar camera enforcement occurred in four locations. During this time period a total of 507 speed violations were recorded. The speed violation rate was estimated at 40.1.

5. OVERALL TRAFFIC & SPEED ANALYSIS

5.1 Global Analysis

This section provides the overall speed and traffic results for the pilot project. The speed analysis focused on evaluating the operating (85th percentile) speed, mean speed, and percent of vehicles in compliance with the posted speed limit. The traffic analysis evaluated the impact of the project on the traffic count and proportion of vehicles tailgating.

Note on the use of the terms "*mean*" and "*average*" in the following section, speed and traffic data were collected for over 25 million vehicle records during the course of the pilot project. As a result, all the performance measures (i.e., operating speed, mean speed, percent compliance, traffic count, and proportion of vehicles tailgating) were averaged over various time periods and geometric space,(i.e., peak/off peak; days of the week; before-after periods; treated, control, and adjacent communities.) As a result, the term "mean" will be reserved for individual distributions and the term "average" will be used to indicate specific values (i.e., 85th percentile speed) are averaged over various time periods and geometric space.

5.1.1 Operating Speed (85th Percentile Speed)

- The "Before" and "After" means and standard errors for the average operating speed are presented in Tables 5.3 to 5.5, by various classifications. The Analysis of Variance (ANOVA) results are presented in Tables 5.6 and 5.7. The results are also depicted in Figures 5.1 to 5.4 for easy visualization.
- Figure 5.1 reveals the operating speed in the treated communities decreased after the implementation of the pilot project. Albeit not as substantial, the operating speed in the adjacent group also decreased. At the same time, the control group witnessed an increase in the operating speed.
- Table 5.1 shows the operating speed in the treated communities was reduced by 4.6% resulting in a 2.25 km/h reduction in speed. However, if the influence of other variables in the road system was accounted for (achieved by using a control group), the operating speed in the treated communities was further reduced to 7.1%. This corresponds to a reduction of 3.95 km/h in operating speed. In the adjacent communities, the operating speed was reduced by 1.6% resulting in a 0.87 km/h reduction. Alternatively, the percent reduction was further reduced to 4.1% (i.e., 2.25 km/h reduction in operating speed) by using a control group.

Table 5.1 Percent Change in the Average Operating Speed with and without using a Control Group

Community Group	Without Control*		With Control**	
	%	km/h	%	km/h
Treated	-4.6%	-2.25	-7.1%	-3.95
Adjacent	-1.6%	0.87	-4.1%	-2.25

*A simple before-after percent change was used to calculate the percentages without the control group i.e., [(after-before)/before]*100

** The cross-product ratio (also known as the odds ratio) was used to calculate the percent change in speed after accounting for the trends in the control group i.e., ([before control/after control]/[before treated/after treated])-1

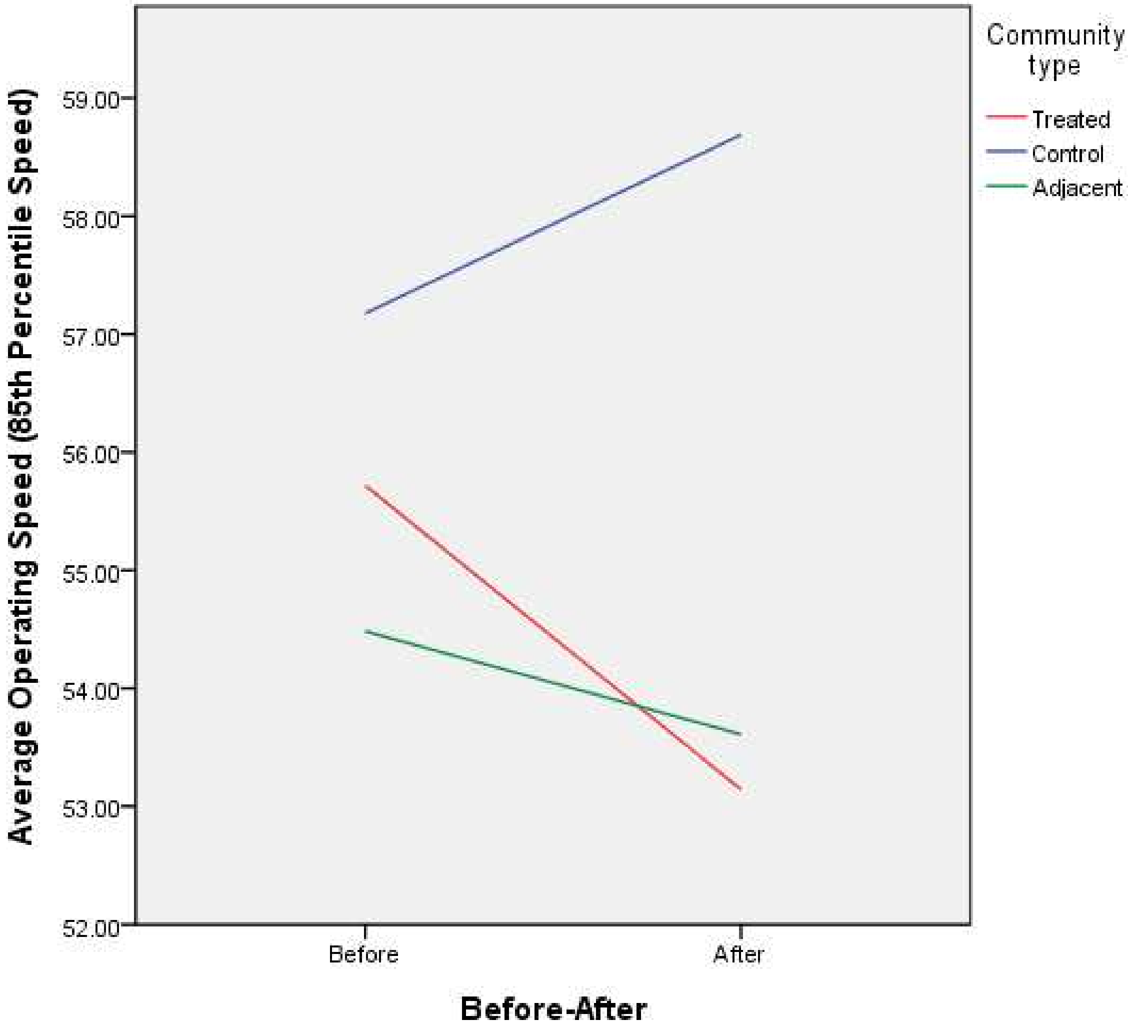


Figure 5.1 “Before” and “After” Average Operating Speed (85th Percentile Speed) by Community Group

- Figure 5.2 depicts the change in operating speed "Before" and "After" the implementation of the pilot project for different times of day and days of the week. The figure shows the operating speed decreased consistently in both treated and adjacent communities (albeit with varying rates) while increasing gradually in the control communities regardless of time of day or day of week.

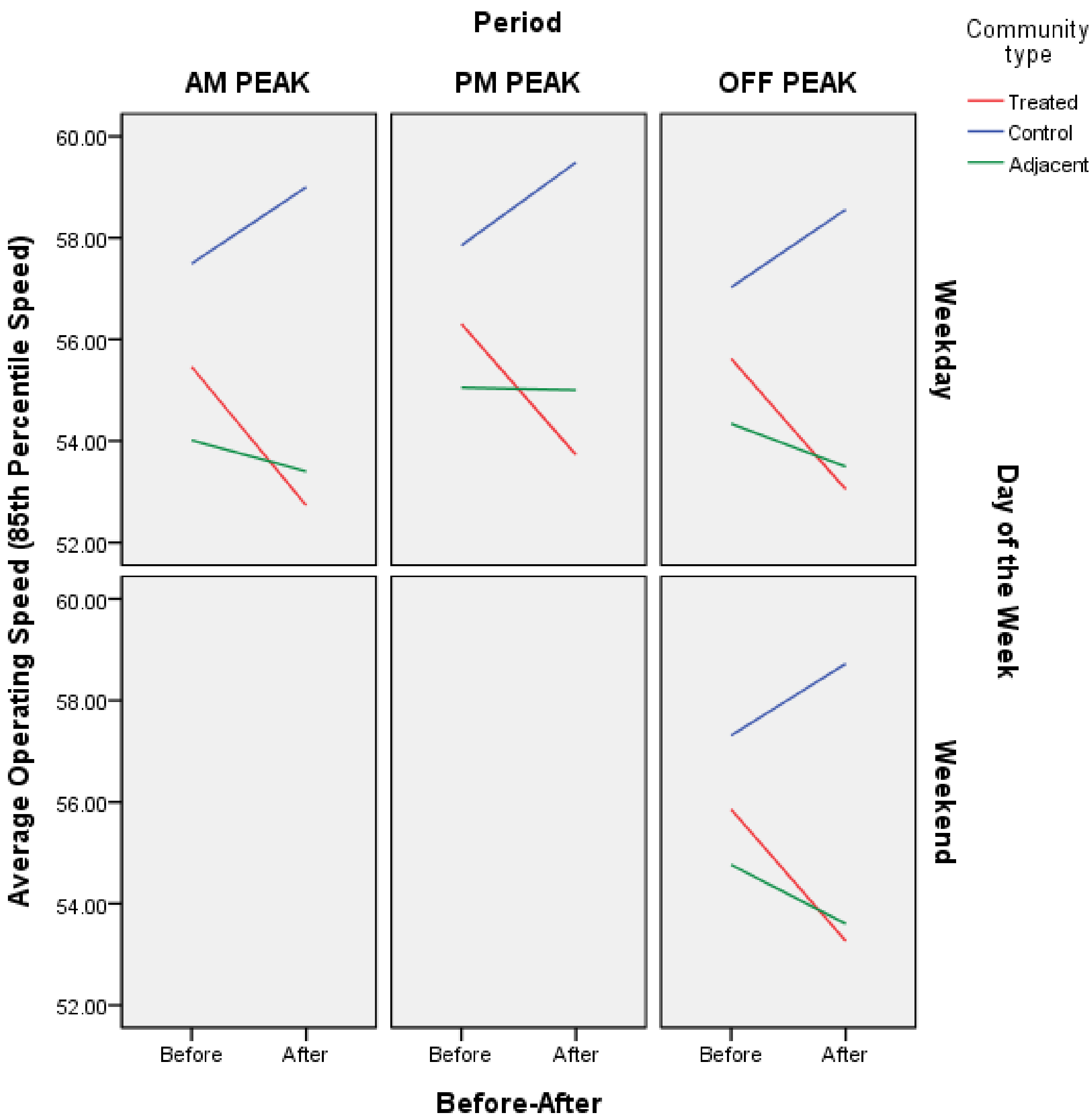


Figure 5.2 "Before" and "After" Average Operating Speed (85th Percentile Speed) by Community Group, Peak Period, and Day of Week

- Table 5.2 summarizes the percent change in operating speed with and without using a control group for different times of day and days of the week. The results show the operating speed decreased consistently in both treated and adjacent communities (albeit with varying rates) regardless of time of day or day of week.
- The table shows the reductions in operating speed were highly influenced by the corresponding increase in the control communities. As a result, the simple "Before" to "After" reduction is consistently lower than the reductions adjusted by the control group.
- Note the operating speed reduction ranged from 6.9% to 7.4% in the treated communities. On the other hand, operating speed reduction in the adjacent communities ranged from 2.8% to 4.5%.
- In the treated communities, the highest reduction in the operating speed (4.08 km/h) occurred during the AM peak on weekdays. Alternatively, the highest reduction in operating speed (2.46 km/h) in the adjacent communities occurred during the off-peak on weekends.

Table 5.2 Percent Change in Average Operating Speed by Community Group, Peak Period, and Day of Week with and without using a Control Group

Period	Community Group	Weekday				Weekend			
		Without Control*		With Control**		Without Control*		With Control**	
		%	km/h	%	km/h	%	km/h	%	km/h
AM Peak	Treated	-4.9%	-2.73	-7.4%	-4.08	.	.	.	.
	Adjacent	-1.1%	-0.61	-3.7%	-1.98	.	.	.	.
PM Peak	Treated	-4.6%	-2.58	-7.2%	-4.05	.	.	.	.
	Adjacent	-0.1%	-0.06	-2.8%	-1.57	.	.	.	.
Off Peak	Treated	-4.6%	-2.57	-7.1%	-3.96	-4.6%	-2.59	-6.9%	-3.87
	Adjacent	-1.6%	-0.85	-4.1%	-2.25	-2.1%	-1.17	-4.5%	-2.46

*A simple before-after percent change was used to calculate the percentages without the control group i.e., [(after-before)/before]*100

** The cross-product ratio (also known as the odds ratio) was used to calculate the percent change in speed after accounting for the trends in the control group i.e., ([before control/after control]/[before treated/after treated])-1

- Figure 5.3 shows there were monthly fluctuations in the operating speed for all community groups. In the treated group the speed was high in April and was reduced in later months, but in the control group the speed increased in later months compared to April. So while the speed was reduced in the treated group over time, it increased in the control group. Also, the speed was marginally reduced for the adjacent group of communities. Note: for the treated communities, the largest reduction in operating speed occurred at the start of the project (from April to June) with the speeds rising slightly in July before dropping and leveling off.

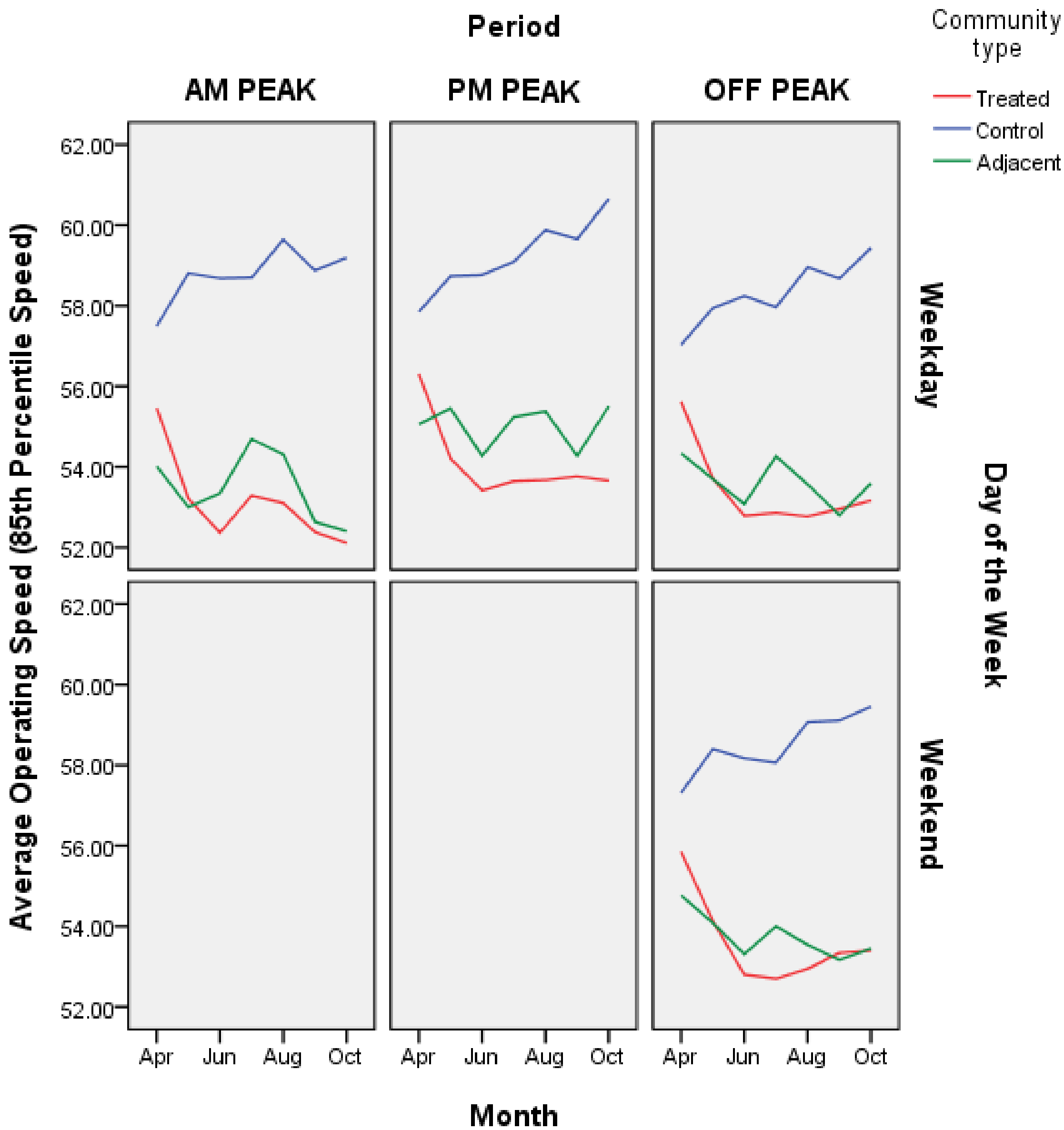


Figure 5.3 Monthly Average Operating Speed (85th Percentile Speed) by Community Group, Peak Period, and Day of Week

- Figure 5.4 shows a panel histogram of the operating speed for each of the community groups. Note: the solid red line represents the before posted speed limit (i.e., 50 km/h). After the implementation of the pilot project, the speed distribution for the treated communities shifted towards the solid red line indicating a reduction in the speed distribution. In contrast, the speed distribution for the control communities remained relatively unchanged, whereas the speed distribution for the adjacent communities shifted slightly to the left.

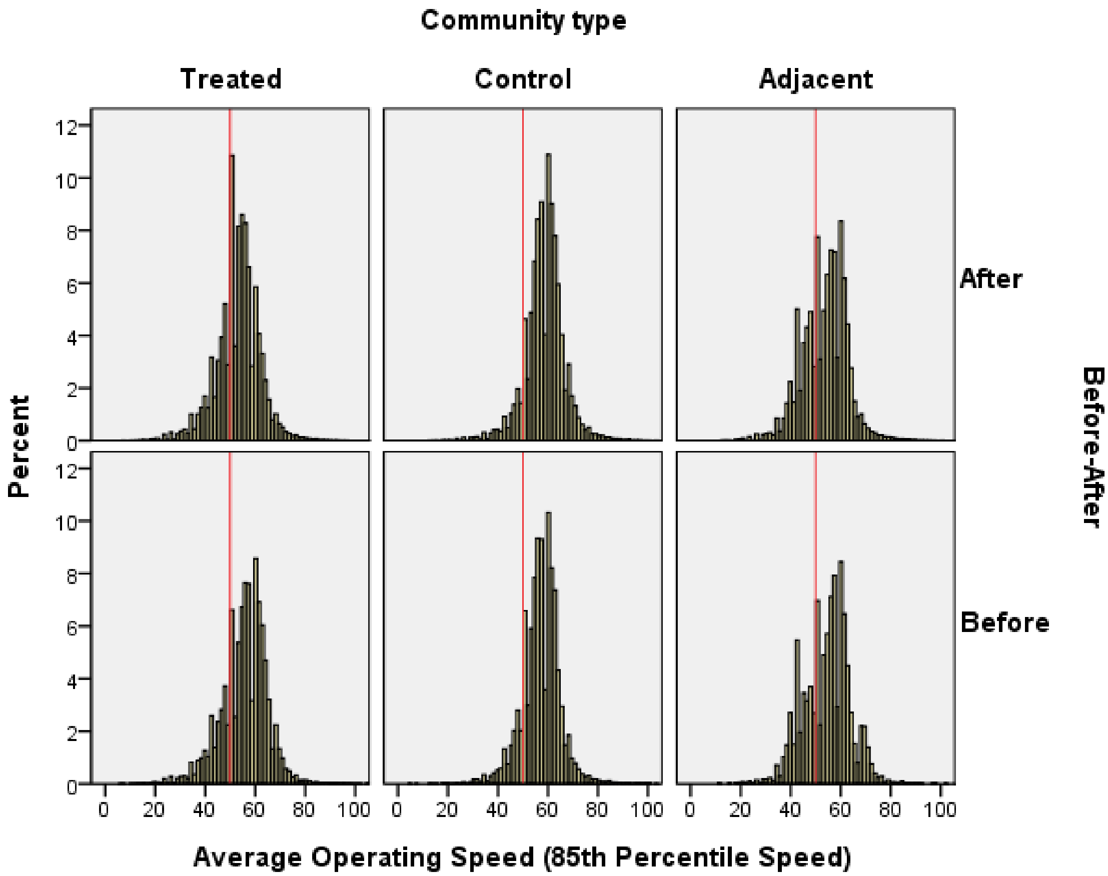


Figure 5.4 "Before" and "After" Histogram showing Average Operating Speed (85th Percentile Speed) by Community Group

- Figure 5.5 shows the "Before" and "After" cumulative distributions for the operating speed for each of the community groups. After the implementation of the pilot project, the cumulative distribution for the treated communities shifted to the left indicating a reduction in the speed. In contrast, the speed distribution for the control communities shifted to the right, whereas the speed distribution for the adjacent communities shifted slightly to the left. This implies the speed increased in the control communities while decreasing slightly in the adjacent communities during the "After" period.

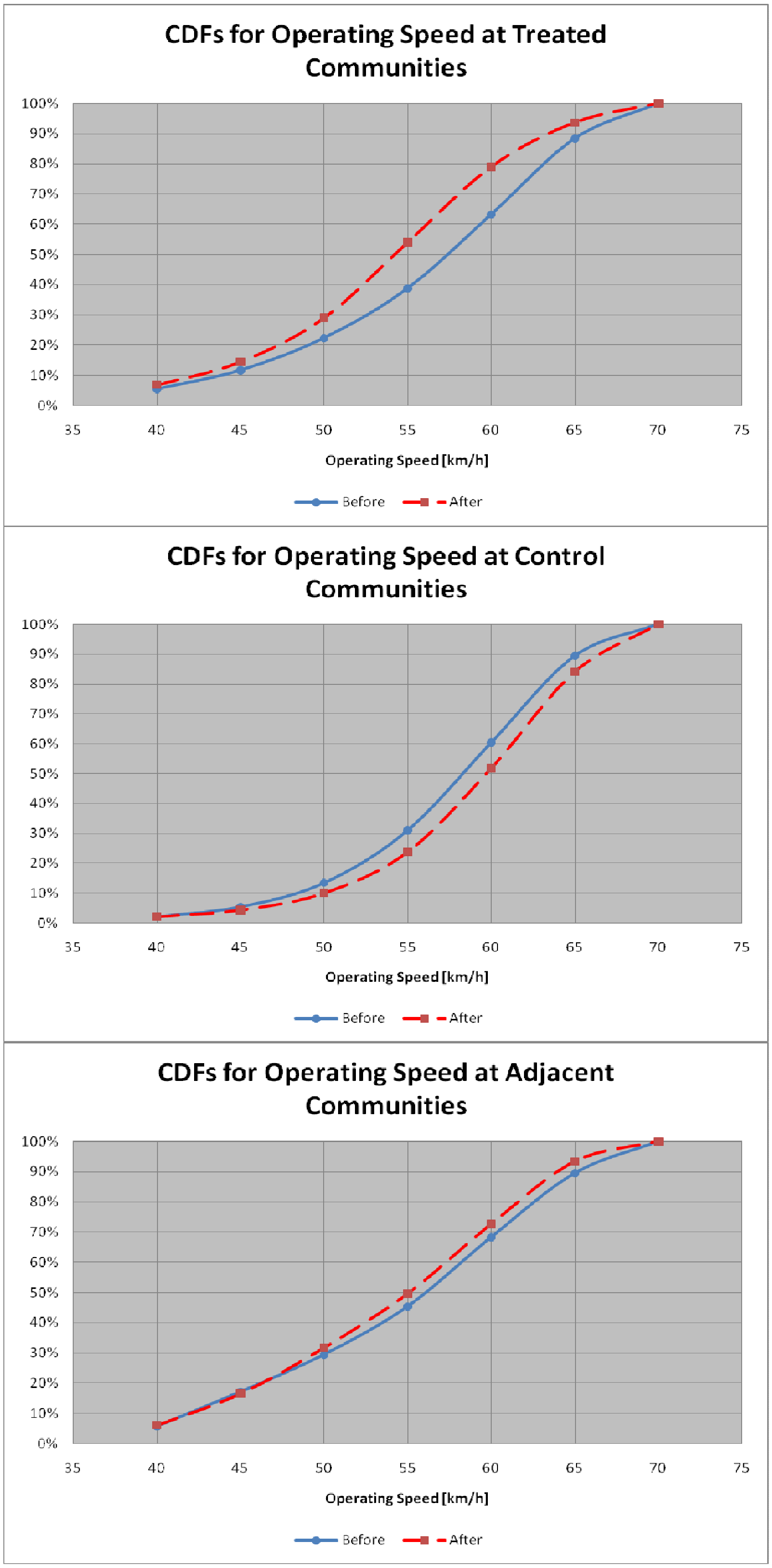


Figure 5.5 "Before" and "After" Cumulative Distributions for Average Operating Speed (85th Percentile Speed) by Community Group

Table 5.3 "Before" and "After" Average Operating Speed (85th Percentile Speed) by Community Group

Community Group	Before		After	
	Mean	S.E.	Mean	S.E.
Treated	55.72	.04	53.14	.02
Control	57.18	.06	58.69	.03
Adjacent	54.48	.11	53.61	.04

Table 5.4 "Before" and "After" Average Operating Speed by Community Group, Peak Period, and Day of Week

Period	Community Group	Weekday				Weekend			
		Before		After		Before		After	
		Mean	S.E.	Mean	S.E.	Mean	S.E.	Mean	S.E.
AM Peak	Treated	55.46	.12	52.73	.06	.	.	.	.
	Control	57.49	.19	59.00	.11	.	.	.	.
	Adjacent	54.01	.38	53.40	.15	.	.	.	.
PM Peak	Treated	56.31	.11	53.73	.05	.	.	.	.
	Control	57.85	.16	59.48	.07	.	.	.	.
	Adjacent	55.06	.34	55.00	.12	.	.	.	.
Off Peak	Treated	55.62	.05	53.05	.02	55.86	.07	53.27	.03
	Control	57.03	.08	58.56	.04	57.31	.12	58.72	.04
	Adjacent	54.34	.15	53.49	.06	54.77	.21	53.60	.07

Table 5.5 Average Operating Speed (85th Percentile Speed) by Community Group and Month

Community Group	Month													
	April		May		June		July		August		September		October	
	Mean	S.E.	Mean	S.E.	Mean	S.E.	Mean	S.E.	Mean	S.E.	Mean	S.E.	Mean	S.E.
Treated	55.72	.04	53.87	.04	52.80	.04	52.87	.04	52.89	.04	53.09	.04	53.22	.04
Control	57.18	.06	58.19	.06	58.28	.06	58.10	.07	59.08	.06	58.88	.06	59.49	.06
Adjacent	54.48	.11	53.90	.10	53.24	.10	54.25	.10	53.70	.10	52.99	.10	53.57	.10

- Tables 5.6 and 5.7 summarize the Mixed Analysis of Variance (ANOVA) results. Since the fixed effects of treatment and time (whether it is a month, day, or “Before” and “After” periods) were mixed with the random speed variation along with the random variation among sites selected within each community, a mixed ANOVA model was used to analyze the operating speed data. Also, the number of vehicles was used as a measure of exposure.
- The results of the Mixed ANOVA analysis reveal exposure (vehicles) is highly significant.
- The variation in the operating speed was significant (p-value <0.0001) for the treated community group, day of week, time of day, and “Before” and “After” periods.
- The interaction between the community group and time of day was statistically significant (p-value = 0.001). This implies the difference in operating speed between treated and control (or any other combination of community groups) in AM peak is different from operating speed in any other time period. Alternatively, the difference in speeds between AM peak and PM peak (or any other combination of peak periods) in the treated group is different from operating speed in the control or adjacent communities.
- The interaction between the community groups and “Before” and “After” periods was statistically significant (p-value < 0.0001). This implies the difference in operating speeds between treated and control (or any other combination of community groups) in the “Before” period was different from operating speeds in the “After” period. Alternatively, the difference in speeds between the “Before” and “After” periods in the treated group was different from operating speeds in the control or adjacent communities.
- The remaining two-way interactions were not significant (p-value > 0.01).
- All three-way interactions were not significant (p-value > 0.01). For example, the three way interaction between the community group, day of week, and “Before” and “After” periods was not statistically significant (p-value > 0.01). This implies the differences in operating speed between treated and control (or any other combination of community groups) communities during weekends in the “Before” period were not different from those on weekdays in the “After” period.
- Street variation within each community group explained 46% of the total variation.

Operating speed summary: after accounting for the unintended influence of other variables (achieved by using the control group), the operating speed was reduced by 7%. This corresponds to a reduction of 3.95 km/h in operating speed. Since the interaction between the community groups and “Before” and “After” periods was statistically significant, it was concluded that the pilot project was successful in reducing the operating speed (by approximately 7%) in the treated communities.

Table 5.6 Mixed ANOVA for Average Operating Speed (85th Percentile Speed)

Source	Numerator df	F	Sig.
(Intercept)	1	6765.997	.000
One-way Interaction			
Community Group	2	2.939	.056
Time of Day	2	311.393	.000
Before-After	1	48.619	.000
Day of Week	1	57.798	.000
Two-way Interactions			
Community Group * Time of Day	4	4.855	.001
Community Group * Before-After	2	512.031	.000
Community Group * Day of Week	2	.106	.899
Time of Day * Before-After	2	1.120	.326
Before-After * Day of Week	1	2.195	.138
Three-way Interactions			
Community Group * Time of Day * Before-After	4	.531	.713
Community Group * Before-After * Day of Week	2	.901	.406
Vehicles	1	2410.109	.000

Table 5.7 Estimates of Covariance Parameters for Average Operating Speed (85th Percentile Speed)

Parameter		Estimate	Std. Error
Residual		49.099826	0.091379
Site Variations within Community Group	Variance	41.102836	4.830825

5.1.2 Mean Speed

- Tables 5.10 to 5.12 summarize the descriptive statistics (marginal and joint means) for the mean speed.
- Figure 5.6 reveals the mean speed in the treated communities decreased after the implementation of the pilot project. Albeit not as substantial, the speed in the adjacent group was decreased. At the same time, the control group witnessed an increase in the mean speed.
- Table 5.8 shows the mean speed in the treated communities was reduced by 5.1% resulting in a 2.43 km/h reduction in speed. However, if the influence of other variables in the road system was accounted for (achieved by using a control group), the mean speed in the treated communities was further reduced to 7.3%. This corresponds to a reduction of 3.48 km/h in mean speed. In the adjacent communities, the mean speed was reduced by 2.0% resulting in a 0.96 km/h reduction. Alternatively, the percent reduction was further reduced to 4.3% (i.e., 2.02 km/h reduction in mean speed) by using a control group.

Table 5.8 Percent Change in Average of Mean Speed with and without using a Control Group

Community Group	Without Control*		With Control**	
	%	km/h	%	km/h
Treated	-5.1%	-2.43	-7.3%	-3.48
Adjacent	-2.0%	-0.96	-4.3%	-2.02

*A simple before-after percent change was used to calculate the percentages without the control group i.e., [(after-before)/before]*100

** The cross-product ratio (also known as the odds ratio) was used to calculate the percent change in speed after accounting for the trends in the control group i.e., ([before control/after control]/[before treated/after treated])-1

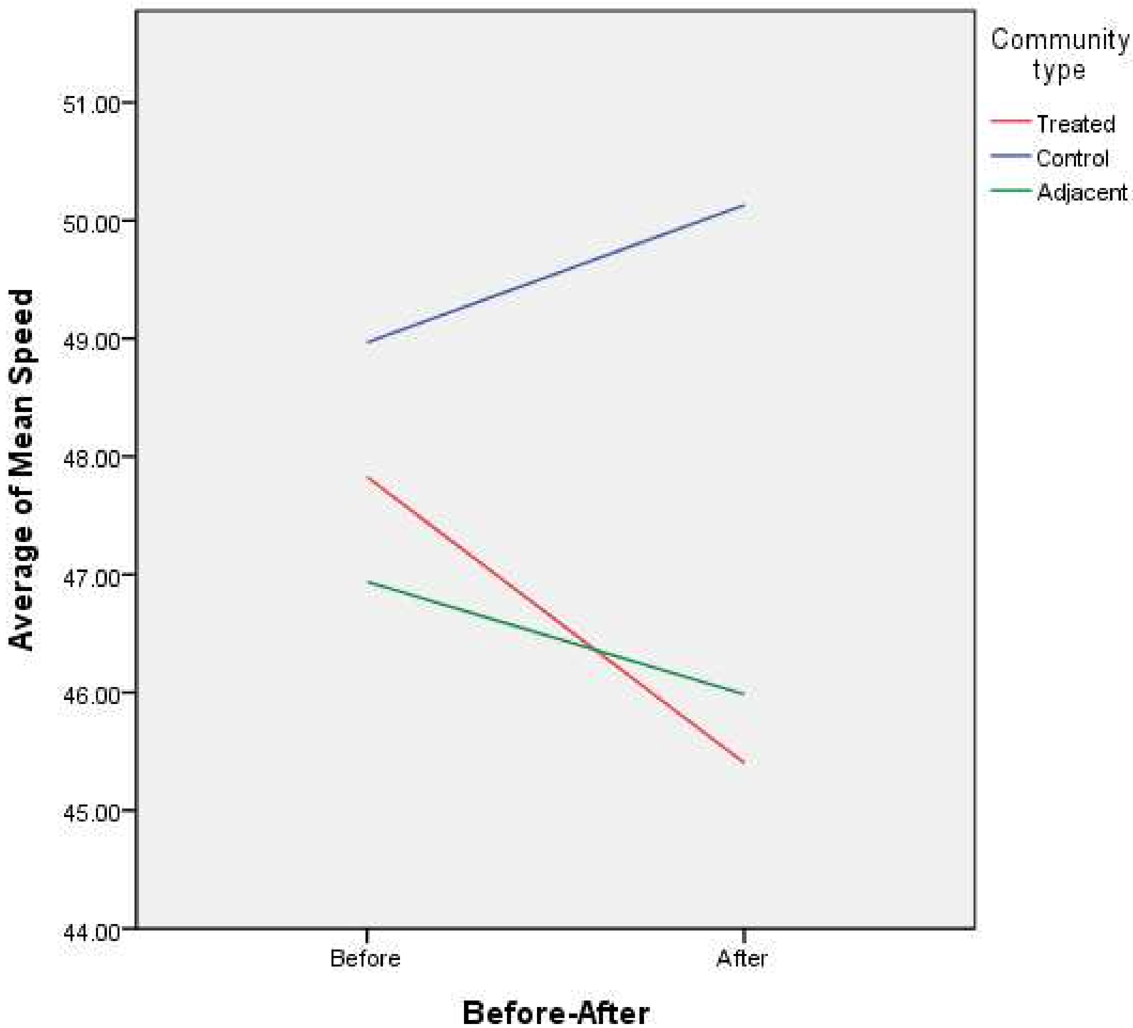


Figure 5.6 “Before” and “After” Average of Mean Speed by Community Group

- Figure 5.7 depicts the change in mean speed "Before" and "After" the implementation of the pilot project for different times of day and days of the week. The figure shows the mean speed decreased consistently in both treated and adjacent communities (albeit with varying rates) while increasing gradually in the control communities regardless of time of day or day of week.

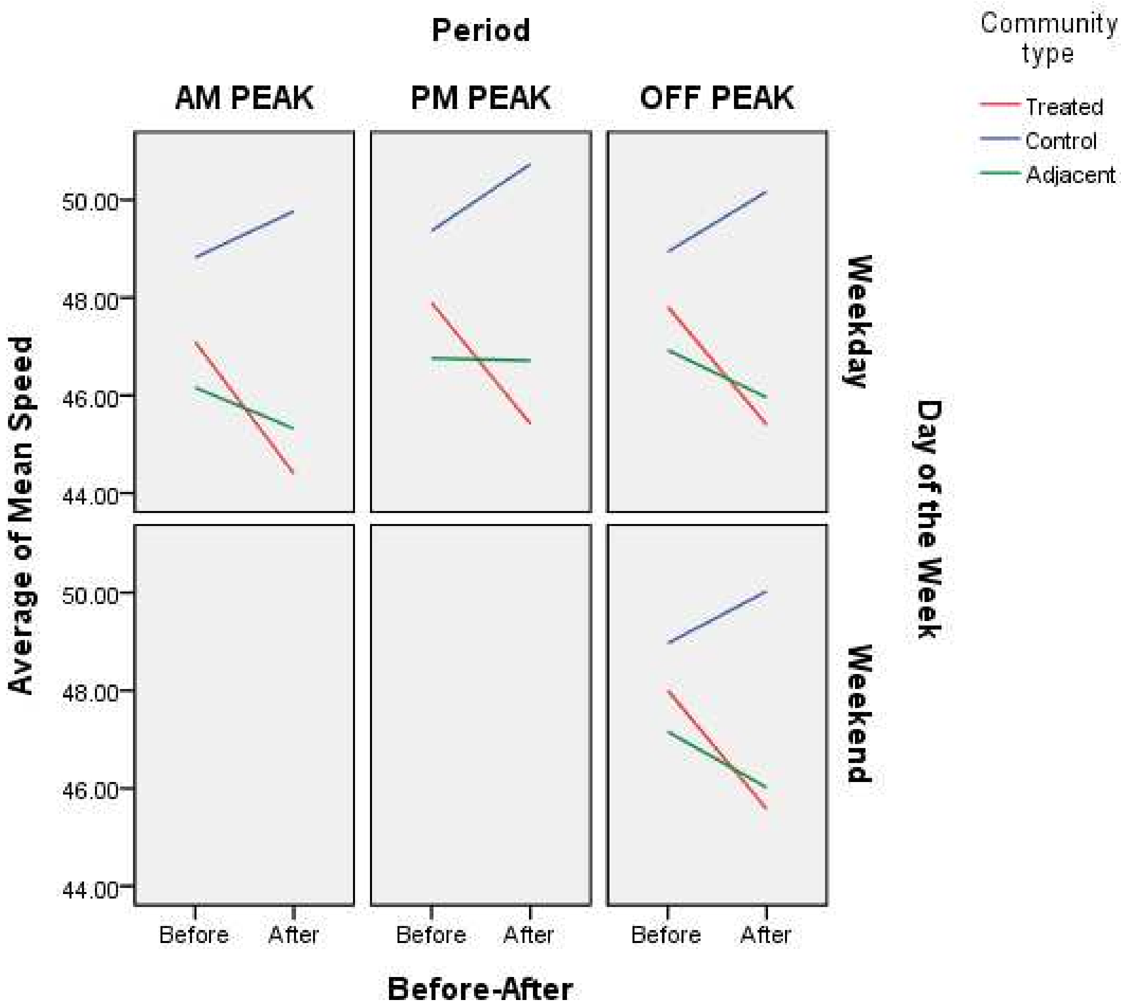


Figure 5.7 "Before" and "After" Average of Mean Speed by Community Group, Peak Period, and Day of Week

- Table 5.9 summarizes the percent change in mean speed with and without using a control group for different times of day and days of the week. The results show the mean speed decreased consistently in both treated and adjacent communities (albeit with varying rates) regardless of time of day or day of week.
- The table shows the reductions in mean speed were highly influenced by the corresponding increase in the control communities. As a result, the simple "Before" to "After" reduction is consistently lower than the reductions adjusted by the control group.
- Note: the mean speed reduction ranged from 7.1% to 7.7% in the treated communities. On the other hand, mean speed reduction in the adjacent communities ranged from 2.8% to 4.5%.
- In the treated communities, the highest reduction in the mean speed (3.70 km/h) occurred during the PM peak on weekdays. Alternatively, the highest reduction in mean speed (2.12 km/h) in the adjacent communities occurred during the off-peak on weekends.

Table 5.9 Percent Change in Average of Mean Speed by Community Group, Peak Period, and Day of Week with and without using a Control Group

Period	Community Group	Weekday				Weekend			
		Without Control*		With Control**		Without Control*		With Control**	
		%	km/h	%	km/h	%	km/h	%	km/h
AM Peak	Treated	-5.7%	-2.70	-7.5%	-3.55	.	.	.	.
	Adjacent	-1.8%	-0.84	-3.7%	-1.71	.	.	.	.
PM Peak	Treated	-5.2%	-2.48	-7.7%	-3.70	.	.	.	.
	Adjacent	-0.1%	-0.05	-2.8%	-1.30	.	.	.	.
Off Peak	Treated	-5.0%	-2.41	-7.4%	-3.52	-5.0%	-2.42	-7.1%	-3.39
	Adjacent	-2.0%	-0.96	-4.4%	-2.09	-2.4%	-1.14	-4.5%	-2.12

*A simple before-after percent change was used to calculate the percentages without the control group i.e., [(after-before)/before]*100

** The cross-product ratio (also known as the odds ratio) was used to calculate the percent change in speed after accounting for the trends in the control group i.e., ([before control/after control]/[before treated/after treated])-1

- Figures 5.8 shows there were monthly fluctuations in the mean speed for all community groups. In the treated group the speed was high in April and was reduced in later months, but in the control group the speed increased in later months compared to April. So while the speed was reduced in the treated group over time, it increased in the control group. Also, the speed was marginally reduced for the adjacent group of communities. Note: for the treated communities, the largest reduction in mean speed occurred at the start of the project (from April to June) with the speeds rising slightly in July before dropping and leveling off or simply leveling off.

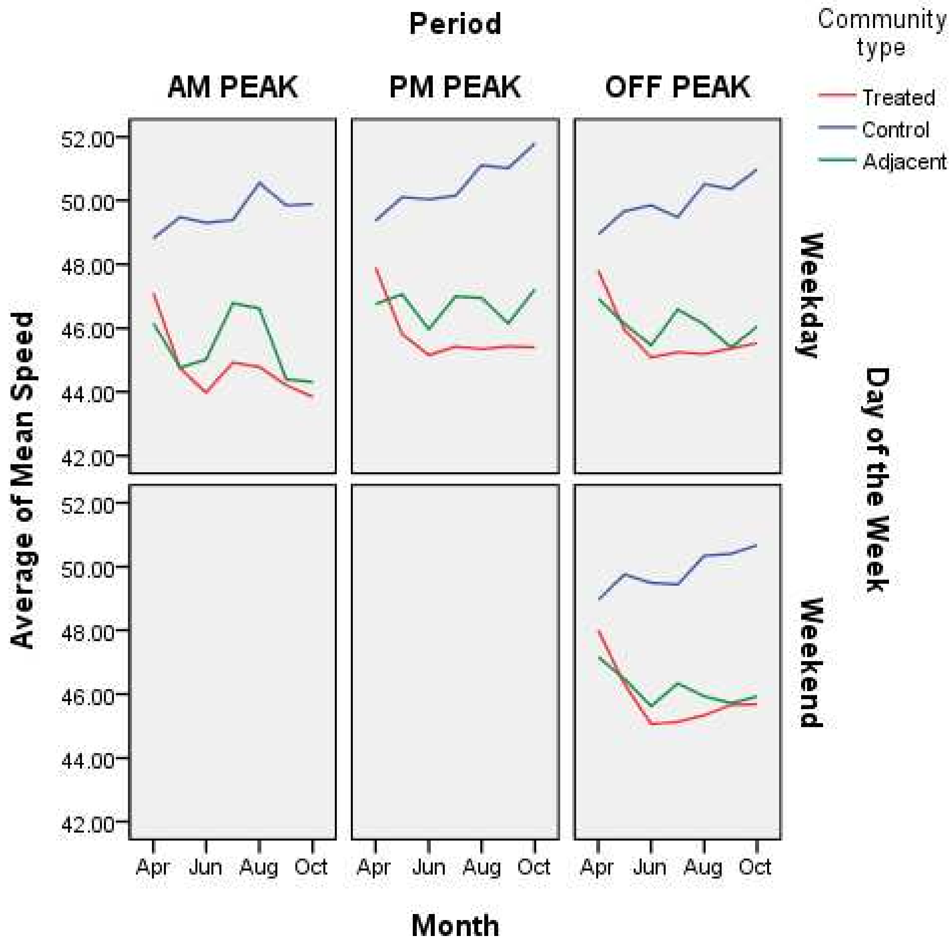


Figure 5.8 Monthly Average of Mean Speed by Community Group, Peak Period and Day of Week

- Figure 5.9 shows a panel histogram of the mean speed for each of the community groups. Note the solid red line represents the before posted speed limit (i.e., 50 km/h). After the implementation of the pilot project, the speed distribution for the treated communities shifted towards the solid red line indicating a reduction in the speed distribution. In contrast, the speed distribution for the control communities remained relatively unchanged, whereas mean speed for the adjacent communities shifted slightly to the left.

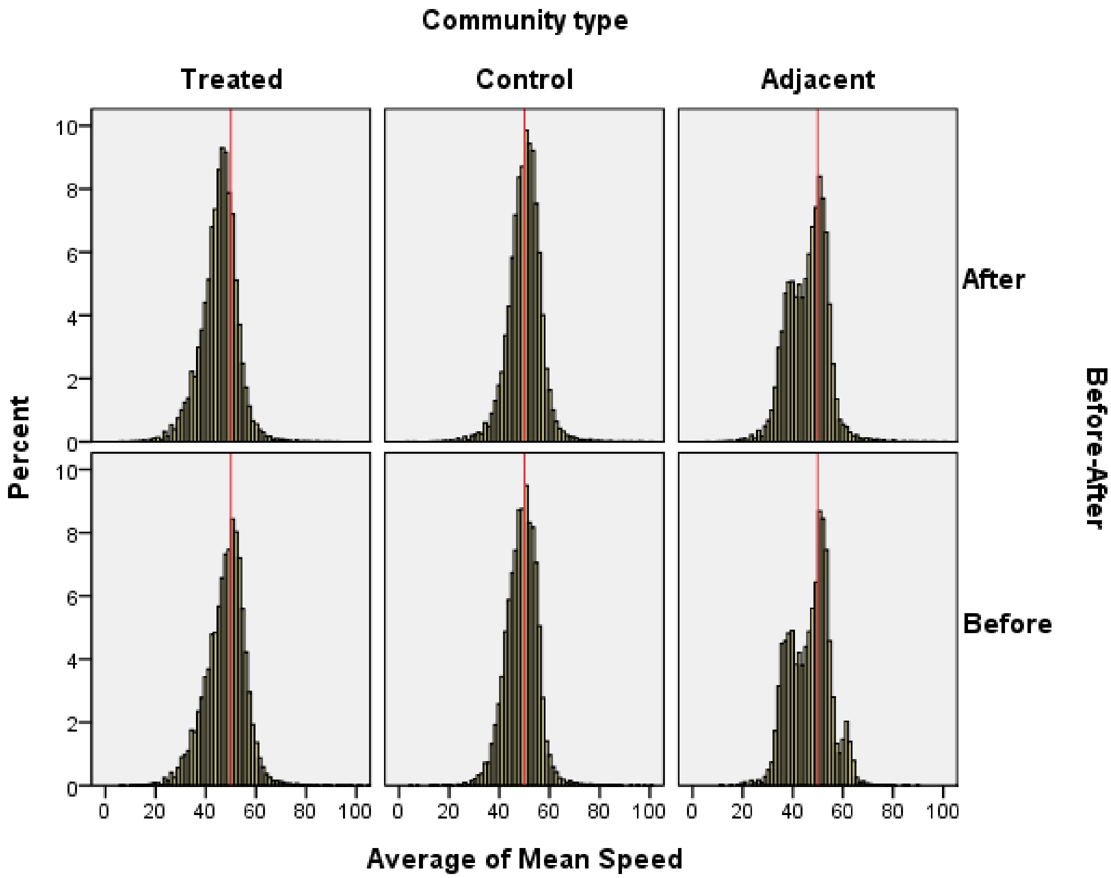


Figure 5.9 “Before” and “After” Histogram showing Mean Speed by Community Group

- Figure 5.10 shows the “Before” and “After” cumulative distributions for the mean speed for each of the community groups. After the implementation of the pilot project, the cumulative distribution for the treated communities shifted to the left indicating a reduction in the speed. In contrast, the speed distribution for the control communities shifted to the right, whereas the speed distribution for the adjacent communities shifted slightly to the left. This implies the mean speed increased in the control communities while decreasing slightly in the adjacent communities during the “After” period.

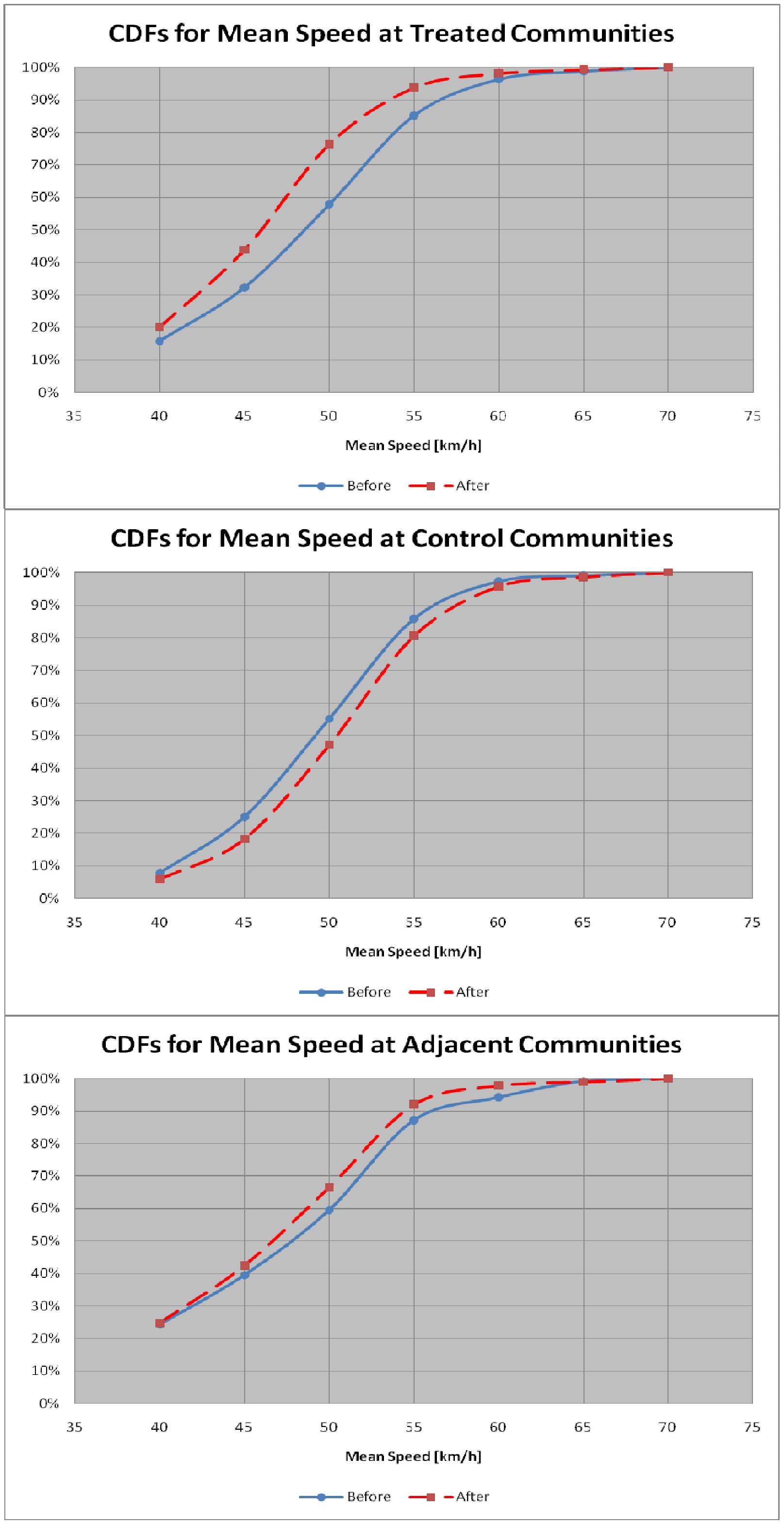


Figure 5.10 “Before” and “After” Cumulative Distributions for Mean Speed by Community Group

Table 5.10 "Before" and "After" Average of Mean Speed by Community Group

Community Group	Before		After	
	Mean	S.E.	Mean	S.E.
Treated	47.83	.03	45.40	.01
Control	48.97	.05	50.13	.02
Adjacent	46.94	.10	45.98	.04

Table 5.11 "Before" and "After" Average of Mean Speed by Community Group, Peak Period, and Day of Week

Period	Community Group	Weekday				Weekend			
		Before		After		Before		After	
		Mean	S.E.	Mean	S.E.	Mean	S.E.	Mean	S.E.
AM Peak	Treated	47.10	.11	44.40	.05	.	.	.	.
	Control	48.82	.17	49.77	.09	.	.	.	.
	Adjacent	46.16	.35	45.32	.14	.	.	.	.
PM Peak	Treated	47.90	.10	45.42	.04	.	.	.	.
	Control	49.37	.16	50.73	.07	.	.	.	.
	Adjacent	46.76	.32	46.71	.12	.	.	.	.
Off Peak	Treated	47.81	.04	45.40	.02	48.00	.06	45.58	.02
	Control	48.94	.07	50.17	.03	48.97	.09	50.03	.04
	Adjacent	46.92	.13	45.96	.05	47.16	.18	46.02	.06

Table 5.12 Average of Mean Speed by Community Group and Month

Community Group	Month													
	April		May		June		July		August		September		October	
	Mean	S.E.	Mean	S.E.	Mean	S.E.	Mean	S.E.	Mean	S.E.	Mean	S.E.	Mean	S.E.
Treated	47.83	.03	46.01	.03	45.01	.03	45.19	.03	45.22	.03	45.39	.03	45.49	.03
Control	48.97	.05	49.71	.05	49.72	.05	49.49	.06	50.50	.05	50.39	.05	50.86	.05
Adjacent	46.94	.10	46.24	.08	45.51	.09	46.54	.09	46.14	.08	45.48	.09	45.98	.09

- Tables 5.13 and 5.14 summarize the ANOVA results.
- The results of the Mixed ANOVA analysis reveal exposure (vehicles) was highly significant.
- The three-way interactions were not significant (p-value > 0.01).
- All two-way interactions were significant (p-value < 0.01) except for the day of the week by “Before” and “After” period interaction.
- The interaction between the community group and the day of the week was statistically significant. This implies the difference in mean speed between treated and control (or any other combination of community groups) on weekdays was different from mean speed on weekends. Alternatively, the difference in speeds between weekdays and weekends in the treated group was different from mean speeds in the control or adjacent communities.
- The interaction between the community group and time of day was statistically significant. This implies the difference in mean speed between treated and control (or any other combination of community groups) in AM peak was different from mean speeds in any other time periods. Alternatively, the difference in speeds between AM peak and PM peak (or a combination of other time periods) in the treated group was different from mean speeds in the control or adjacent communities.
- The interaction between the community groups and “Before” and “After” periods was statistically significant. This implies the difference in mean speeds between treated and control (or any other combination of community groups) in the “Before” period was different from mean speeds in the “After” period. Alternatively, the difference in speeds between “Before” and “After” periods in the treated group was different from mean speeds in the control or adjacent communities.
- The interaction between the time of day and “Before” and “After” periods was statistically significant. This implies the difference in mean speeds between AM peak and PM peak (or a combination of other time periods) in the “Before” period was different from mean speeds in the “After” period. Alternatively, the difference in speeds between “Before” and “After” periods in the AM peak was different from mean speeds in the PM and off-peak time periods.
- Street variation within each community group explained 54% of the total variation.

Mean speed summary: the mean speed was reduced by 7% which corresponds to a reduction of 3.48 km/h in mean speed. Again, since the interaction between the community groups and “Before” and “After” periods was statistically significant, it was concluded that the pilot project was successful in reducing the mean speed (by approximately 7%) in the treated communities.

Table 5.13 Mixed ANOVA for Average of Mean Speed

Source	Numerator df	F	Sig.
(Intercept)	1	5925.074	.000
One-way Interaction			
Community Group	2	2.624	.076
Day of Week	1	22.864	.000
Time of Day	2	229.812	.000
Before-After	1	136.201	.000
Two-way Interactions			
Community Group * Day of Week	2	11.078	.000
Community Group * Time of Day	4	6.048	.000
Community Group * Before-After	2	660.838	.000
Day of Week * Before-After	1	1.852	.174
Time of Day * Before-After	2	5.684	.003
Three-way Interactions			
Community Group * Day of Week * Before-After	2	1.595	.203
Community Group * Time of Day * Before-After	4	1.115	.347
Vehicles	1	4621.661	.000

Table 5.14 Estimates of Covariance Parameters for Average of Mean Speed

Parameter		Estimate	Std. Error
Residual		29.750462	0.055368
Site Variations within Community Group	Variance	34.635901	4.030146

5.1.3 Percent Compliance

- Tables 5.15 to 5.17 summarize the descriptive statistics (marginal and joint means) for the percentage of vehicles in compliance with the posted speed limit.
- Figure 5.11 reveals the percent compliance to the posted speed limit (40 km/h) in the treated communities decreased substantially (61% to 35%) after the implementation of the pilot project. Albeit not as steep, compliance percentages to the posted speed (50 km/h) in the control group decreased from 58% to 53%. Alternatively, the percent compliance to the posted speed (50 km/h) improved marginally for the adjacent communities (64% to 68%).

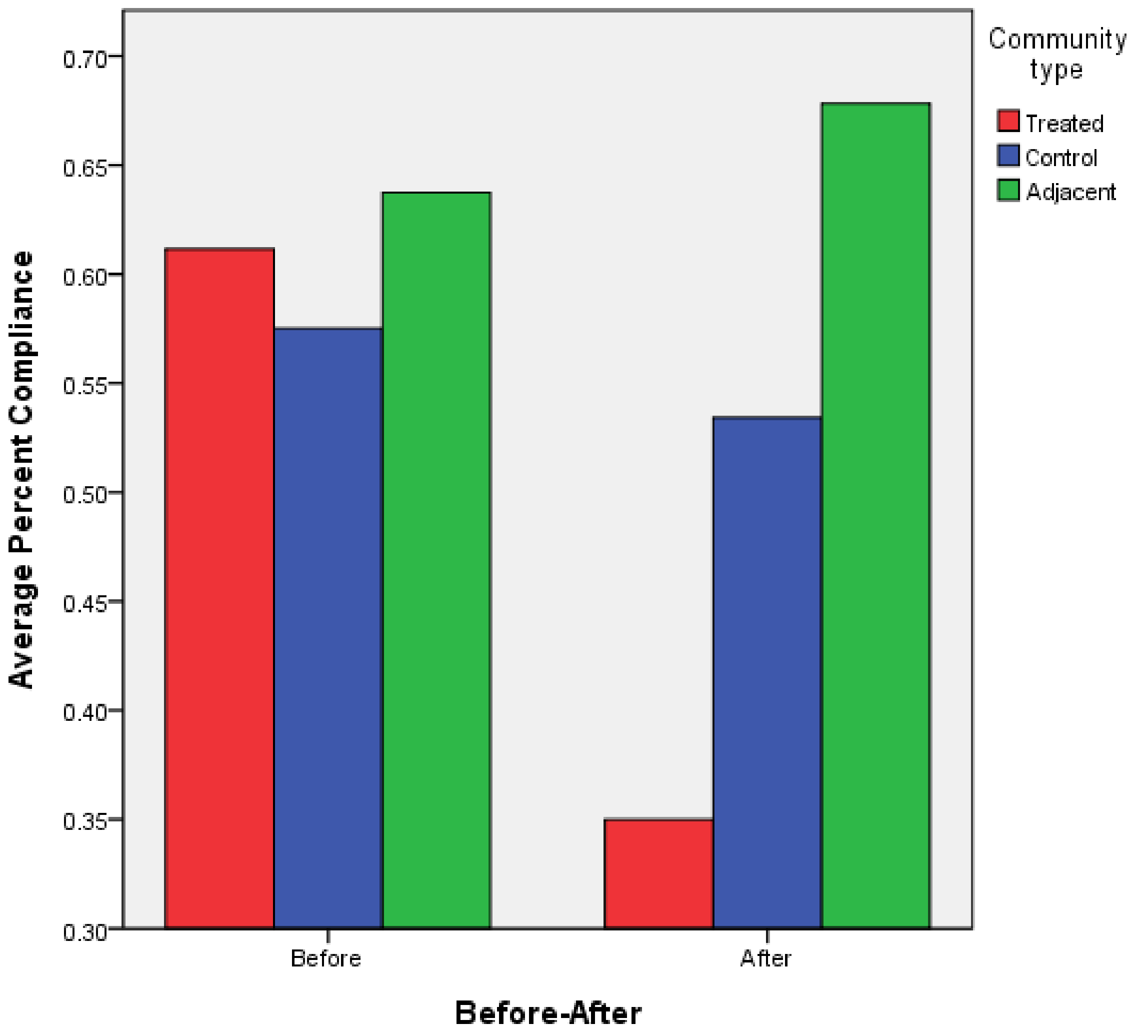


Figure 5.11 "Before" and "After" Average Percent Compliance by Community Group

- Figure 5.12 depicts the change in percent compliance with the posted speed limit "Before" and "After" the implementation of the pilot project for different times of day and days of the week. The figure shows the compliance decreased consistently in both treated and control communities (albeit with varying rates) while slightly increasing in the adjacent communities regardless of time of day or day of week.

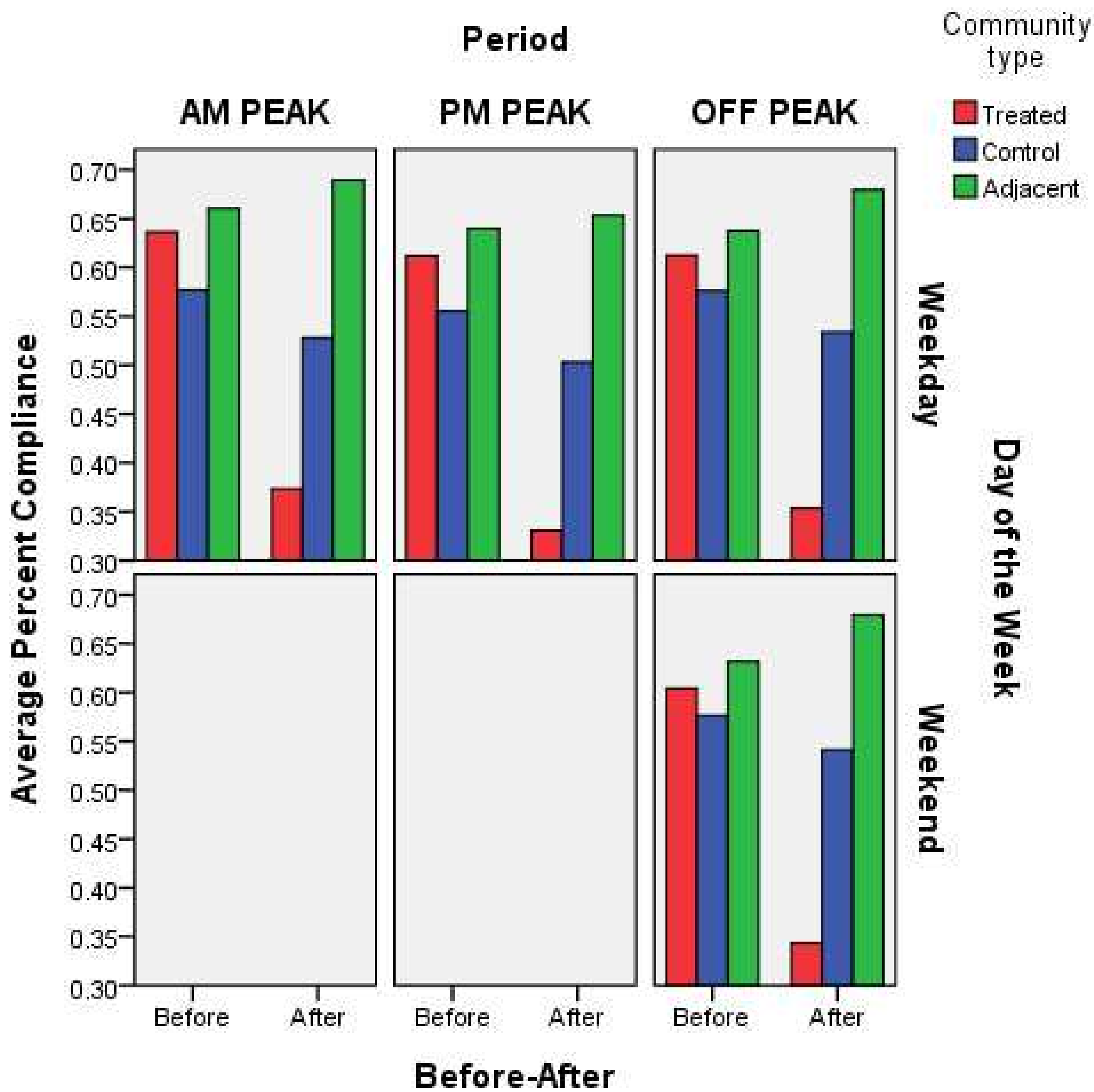


Figure 5.12 "Before" and "After" Average Percent Compliance by Community Group, Peak Period, and Day of Week

- Figures 5.13 shows there were some monthly fluctuations in compliance percentages for all community groups. Compliance rates in the control communities were declining slightly while the rates for the adjacent group were improving slightly. In the treated and control communities the compliance rates were high in April and were reduced in later months, but in the adjacent group the compliance rate increased in later months compared to April. So while the compliance rate was reduced in the treated and control groups over time, it increased in the adjacent group. Note: for the treated communities, a large reduction in compliance percentage occurred at the start of the project (from April to May) which leveled off at approximately 35% for the remaining months.

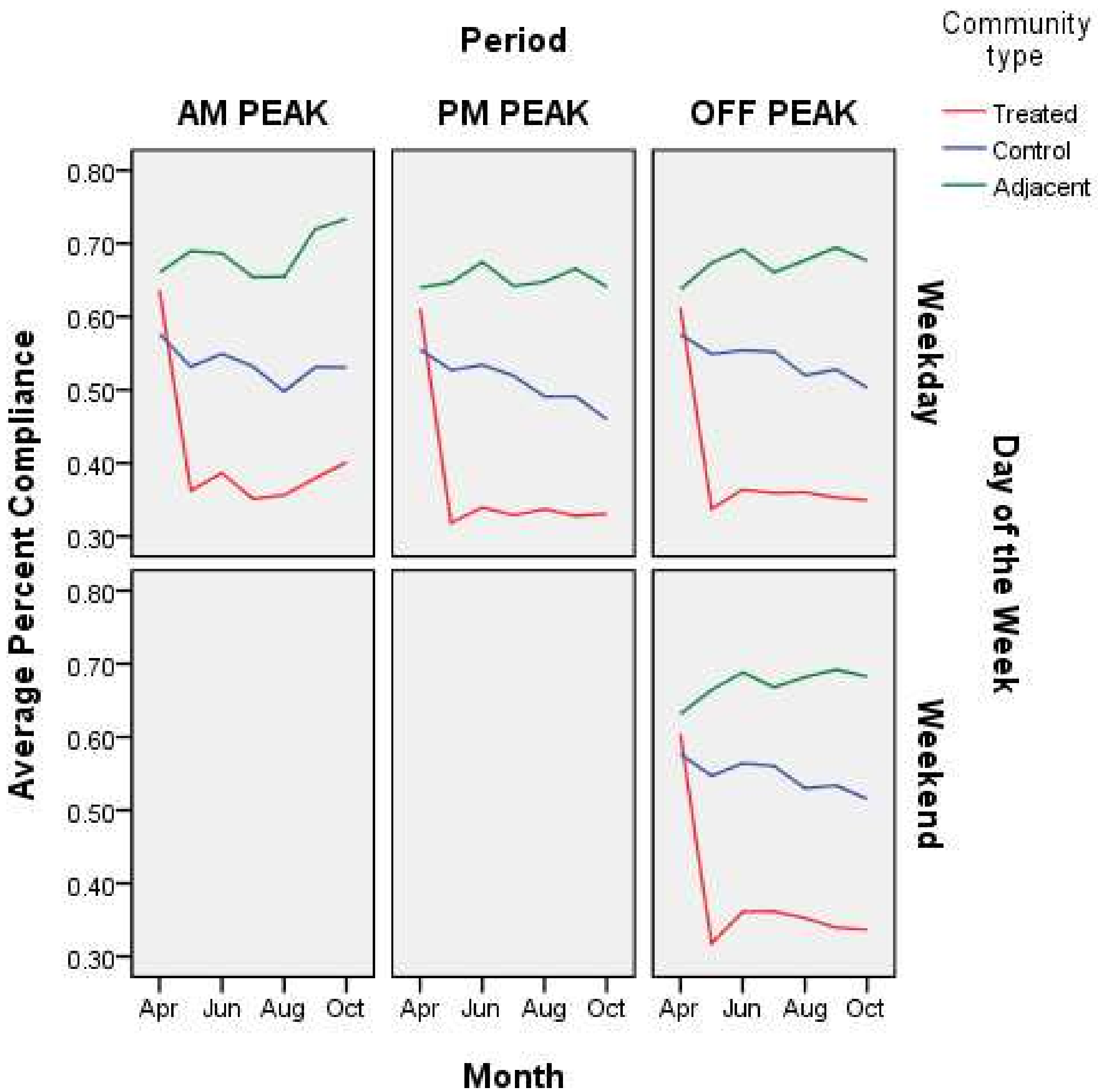


Figure 5.13 Monthly Average Percent Compliance by Community Group, Peak Period, and Day of Week

Table 5.15 "Before" and "After" Average Percent Compliance by Community Group

Community Group	Before		After	
	Mean	S.E.	Mean	S.E.
Treated	.61	.00	.35	.00
Control	.58	.00	.53	.00
Adjacent	.64	.00	.68	.00

Table 5.16 "Before" and "After" Average Percent Compliance by Community Group, Peak Period, and Day of Week

Period	Community Group	Weekday				Weekend			
		Before		After		Before		After	
		Mean	S.E.	Mean	S.E.	Mean	S.E.	Mean	S.E.
AM Peak	Treated	.64	.00	.37	.00	.	.	.	.
	Control	.58	.01	.53	.00	.	.	.	.
	Adjacent	.66	.01	.69	.00	.	.	.	.
PM Peak	Treated	.61	.00	.33	.00	.	.	.	.
	Control	.56	.01	.50	.00	.	.	.	.
	Adjacent	.64	.01	.65	.00	.	.	.	.
Off Peak	Treated	.61	.00	.35	.00	.60	.00	.34	.00
	Control	.58	.00	.53	.00	.58	.00	.54	.00
	Adjacent	.64	.00	.68	.00	.63	.01	.68	.00

Table 5.17 Average Percent Compliance by Community Group and Month

Community Group	Month													
	April		May		June		July		August		September		October	
	Mean	S.E.	Mean	S.E.	Mean	S.E.	Mean	S.E.	Mean	S.E.	Mean	S.E.	Mean	S.E.
Treated	.61	.00	.33	.00	.36	.00	.36	.00	.36	.00	.35	.00	.35	.00
Control	.58	.00	.55	.00	.56	.00	.55	.00	.52	.00	.53	.00	.51	.00
Adjacent	.64	.00	.67	.00	.69	.00	.66	.00	.68	.00	.69	.00	.68	.00

- Figures 5.14 and 5.15 depict the change in the percent of vehicles in compliance to the posted speed limit based on different speed increments (i.e., at posted speed limit, +5 km/h, +10 km/h, +15 km/h) for the different community groups. Also, the figures portray this relationship for different times of day and days of the week, respectively.
- The figures reveal, regardless of the time of day or day of week, the percent compliance to the posted speed limit increases with the speed allowance or tolerance.
- During the “Before” period, the percentages of vehicles in compliance to the posted speed limit were 62%, 57%, and 64% for the treated, control, and adjacent communities, respectively. The respective percentages have progressively increased to 77%, 75%, and 79% at an allowance of 5 km/h (posted speed +15 km/h); to 87%, 87%, and 89% at an allowance of 10 km/h; and to 93%, 93%, and 94% at an allowance of 15 km/h.
- In contrast, during the “After” period, the percentages of vehicles in compliance to the posted speed limit were 35%, 53%, and 68% for the treated, control, and adjacent communities, respectively. The respective percentages have progressively increased to 55%, 71%, and 81% at an allowance of 5 km/h; to 72%, 84%, and 90% at an allowance of 10 km/h; and to 84%, 91%, and 94% at an allowance of 15 km/h.
- When the allowance increases to 15 km/h over the speed limit, the percent compliance was highest at approximately 90%. This indicates 90% of the road users drive at speeds at or below 15 km/h over the posted speed limit. Alternatively, lower percentages were consistently observed at the posted speed limit (i.e., when the allowance is set at zero).
- For the treated communities, the percent compliance with the posted speed limit was approximately 60% during April (the “Before” month). After the implementation of the project, the compliance percentages dropped to approximately 35%.
- Before the implementation of the pilot project, the compliance percentage at 15 km/h over the posted speed limit was approximately 93% for all community groups. After the implementation of the project, the compliance dropped to approximately 84% for the treated communities while remaining unchanged for the control and adjacent communities. A similar relationship was observed for speed allowances of +5 km/h and +10 km/h.

Allowance or tolerance summary: the percent compliance was found to be highly correlated with the speed allowance or tolerance level. The highest percentage compliance (90%) was achieved at approximately 15 km/h over the posted speed limit.

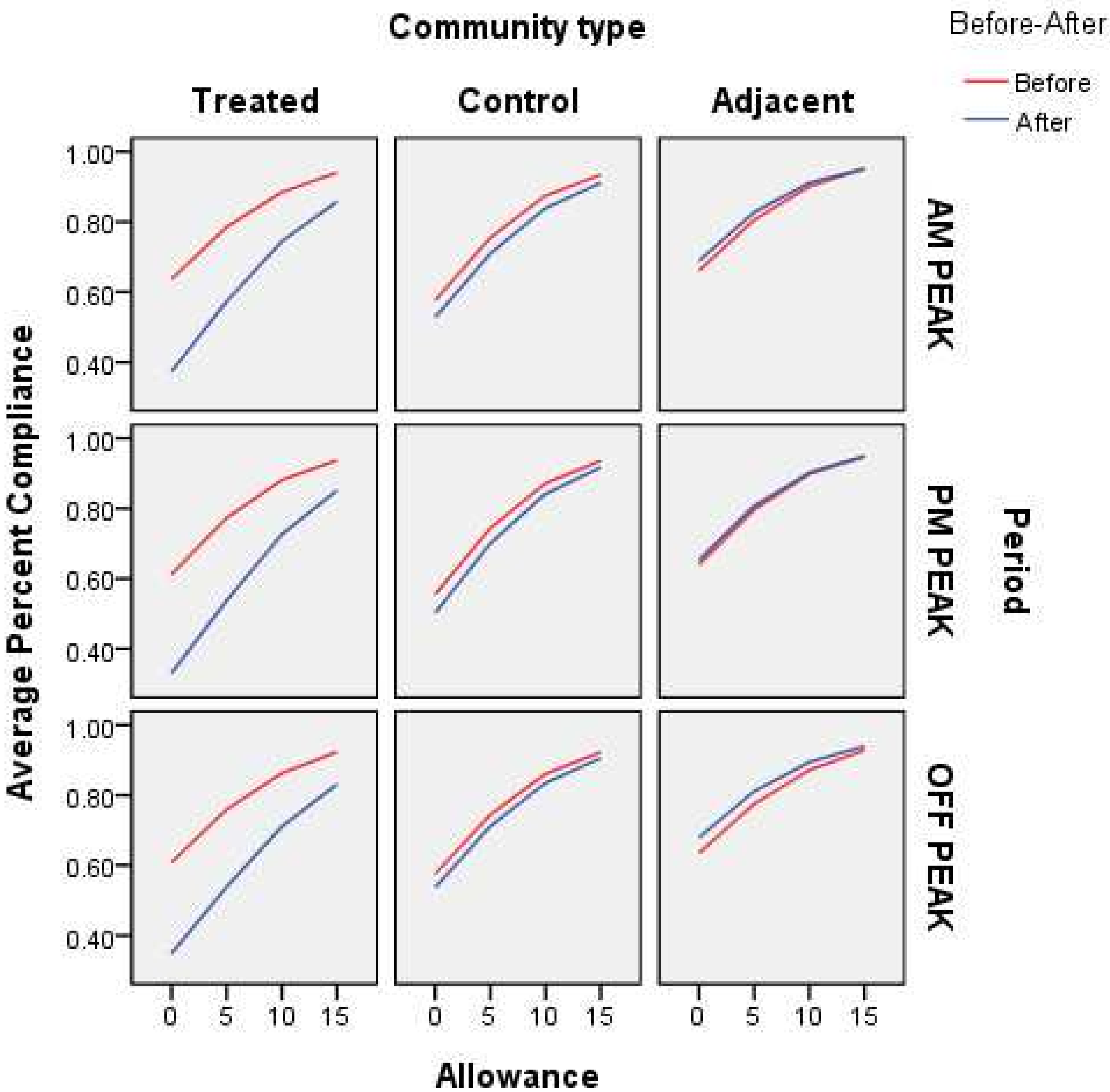


Figure 5.14 “Before” and “After” Average Percent Compliance by Community Group, Peak Period, and Allowance

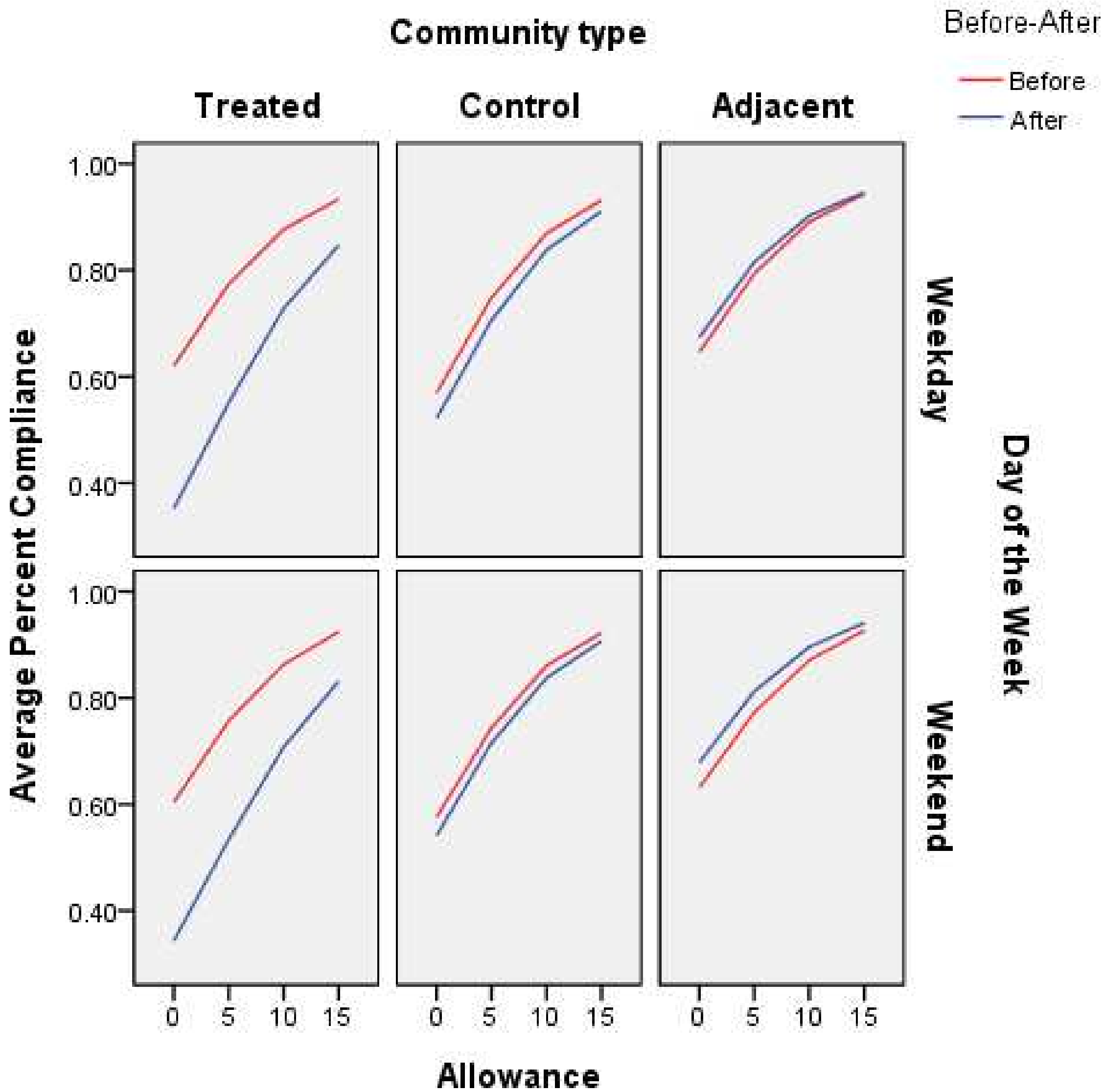


Figure 5.15 “Before” and “After” Average Percent Compliance by Community Group, Day of Week, and Allowance

- Table 5.18 summarizes the results of the Logistic Regression Analysis.
- The main findings are summarized below using the Odds Ratio (OR) terminology. To illustrate, note the odds of compliance (with the posted speed limit) is equal to the probability of compliance divided by the probability of non-compliance. For day of the week, say, the odds ratio is equal to the odds of compliance during weekdays divided by the odds of compliance during weekends. Thus, the odds ratio indicates the likelihood of compliance during weekdays with respect to compliance during weekends. Other odds ratios are defined in a similar way.
- The compliance OR in treated communities during weekdays = 1.11, i.e., the drivers in treated communities during weekdays were more (1.11) likely to comply than the drivers in other communities or during weekends. The OR was significant at a p-value <0.0001.
- The compliance OR in treated communities during AM peak = 1.04, i.e., the drivers in treated communities during AM peak were a little more (1.04) likely to comply than the drivers in other communities or during other periods. The OR was significant at a p-value <0.0001.
- The compliance OR in treated communities during PM peak = 1.06, i.e., the drivers in treated communities during PM peak were a little more (1.06) likely to comply than the drivers in other communities or during other periods. The OR was significant at a p-value <0.0001.
- The compliance OR in treated communities during the “After” period = 0.35, i.e., the drivers in treated communities during the “After” period were much less (0.35) likely to comply than the drivers in other communities or during the “Before” period. The OR was significant at a p-value <0.0001.
- The compliance OR in treated communities during weekdays in the “After” period = 1.02, i.e., the drivers in treated communities during weekdays in the “After” period were a little more (1.02) likely to comply than the drivers in other communities, during weekends or during the “Before” period. The OR was significant at a p-value = 0.031.
- The compliance OR in treated communities during AM peak in the “After” period = 1.02, i.e., the drivers in treated communities during AM peak in the “After” period were a little more (1.02) likely to comply than the drivers in other communities, during other periods or during the “Before” period. The OR was significant at a p-value = 0.044.
- The compliance OR in treated communities during PM peak in the “After” period = 0.99, i.e., the drivers in treated communities during PM peak in the “After” period were a little less (0.99) likely to comply than the drivers in other communities, during other periods or during the “Before” period. The OR was not significant, p-value = 0.176.

Percent compliance summary: the analysis showed that drivers in treated communities during the “After” period were much less likely to comply to the posted speed limit than the drivers in other communities or during the “Before” period. This implies that there was a significant decrease in the compliance percentages to the posted speed limit in the treated communities as a result of the pilot project.

Table 5.18 Logistic Regression Analysis for Average Percent Compliance

Variable	B	S.E.	Wald	df	Sig.	Exp(B)
One-way Interactions						
Community Groups			311.338	2	.000	
Treated Communities	-.052	.005	97.035	1	.000	.949
Adjacent Communities	-.146	.008	310.714	1	.000	.864
Day of Week						
Weekday	-.012	.006	4.231	1	.040	.988
Time of Day			510.668	2	.000	
AM Peak	-.005	.007	.538	1	.463	.995
PM Peak	-.154	.007	499.358	1	.000	.857
Before-After						
After Period	-.079	.005	236.424	1	.000	.924
Two-way Interaction						
Community Groups * Day of Week			1065.288	2	.000	
Treated Communities by Weekday	.104	.006	272.425	1	.000	1.109
Adjacent Communities by Weekday	-.152	.010	240.520	1	.000	.859
Community Groups * Time of Day			463.700	4	.000	
Treated Communities by AM Peak	.037	.008	19.307	1	.000	1.038
Treated Communities by PM Peak	.062	.008	63.292	1	.000	1.064
Adjacent Communities by AM Peak	.147	.014	116.368	1	.000	1.159
Adjacent Communities by PM Peak	.246	.012	400.748	1	.000	1.279
Community Groups * Before-After			67655.190	2	.000	
Treated Communities by After Period	-1.055	.006	34215.510	1	.000	.348
Adjacent Communities by After Period	.555	.009	3866.403	1	.000	1.742
Week of Day * Before-After						
Weekday by After Period	-.031	.006	25.788	1	.000	.969
Time of Day * Before-After			16.806	2	.000	
AM Peak by After Period	-.024	.008	8.563	1	.003	.976
PM Peak by After Period	-.025	.008	11.238	1	.001	.975
Three-way Interaction						
Community Group * Day of Week * Before-After			393.858	2	.000	
Treated Communities by Weekday by After Period	.015	.007	4.648	1	.031	1.015
Adjacent Communities by Weekday by After Period	.193	.011	326.287	1	.000	1.213
Community Group * Time of day * Before-After			676.999	4	.000	
Treated Communities by AM Peak by After Period	.019	.009	4.048	1	.044	1.019
Treated Communities by PM Peak by After Period	-.012	.009	1.830	1	.176	.988
Adjacent Communities by AM Peak by After Period	-.233	.015	238.751	1	.000	.792
Adjacent Communities by PM Peak by After Period	-.253	.014	349.854	1	.000	.777
Constant	.095	.005	399.552	1	.000	1.100

5.1.4 Traffic Count

- The number of vehicles was recorded every hour, every day for each selected site within the treated, control, and adjacent communities. Since the hourly periods were categorized into three periods (AM peak, PM peak, and off peak) for time-of-day, the number of recorded vehicles during the time-of-day period was used as a measure of traffic volume.
- Tables 5.19 to 5.21 summarize the traffic counts' descriptive statistics (marginal and joint means).
- Figure 5.16 reveals the number of vehicles passing through the treated communities decreased slightly after the implementation of the pilot project. Note: the decrease in the number of vehicles also occurs for both control and adjacent communities although with varying rates. However, the largest decrease occurred for the adjacent communities.

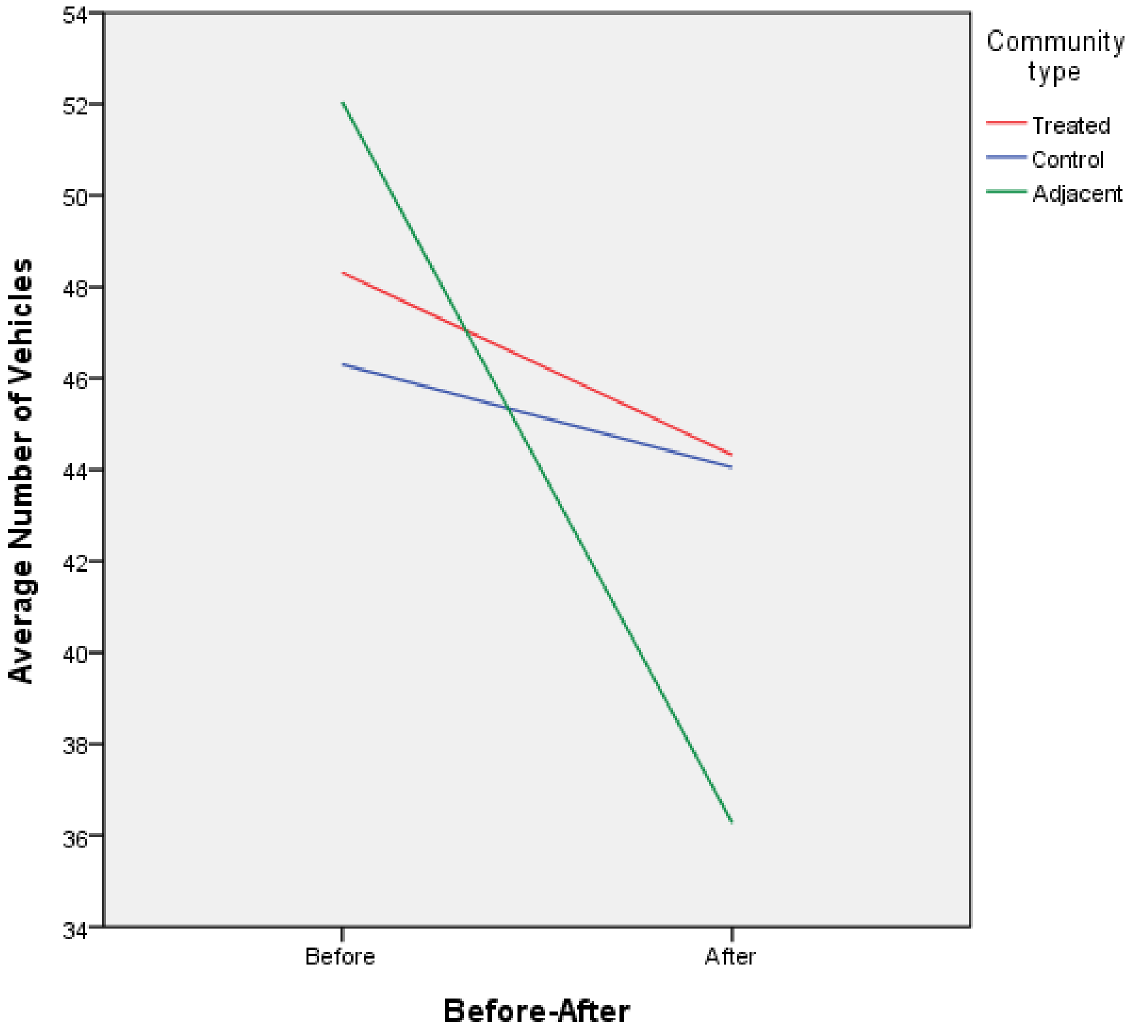


Figure 5.16 "Before" and "After" Average Number of Vehicles by Community Group

- Figure 5.17 depicts the change in traffic counts “Before” and “After” the implementation of the pilot project for different times of day and days of the week. The figure shows the number of vehicles was correlated to the time of day and day of week factors. The highest number of recorded vehicles occurs during the PM peak period on weekdays. Alternatively, the lowest number of recorded vehicles was observed during the off-peak period on weekends.
- Also, the figure shows the number of vehicles within each community group decreased from the “Before” to the “After” conditions. Depending on the day of week and time of day, the decrease could be minor or major with the adjacent communities experiencing the most reduction in vehicle counts.

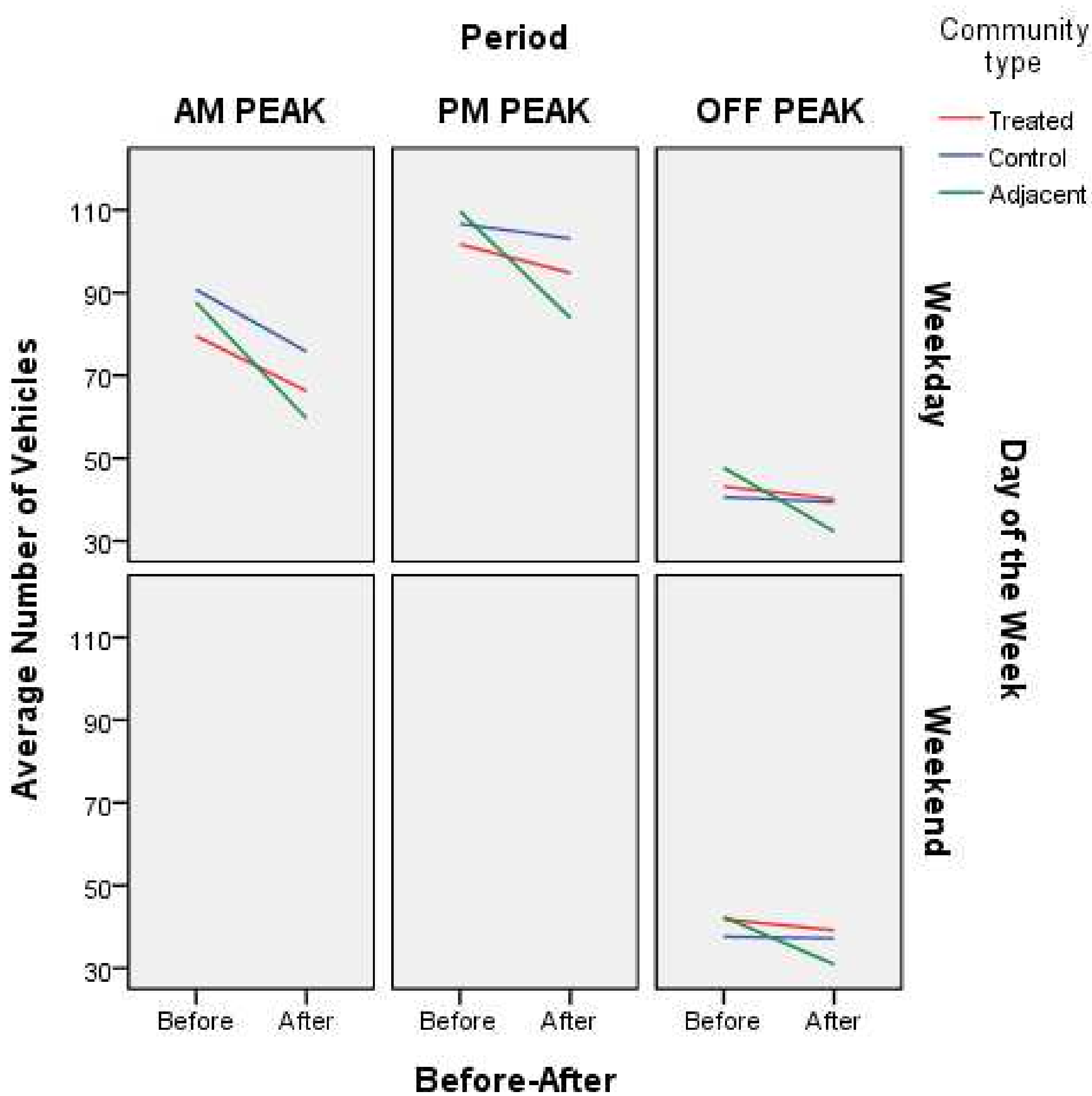


Figure 5.17 “Before” and “After” Average Number of Vehicles by Community Group, Peak Period, and Day of Week

- Figures 5.18 shows traffic counts were subject to monthly fluctuations. Again, the highest number of recorded traffic occurred during the PM peak period on weekdays with the lowest happening on off-peak periods during weekends.
- Note: for all community groups, there was a significant drop in the number of vehicles during the months of July and August. This drop could be due to the summer break with many people taking time off, however, traffic seemed to pick up again and peak after August.
- The figure also shows the monthly variation in traffic counts for the control and adjacent groups closely trace those of the treated communities.

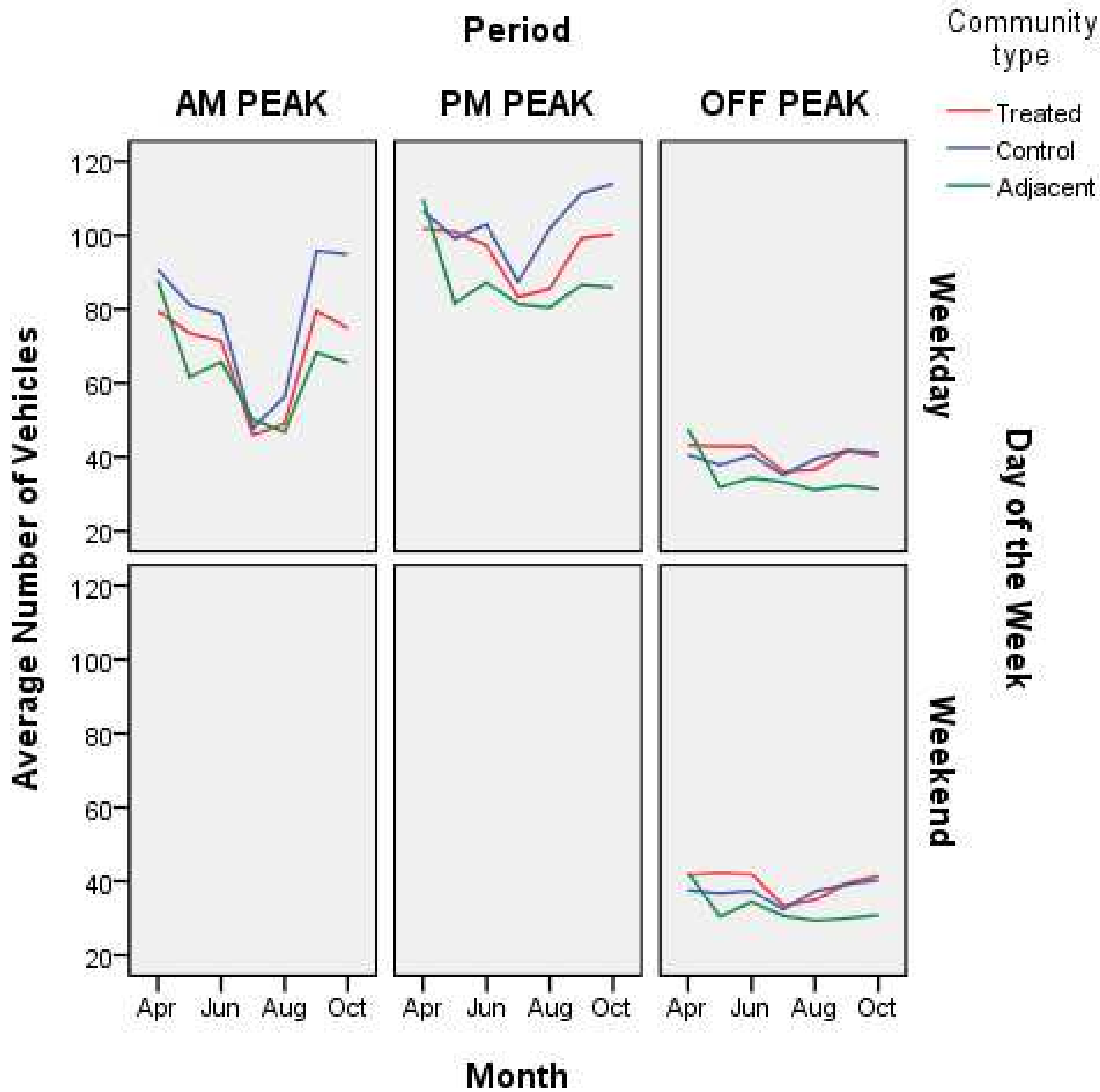


Figure 5.18 Monthly Average Number of Vehicles by Community Group, Peak Period, and Day of Week

Table 5.19 "Before" and "After" Average Number of Vehicles by Community Group

Community Group	Before		After	
	Mean	S.E.	Mean	S.E.
Treated	48	0	44	0
Control	46	0	44	0
Adjacent	52	1	36	0

Table 5.20 "Before" and "After" Average Number of Vehicles by Community Group, Peak Period, and Day of Week

Period	Community Group	Weekday				Weekend			
		Before		After		Before		After	
		Mean	S.E.	Mean	S.E.	Mean	S.E.	Mean	S.E.
AM Peak	Treated	80	1	66	1	.	.	.	.
	Control	91	3	76	1	.	.	.	.
	Adjacent	88	5	60	1	.	.	.	.
PM Peak	Treated	102	2	95	1	.	.	.	.
	Control	107	3	103	1	.	.	.	.
	Adjacent	110	7	84	1	.	.	.	.
Off Peak	Treated	43	0	40	0	42	0	39	0
	Control	41	0	39	0	38	1	37	0
	Adjacent	48	1	32	0	42	1	31	0

Table 5.21 Average Number of Vehicles by Community Group and Month

Community Group	Month													
	April		May		June		July		August		September		October	
	Mean	S.E.	Mean	S.E.	Mean	S.E.	Mean	S.E.	Mean	S.E.	Mean	S.E.	Mean	S.E.
Treated	48	0	47	0	48	0	38	0	39	0	47	0	46	0
Control	46	0	43	0	45	0	37	0	43	0	48	0	47	0
Adjacent	52	1	36	0	39	0	36	0	34	0	37	0	36	0

- Table 5.22 summarizes the results of the Negative Binomial Regression Analysis.
- A Negative Binomial model was fitted linking the natural logarithm of the number of recorded vehicles to various covariates representing treatment, time, and their interactions.
- The results of the Negative Binomial Regression Analysis reveal all three-way interactions were not significant (p-value > 0.01), whereas all two-way interactions were significant (p-value <0.01) as explained below:
- The significant two-way interactions suggests the number of vehicles varied significantly:
    - *By community groups for different days of week* implying the difference in traffic counts between treated and control (or any other combination of community groups) on weekdays was different from traffic counts on weekends. Alternatively, the difference in traffic counts between weekdays and weekends in the treated group was different from traffic counts in the control or adjacent communities;
    - *By community groups or different times of day* implying the difference in traffic counts between treated and control (or any other combination of community groups) in the AM peak was different from traffic counts in any other time periods. Alternatively, the difference in traffic counts between the AM peak and the PM peak (or a combination of other time periods) in the treated group was different from traffic counts in the control or adjacent communities;
    - *By community groups during the "Before" and "After" periods* implying the difference in traffic counts between treated and control (or any other combination of community groups) in the "Before" period was different from traffic counts in the "After" period. Alternatively, the difference in traffic counts between "Before" and "After" periods in the treated group was different from traffic counts in the control or adjacent communities.
    - *During the "Before" and "After" periods for different days of week implying* the difference in traffic counts between "Before" and "After" conditions on weekdays was different from traffic counts on weekends. Alternatively, the difference in traffic counts between weekdays and weekends in the "Before" period was different from traffic counts in the "After" period.
    - *During the "Before" and "After" periods for different times of day implying* the difference in traffic counts between "Before" and "After" conditions in the AM peak was different from traffic counts in any other time period. Alternatively, the difference in traffic counts between the AM peak and the PM peak (or a combination of other time periods) in the "Before" period was different from traffic counts in the "After" period.

Traffic count summary: the average number of recorded vehicles was reduced by 4% with respect to the changes in the control communities. The interaction between the community groups and "Before" and "After" periods was statistically significant indicating that the number of recorded vehicles was marginally reduced (by approximately 4%) in the treated communities. However, the reduction in traffic count could be attributed to the fact that below-average counts are typically observed during June, July and August.

Table 5.22 Negative Binomial Regression Analysis for Average Number of Vehicles

Source	Wald Chi-Square	df	Sig.
(Intercept)	355400.983	1	.000
One-way Interaction			
Community Group	20.738	2	.000
Day of Week	*		
Time of Day	6147.231	2	.000
Before-After	141.626	1	.000
Two-way Interactions			
Community Group * Day of Week	15.065	2	.001
Community Group * Time of Day	64.360	4	.000
Community Group * Before-After	40.297	2	.000
Day of Week * Before-After	5.830	1	.016
Time of Day * Before-After	12.729	2	.002
Three-way Interactions			
Community Group * Day of Week * Before-After	3.647	2	.161
Community Group * Time of Day * Before-After	6.478	4	.166

* Unable to compute due to numerical problems

5.1.5 Proportion of Tailgating Vehicles

- Tailgating is the practice of driving on a road too close to the vehicle in front. The proportion of tailgating vehicles was taken as a proxy measure of follow-too-closely behavior.
- Tables 5.23 to 5.25 summarize the descriptive statistics (marginal and joint means) for the proportion of tailgating vehicles.
- Figure 5.19 reveals the proportion of tailgating vehicles i) remained unchanged for the treated communities, ii) decreased slightly for the adjacent communities, and iii) increased slightly for the control communities.
- The proportion of tailgating vehicles was very small ranging from 0.005 to 0.009, i.e., this represented 5 to 9 tailgating vehicles per thousand vehicles.

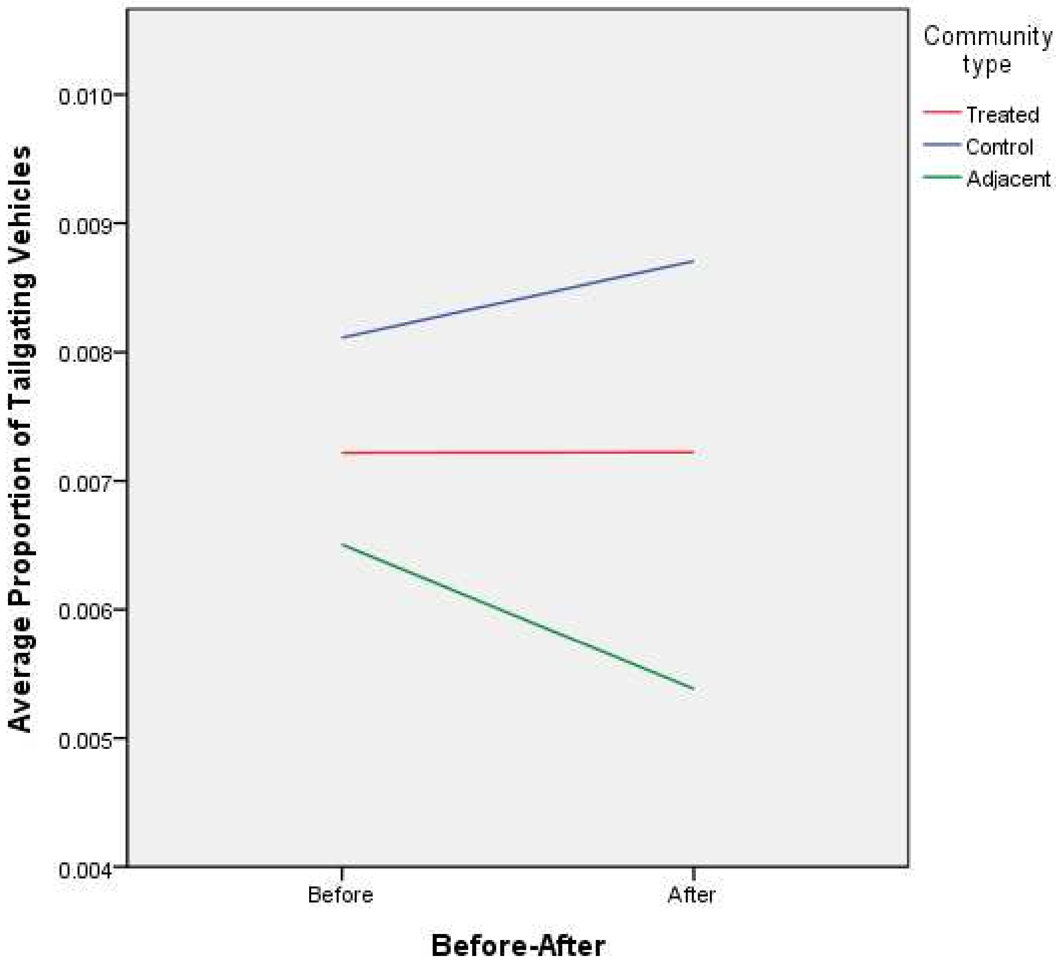


Figure 5.19 "Before" and "After" Average Proportion of Tailgating Vehicles by Community Group

- Figure 5.20 depicts the change in proportion of tailgating vehicles "Before" and "After" the implementation of the pilot project for different times of day and days of the week.
- The highest proportion of tailgating vehicles occurred during the PM peak period on weekdays. Alternatively, the lowest proportion of tailgating vehicles was observed during the off-peak period on weekends. This is a reasonable finding since rush hour is associated with higher congestion levels and therefore higher proportions of tailgating vehicles.
- Depending on the day of week and time of day, the proportion of tailgating vehicles within each community group increased or decreased slightly from the "Before" to the "After" conditions.

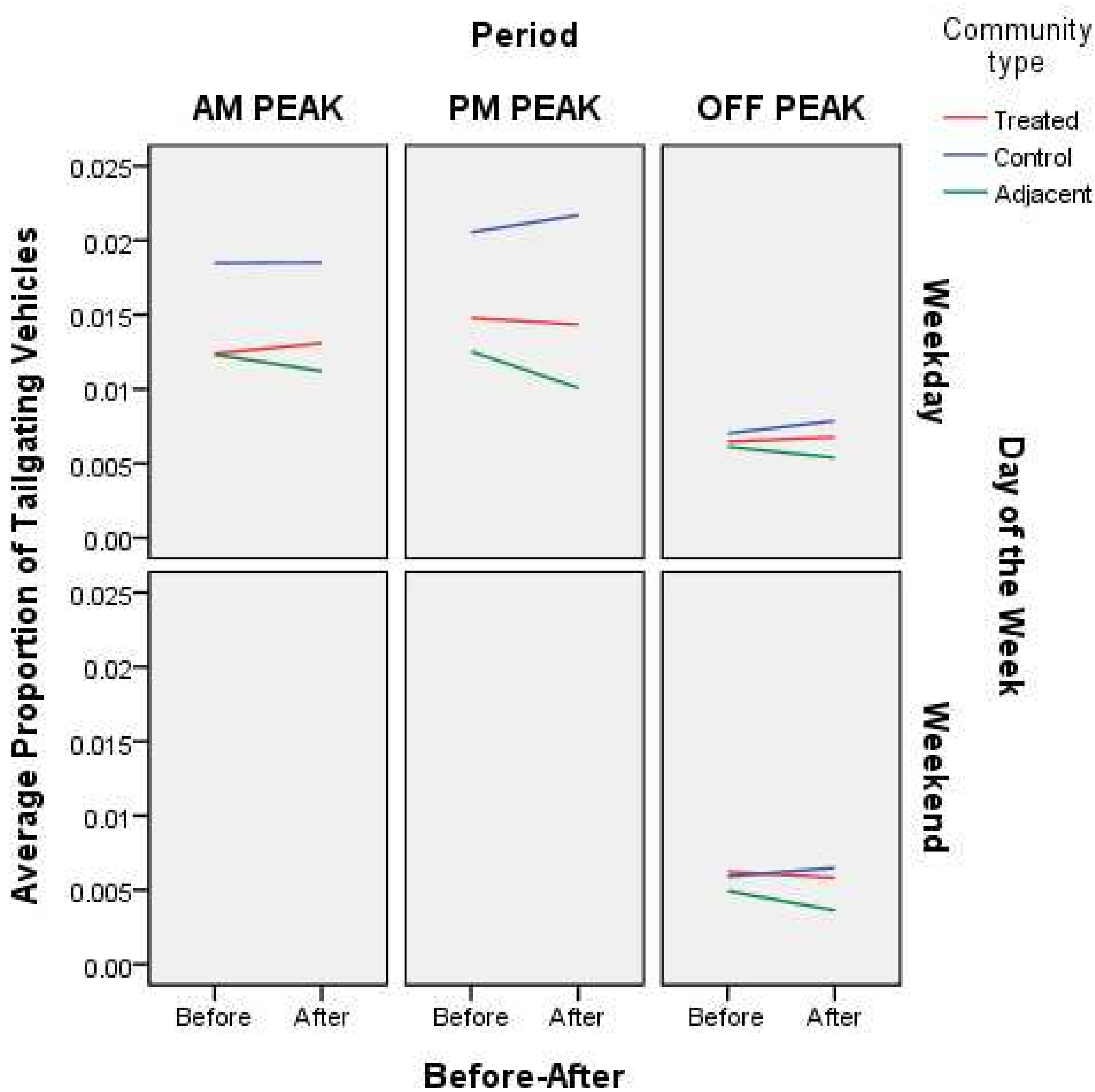


Table 5.20 "Before" and "After" Average Proportion of Tailgating Vehicles by Community Group, Peak Period, and Day of Week

- Figures 5.21 shows the proportion of tailgating vehicles was subject to monthly fluctuations. Again, the highest proportion of tailgating vehicles occurred during the PM peak period on weekdays with the lowest happening on off-peak periods during weekends.
- Note for almost all community groups, there was a significant decrease in the proportion of tailgating vehicles during the months of July and August, which is again understandable given the observed reduction in vehicle counts during the same period.

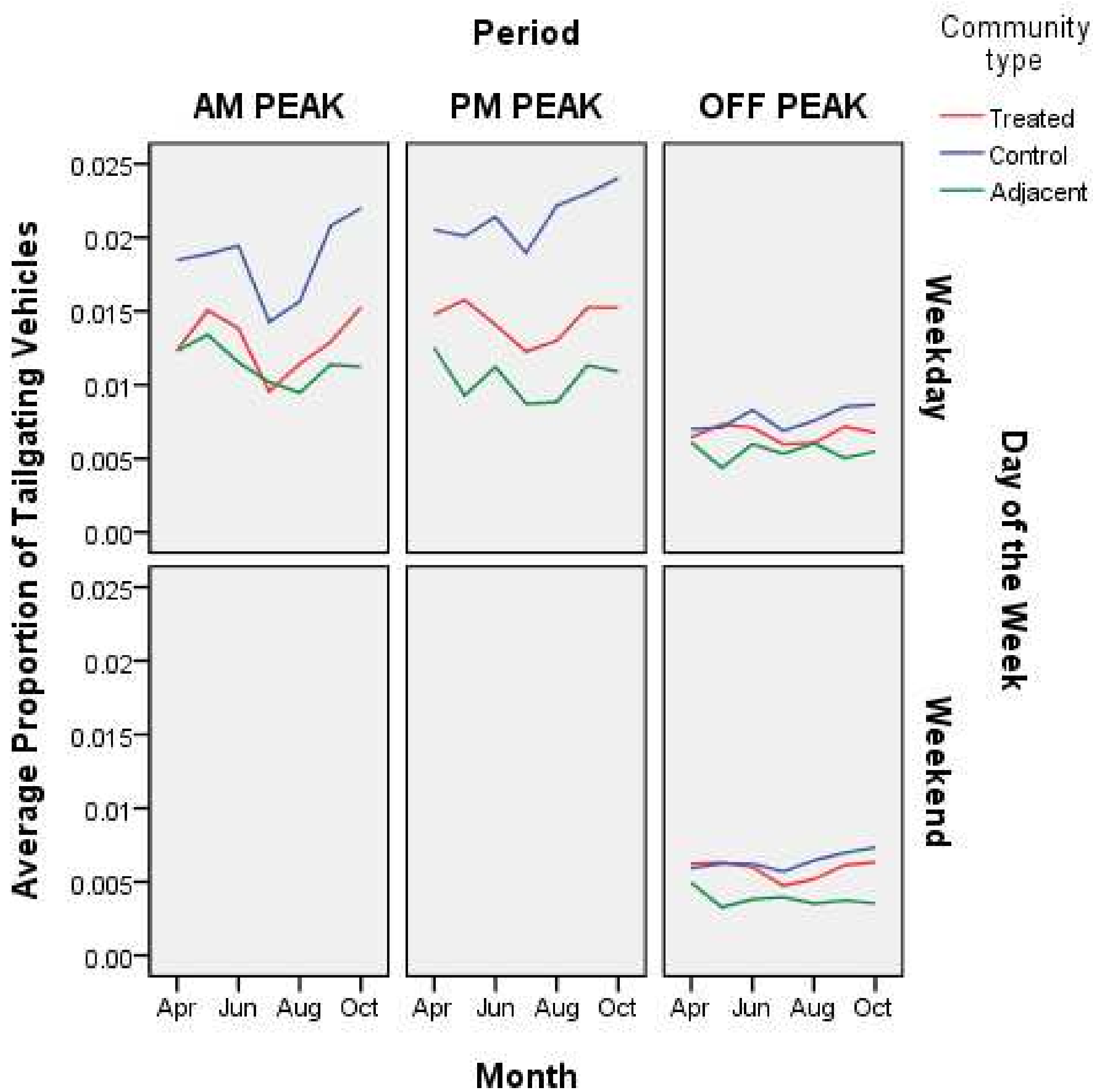


Figure 5.21 Monthly Average Proportion of Tailgating Vehicles by Community Group, Peak Period, and Day of Week

Table 5.23 "Before" and "After" Average Proportion of Tailgating Vehicles by Community Group

Community Group	Before		After	
	Mean	S.E.	Mean	S.E.
Treated	.007	.000	.007	.000
Control	.008	.000	.009	.000
Adjacent	.007	.000	.005	.000

Table 5.24 "Before" and "After" Average Proportion of Tailgating Vehicles by Community Group, Peak Period, and Day of Week

Period	Community Group	Weekday				Weekend			
		Before		After		Before		After	
		Mean	S.E.	Mean	S.E.	Mean	S.E.	Mean	S.E.
AM Peak	Treated	.012	.000	.013	.000	.	.	.	.
	Control	.018	.001	.019	.000	.	.	.	.
	Adjacent	.012	.001	.011	.001	.	.	.	.
PM Peak	Treated	.015	.000	.014	.000	.	.	.	.
	Control	.021	.001	.022	.000	.	.	.	.
	Adjacent	.013	.001	.010	.000	.	.	.	.
Off Peak	Treated	.006	.000	.007	.000	.006	.000	.006	.000
	Control	.007	.000	.008	.000	.006	.000	.006	.000
	Adjacent	.006	.000	.005	.000	.005	.000	.004	.000

Table 5.25 Average Proportion of Tailgating Vehicles by Community Group and Month

Community Group	Month													
	April		May		June		July		August		September		October	
	Mean	S.E.	Mean	S.E.	Mean	S.E.	Mean	S.E.	Mean	S.E.	Mean	S.E.	Mean	S.E.
Treated	.007	.000	.008	.000	.008	.000	.006	.000	.006	.000	.008	.000	.007	.000
Control	.008	.000	.008	.000	.009	.000	.007	.000	.008	.000	.010	.000	.010	.000
Adjacent	.007	.000	.005	.000	.006	.000	.005	.000	.006	.000	.005	.000	.005	.000

- Table 5.26 summarizes the results of the Logistic Regression Analysis.
- The main findings are summarized below.
- The proportion of tailgating vehicles OR in treated communities during weekdays = 0.82, i.e., the drivers in treated communities during weekdays were less (0.82) likely to tailgate than the drivers in other communities or during weekends. The OR was significant at a p-value <0.0001.
- The proportion of tailgating vehicles OR in treated communities during AM peak = 0.76, i.e., the drivers in treated communities during AM peak were less (0.76) likely to tailgate than the drivers in other communities or during other periods. The OR was significant at a p-value <0.0001.
- The proportion of tailgating vehicles OR in treated communities during PM peak = 0.74, i.e., the drivers in treated communities during PM peak were less (0.74) likely to tailgate than the drivers in other communities or during other periods. The OR was significant at a p-value <0.0001.
- The proportion of tailgating vehicles OR in treated communities during the “After” period = 0.94, i.e., the drivers in treated communities during the “After” period were a little less (0.94) likely to tailgate than the drivers in other communities or during the “Before” period. The OR was significant at a p-value = 0.016.
- The proportion of tailgating vehicles OR during AM peak in the “After” period = 0.92, i.e., the drivers during AM peak in the “After” period were a little less (0.92) likely to tailgate than the drivers during other periods in the “Before” period. The OR was significant at a p-value = 0.002.
- The proportion of tailgating vehicles OR in treated communities during AM peak in the “After” period = 1.06, i.e., the drivers in treated communities during AM peak in the “After” period were a little more (1.06) likely to tailgate than the drivers in other communities, during other periods or during the “Before” period. The OR was significant at a p-value = 0.057.

Proportion of tailgating vehicles summary: the proportion of tailgating vehicles was found to be very small ranging from 0.005 to 0.009, (i.e., representing 5 to 9 tailgating vehicles per thousand vehicles). In addition, the analysis revealed that drivers in treated communities during the “After” period were a little less likely to tailgate than the drivers in other communities or during the “Before” period. Yet, the decrease in the proportion of tailgating vehicles in the treated communities was statistically significant.

Table 5.26 Logistic Regression Analysis for Mean Proportion of Tailgating Vehicles

Variables	B	S.E.	Wald	df	Sig.	Exp(B)
One-way interaction						
Community Group			83.788	2	.000	
Treated Communities	.202	.024	70.159	1	.000	1.224
Adjacent Communities	.053	.038	1.951	1	.163	1.054
Day of Week						
Weekday	.221	.026	74.790	1	.000	1.247
Time of Day			2469.986	2	.000	
AM Peak	.744	.024	990.814	1	.000	2.104
PM Peak	.966	.021	2182.774	1	.000	2.627
Before-After						
After Period	.003	.024	.014	1	.905	1.003
Two-way interaction						
Community Group * Day of Week			339.881	2	.000	
Treated Communities by Weekday	-.197	.028	49.411	1	.000	.821
Adjacent Communities by Weekday	.438	.042	107.245	1	.000	1.550
Community Group * Time of Day			392.147	4	.000	
Treated Communities by AM Peak	-.275	.027	101.651	1	.000	.760
Treated Communities by PM Peak	-.304	.024	165.487	1	.000	.738
Adjacent Communities by AM Peak	-.464	.041	127.370	1	.000	.629
Adjacent Communities by PM Peak	-.637	.036	311.450	1	.000	.529
Community Group * Before-After			179.677	2	.000	
Treated Communities by After Period	-.062	.026	5.812	1	.016	.939
Adjacent Communities by After Period	-.526	.042	157.053	1	.000	.591
Day of Week * Before-After						
Weekdays by After	.004	.028	.019	1	.890	1.004
Time of Day * Before-After			9.236	2	.010	
AM Peak by After	-.080	.026	9.236	1	.002	.923
PM Peak by After	-.022	.023	.973	1	.324	.978
Three-way Interaction						
Community Group * Day of week * Before-After			146.058	2	.000	
Treated Communities by Weekday by After Period	.016	.030	.271	1	.602	1.016
Adjacent Communities by Weekday by After Period	-.479	.048	100.249	1	.000	.620
Community Group * Time of Day * Before-After			73.021	4	.000	
Treated Communities by AM Peak by After Period	.058	.030	3.632	1	.057	1.059
Treated Communities by PM Peak by After Period	.018	.026	.493	1	.482	1.018
Adjacent Communities by AM Peak by After Period	.309	.049	40.376	1	.000	1.362
Adjacent Communities by PM Peak by After Period	.271	.042	41.016	1	.000	1.311
Constant	-4.435	.022	40061.54	1	.000	.012

5.2 Analysis of Treated Communities

This section provides the speed and traffic results for the three treated neighbourhood designs: old (1950's/60's), grid-based, and new (1970's/80's).

5.2.1 Operating (85th Percentile) Speeds

- Tables 5.27 to 5.29 summarize the descriptive statistics (marginal and joint means) for the operating speed (85th percentile speed).
- Figure 5.22 reveal the operating speed decreased since the implementation of the pilot project for all treated neighbourhood designs, however, with slightly varying rates.
- Operating speeds varied with level of community development and type of roadway network. Higher speeds were observed in new (1970's/80's) communities followed by grid-based communities, and old (1950's/60's) communities.

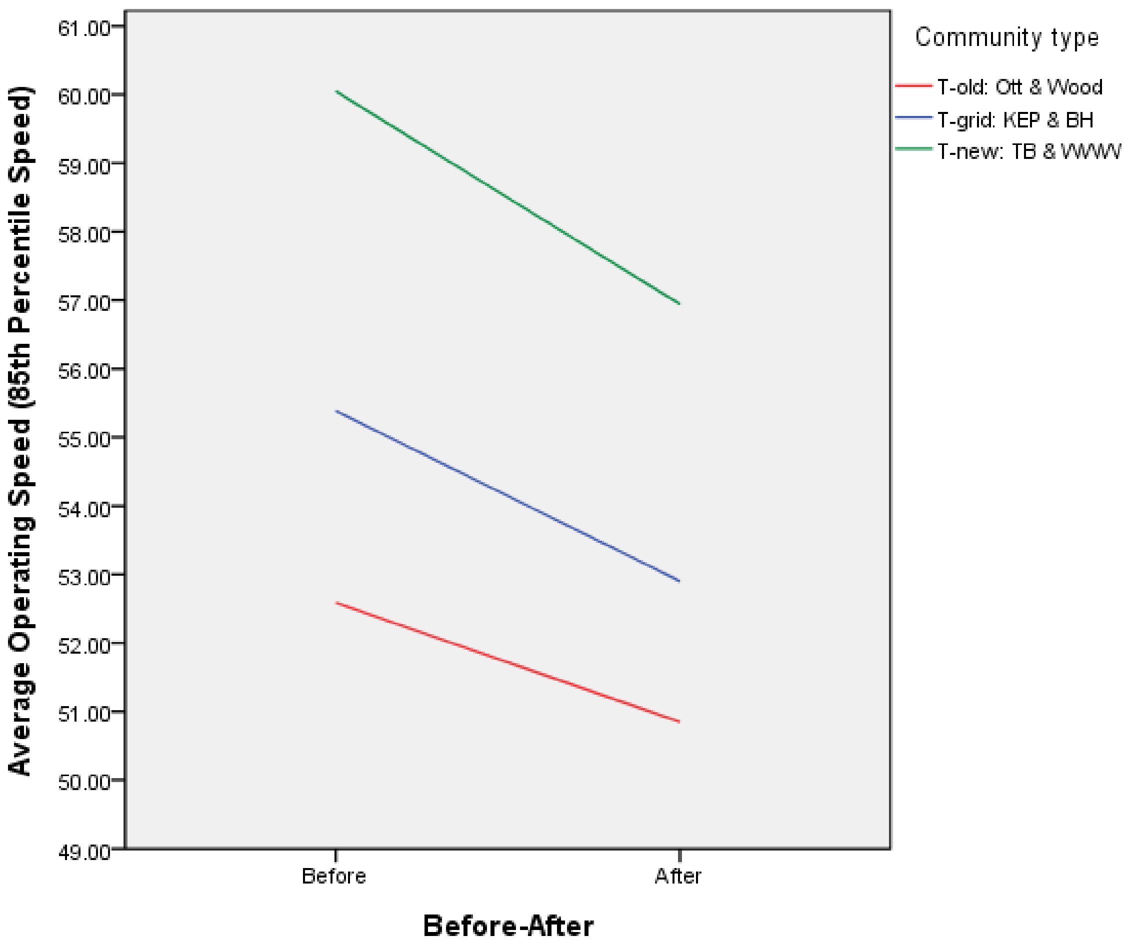


Figure 5.22 "Before" and "After" Average Operating Speed (85th Percentile Speed) by Neighbourhood Design

- Figure 5.23 depicts the change in operating speed "Before" and "After" the implementation of the pilot project for different times of day and days of the week. The figure shows the operating speed decreased consistently (with varying rates) in all of the treated neighbourhood designs regardless of time of day or day of week.

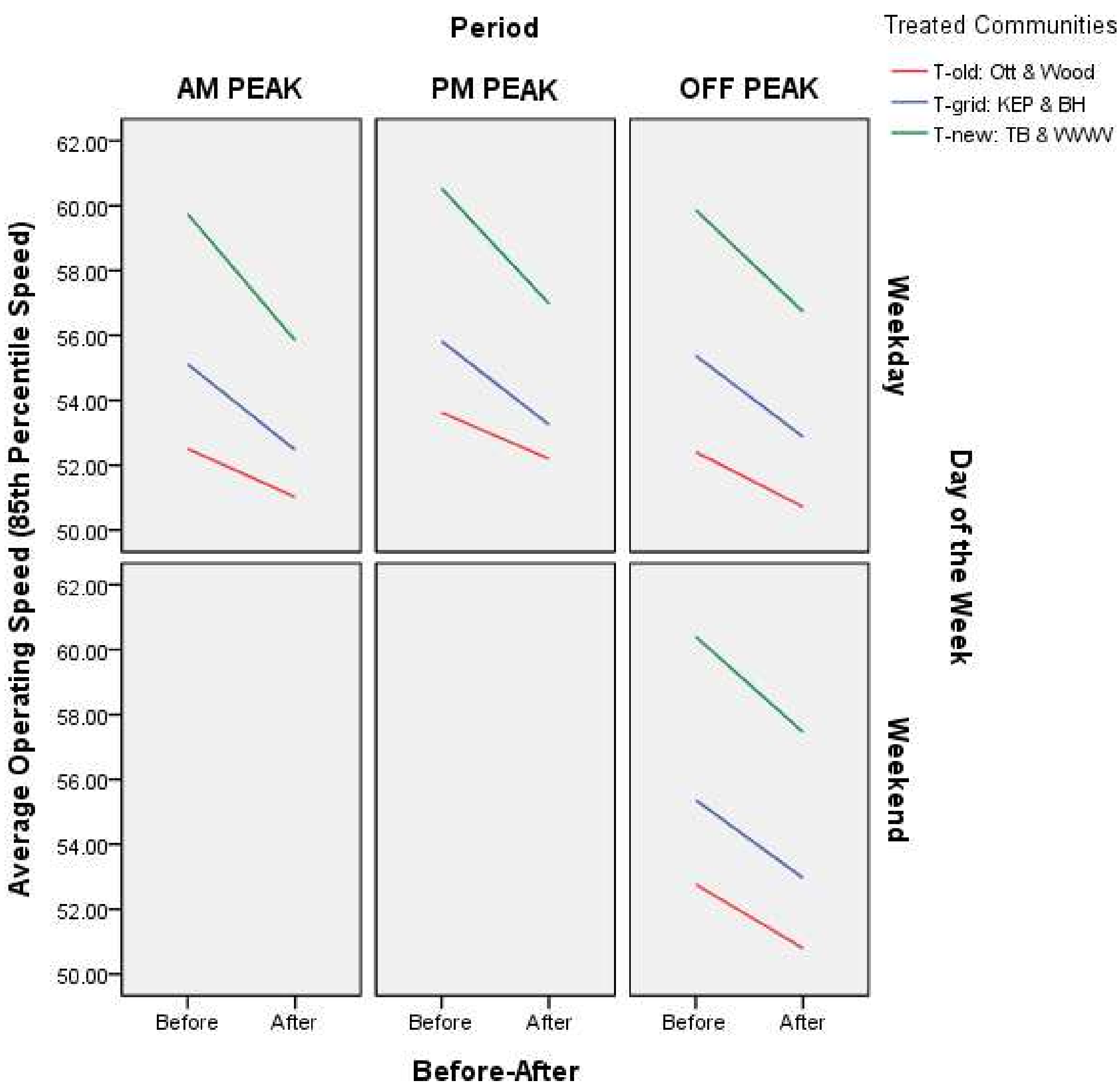


Figure 5.23 "Before" and "After" Average Operating Speed (85th Percentile Speed) by Neighbourhood Design, Peak Period, and Day of Week

- Figure 5.24 shows there were monthly fluctuations in the operating speed for all treated neighbourhood designs. The speed was consistently high in April and was reduced in later months compared to April. The largest reduction in speeds occurred at the start of the project (from April to June) with the speeds rising slightly in July before dropping and leveling off. Speeds in old communities were consistently lower than grid and new communities.

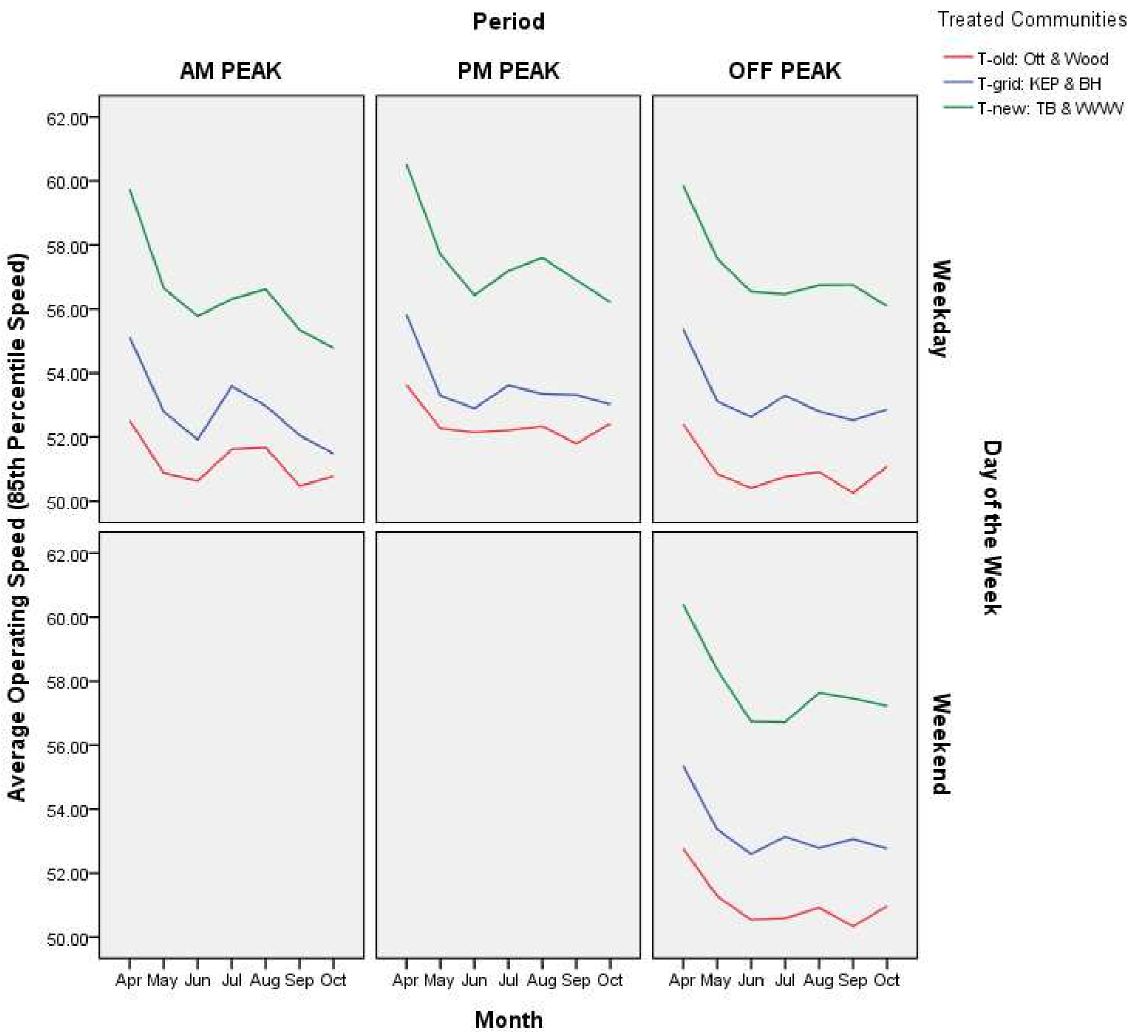


Figure 5.24 Monthly Average Operating Speed (85th Percentile Speed) by Neighbourhood Design, Peak Period, and Day of Week

- Figure 5.25 shows a panel histogram of the operating speed for each of the neighbourhood designs. Note: the solid red line represents the before posted speed limit (i.e., 50 km/h). After the implementation of the pilot project, the speed distribution for all treated neighbourhood designs shifted towards the solid line indicating a reduction in the speed distributions.

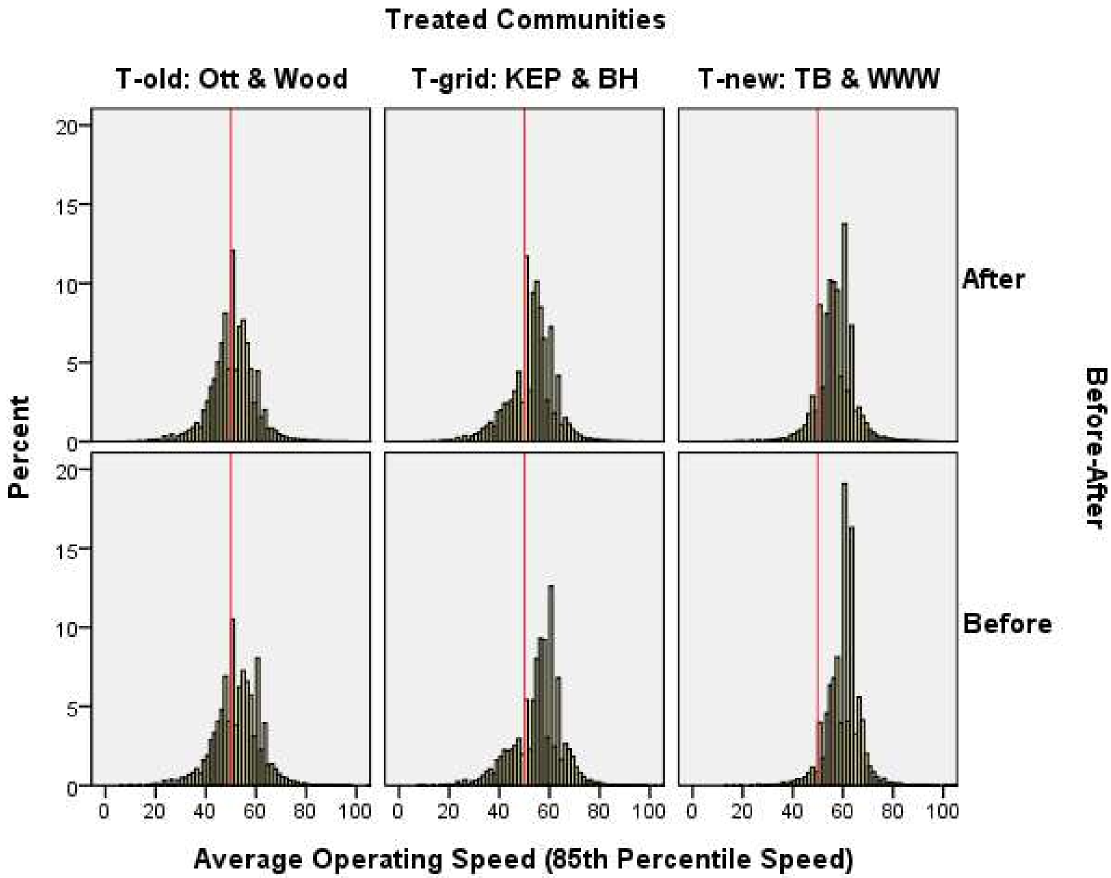


Figure 5.25 “Before” and “After” Histogram showing Average Operating Speed (85th Percentile Speed) by Neighbourhood Design

- Figure 5.26 shows the “Before” and “After” cumulative distributions for the operating speed for each of the neighbourhood designs. After the implementation of the pilot project, the cumulative distribution for all neighbourhood designs shifted to the left indicating a reduction in the speed.

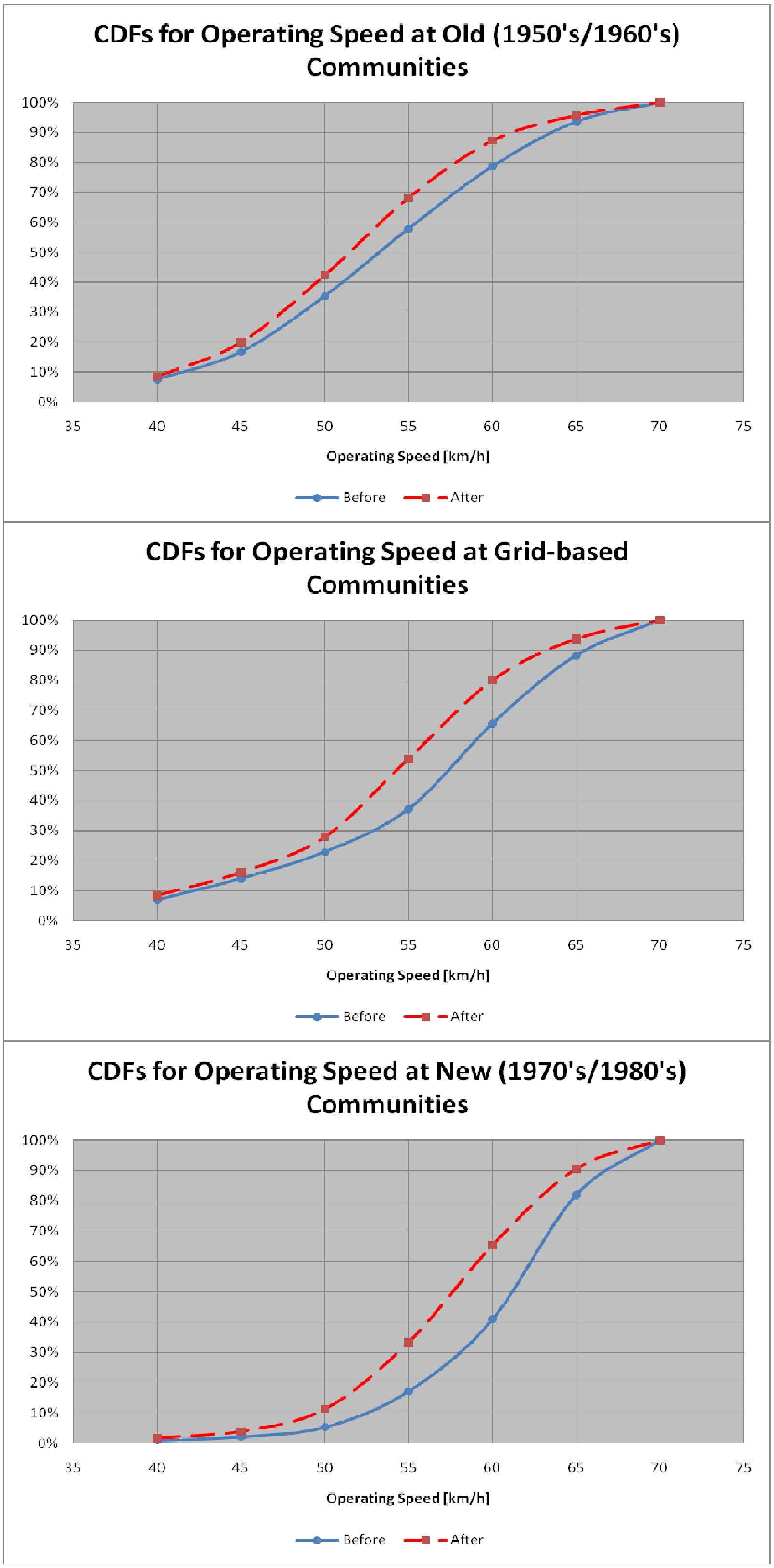


Figure 5.26 "Before" and "After" Cumulative Distributions for Average Operating Speed (85th Percentile Speed) by Neighbourhood design

Table 5.27 "Before" and "After" Average Operating Speed (85th Percentile Speed) by Neighbourhood Design

Neighbourhood design	Before		After	
	Mean	S.E.	Mean	S.E.
Old: Ott & Wood	52.59	.06	50.85	.03
Grid: KEP & BH	55.39	.06	52.90	.02
New: TB & WWW	60.05	.05	56.94	.03

Table 5.28 "Before" and "After" Average Operating Speed by Neighbourhood Design, Peak Period, and Day of Week

Period	Neighbourhood design	Weekday				Weekend			
		Before		After		Before		After	
		Mean	S.E.	Mean	S.E.	Mean	S.E.	Mean	S.E.
AM Peak	Old: Ott & Wood	52.51	.19	51.02	.09	.	.	.	.
	Grid: KEP & BH	55.12	.22	52.47	.10	.	.	.	.
	New: TB & WWW	59.75	.17	55.85	.11	.	.	.	.
PM Peak	Old: Ott & Wood	53.62	.18	52.20	.07	.	.	.	.
	Grid: KEP & BH	55.82	.18	53.25	.08	.	.	.	.
	New: TB & WWW	60.53	.13	56.98	.07	.	.	.	.
Off Peak	Old: Ott & Wood	52.41	.08	50.72	.04	52.77	.12	50.80	.04
	Grid: KEP & BH	55.38	.08	52.87	.03	55.36	.12	52.96	.04
	New: TB & WWW	59.87	.07	56.73	.04	60.40	.10	57.46	.04

Table 5.29 Average Operating Speed (85th Percentile Speed) by Neighbourhood Design and Month

Neighbourhood design	Month													
	April		May		June		July		August		September		October	
	Mean	S.E.	Mean	S.E.	Mean	S.E.	Mean	S.E.	Mean	S.E.	Mean	S.E.	Mean	S.E.
Old: Ott & Wood	52.59	.06	51.09	.06	50.58	.06	50.83	.06	51.04	.06	50.39	.06	51.10	.06
Grid: KEP & BH	55.39	.06	53.20	.06	52.59	.06	53.28	.06	52.84	.06	52.71	.06	52.77	.06
New: TB & WWW	60.05	.05	57.82	.05	56.55	.07	56.58	.08	57.08	.08	56.90	.06	56.46	.06

- Tables 5.30 and 5.31 summarize the results of mixed ANOVA.
- The results of the Mixed ANOVA analysis reveals the variation in the operating speed was significant (p-value <0.0001) for the treated neighbourhood design, day of week, time of day, and “Before” and “After” periods.
- The interaction between the neighbourhood design and the day of the week was statistically significant. This implies the difference in operating speed between old and grid (or any other combination of neighbourhood designs) on weekdays was different from the operating speed on weekends. Alternatively, the difference in speeds between weekdays and weekends in old communities was different from the operating speeds in the grid or new communities.
- The interaction between the neighbourhood design and time of day was statistically significant. This implies the difference in operating speeds between old and grid (or any other combination of neighbourhood designs) in AM peak was different from operating speeds in any other time periods. Alternatively, the difference in speeds between AM peak and PM peak (or a combination of other time periods) in old communities was different from operating speeds in the grid or new communities.
- The interaction between the neighbourhood designs and “Before” and “After” periods was statistically significant. This implies the difference in operating speeds between old and grid (or any other combination of neighbourhood designs) in the “Before” period was different from operating speeds in the “After” period. Alternatively, the difference in speeds between “Before” and “After” periods in the old group was different from operating speeds in the grid or new communities.
- The interaction between the time of day and “Before” and “After” periods was statistically significant. This implies the difference in mean speeds between AM Peak and PM Peak (or a combination of other time periods) in the “Before” period was different from operating speeds in the “After” period. Alternatively, the difference in speeds between the “Before” and “After” periods in the AM peak was different from operating speeds in the PM and off-peak time periods.
- The interaction between the neighbourhood design, day of week, and “Before” and “After” periods was marginally significant. This implies the differences in operating speed between old and grid (or any other combination of neighbourhood designs) during weekends in the “Before” period were different from operating speeds on weekdays in the “After” period.
- The interaction between the neighbourhood design, time of day, and “Before” and “After” periods was statistically significant. This implies the differences in operating speed between old and grid (or any other combination of neighbourhood designs) during AM peak in the “Before” period were different from operating speeds during other peak periods in the “After” period.
- Street variation within each neighbourhood design explained 39% of the total variation.

Operating speed summary: the operating speed varied with level of community development and type of roadway network. Higher operating speeds were observed in new (1970’s/80’s) communities followed by grid-based communities, and old (1950’s/60’s) communities.

Table 5.30 Mixed ANOVA for Average Operating Speed (85th Percentile Speed)

Source	Numerator df	F	Sig.
(Intercept)	1	10289.660	.000
Vehicles	1	2751.610	.000
One-way Interaction			
Neighbourhood designs	2	12.956	.000
Day of Week	1	113.059	.000
Time of Day	2	406.955	.000
Before-After	1	2263.510	.000
Two-way Interactions			
Neighbourhood designs * Day of Week	2	23.483	.000
Neighbourhood designs * Time of Day	4	8.575	.000
Neighbourhood designs * Before-After	2	89.183	.000
Day of Week * Before-After	1	.212	.645
Time of Day * Before-After	2	4.450	.012
Three-way Interactions			
Neighbourhood designs * Day of Week * Before-After	2	2.824	.059
Neighbourhood designs * Time of Day * Before-After	4	3.600	.006

Table 5.31 Estimates of Covariance Parameters for Average Operating Speed (85th Percentile Speed)

Parameter		Estimate	Std. Error
Residual		49.821218	0.110341
Site Variations within Neighbourhood design	Variance	32.508567	4.648625

5.2.2 Percent Compliance

- Tables 5.32 to 5.34 summarize the descriptive statistics (marginal and joint means) for the percentage of vehicles in compliance with the posted speed limit within the three neighbourhood designs.
- Figure 5.27 shows the percent compliance to the posted speed limit in all of the three treated neighbourhood designs decreased consistently with the implementation of the pilot project.
- The degree of compliance was highest for old communities and lowest for new communities.

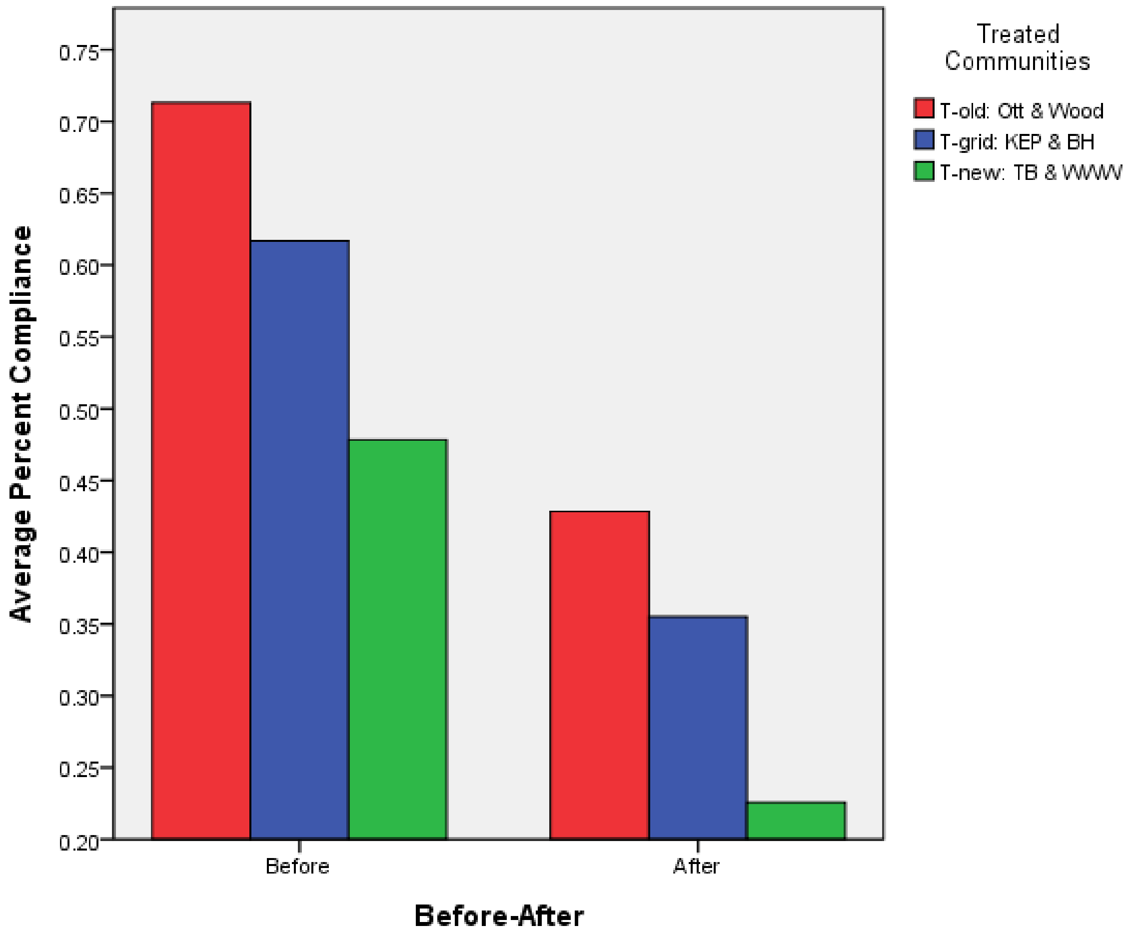


Figure 5.27 “Before” and “After” Average Percent Compliance by Neighbourhood Design

- Figure 5.28 depicts the change in percent compliance with the posted speed limit "Before" and "After" the implementation of the pilot project for different times of day and days of the week. The figure shows the percent of vehicles in compliance to the posted speed limit decreased regardless of neighbourhood design, time of day or day of week.

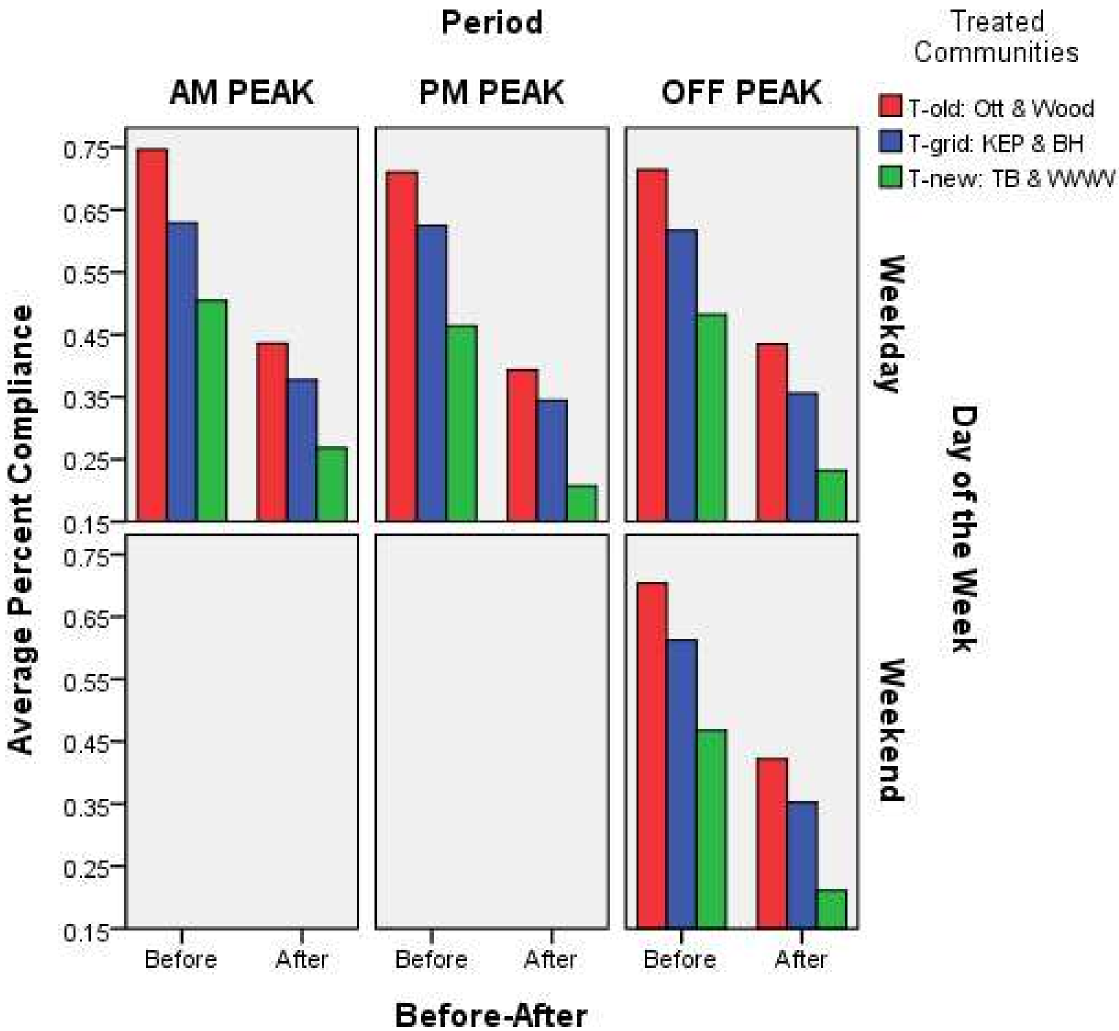


Figure 5.28 "Before" and "After" Average Percent Compliance by Neighbourhood Design, Peak Period, and Day of Week

- Figures 5.29 shows there were monthly fluctuations in compliance percentages for all of the treated neighbourhood designs. The compliance rates were high in April and were reduced in later months with the largest reduction in compliance percentage occurring at the start of the project (from April to May). Note: the lowest compliance rates were observed in new (1970's/80's) communities followed by grid-based and old (1950's/60's) communities.

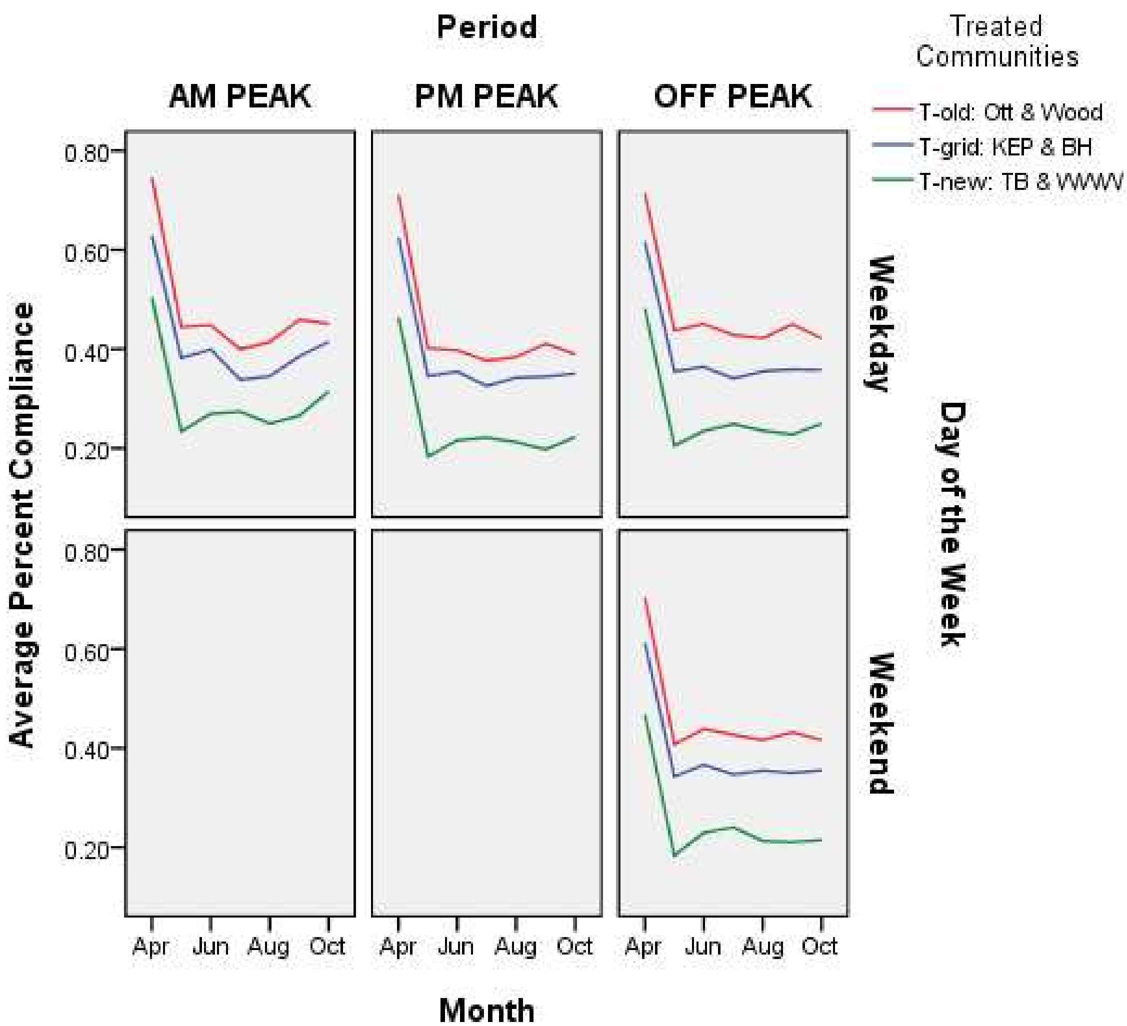


Figure 5.29 Monthly Average Percent Compliance by Neighbourhood Design, Peak Period, and Day of Week

Table 5.32 "Before" and "After" Average Percent Compliance by Neighbourhood Design

Neighbourhood design	Before		After	
	Mean	S.E.	Mean	S.E.
Old: Ott & Wood	.71	.00	.43	.00
Grid: KEP & BH	.62	.00	.36	.00
New: TB & WWW	.48	.00	.23	.00

Table 5.33 "Before" and "After" Average Percent Compliance by Neighbourhood Design, Peak Period, and Day of Week

Period	Neighbourhood design	Weekday				Weekend			
		Before		After		Before		After	
		Mean	S.E.	Mean	S.E.	Mean	S.E.	Mean	S.E.
AM Peak	Old: Ott & Wood	.75	.01	.44	.00	.	.	.	.
	Grid: KEP & BH	.63	.01	.38	.00	.	.	.	.
	New: TB & WWW	.50	.01	.27	.00	.	.	.	.
PM Peak	Old: Ott & Wood	.71	.01	.39	.00	.	.	.	.
	Grid: KEP & BH	.62	.01	.34	.00	.	.	.	.
	New: TB & WWW	.46	.01	.21	.00	.	.	.	.
Off Peak	Old: Ott & Wood	.71	.00	.43	.00	.70	.00	.42	.00
	Grid: KEP & BH	.62	.00	.36	.00	.61	.00	.35	.00
	New: TB & WWW	.48	.00	.23	.00	.47	.00	.21	.00

Table 5.34 Average Percent Compliance by Neighbourhood Design and Month

Neighbourhood design	Month													
	April		May		June		July		August		September		October	
	Mean	S.E.	Mean	S.E.	Mean	S.E.	Mean	S.E.	Mean	S.E.	Mean	S.E.	Mean	S.E.
Old: Ott & Wood	.71	.00	.43	.00	.44	.00	.42	.00	.42	.00	.44	.00	.42	.00
Grid: KEP & BH	.62	.00	.35	.00	.37	.00	.34	.00	.35	.00	.36	.00	.36	.00
New: TB & WWW	.48	.00	.20	.00	.23	.00	.25	.00	.23	.00	.22	.00	.24	.00

- Table 5.35 summarizes the results of the Logistic Regression Analysis.
- The compliance OR in old communities during weekdays = 0.97, i.e., the drivers in old communities during weekdays were a little less (0.97) likely to comply than the drivers in other communities or during weekends. The OR was significant at a p-value <0.0001.
- The compliance OR in grid communities during weekdays = 0.97, i.e., the drivers in grid communities during weekdays were a little less (0.97) likely to comply than the drivers in other communities or during weekends. The OR was significant at a p-value <0.001.
- The compliance OR in old communities during AM peak = 0.92, i.e., the drivers in old communities during the AM peak were a little less (0.92) likely to comply than the drivers in other communities or during other periods. The OR was significant at a p-value <0.0001.
- The compliance OR in grid communities during AM peak = 0.80, i.e., the drivers in grid communities during the AM peak were less (0.80) likely to comply than the drivers in other communities or during other periods. The OR was significant at a p-value <0.0001.
- The compliance OR in grid communities during PM peak = 1.10, i.e., the drivers in grid communities during the PM peak were more (1.10) likely to comply than the drivers in other communities or during other periods. The OR was significant at a p-value <0.0001.
- The compliance OR in old communities during the “After” period = 0.95, i.e., the drivers in old communities during the “After” period were a little less (0.95) likely to comply than the drivers in other communities or during the “Before” period. The OR was significant at a p-value <0.0001.
- The compliance OR in grid communities during the “After” period = 1.04, i.e., the drivers in grid communities during the “After” period were a little more (1.04) likely to comply than the drivers in other communities or during the “Before” period. The OR was significant at a p-value <0.0001.
- The compliance OR during weekdays in the “After” period = 1.03, i.e., the drivers during weekdays in the “After” period were a little more (1.03) likely to comply than the drivers during weekends or during the “Before” period. The OR was significant at a p-value <0.0001.
- The compliance OR in old communities during weekdays in the “After” period = 0.95, i.e., the drivers in old communities during weekdays in the “After” period were a little less (0.95) likely to comply than the drivers in other communities, during weekends or during the “Before” period. The OR was significant at a p-value <0.0001.
- The compliance OR in grid communities during weekdays in the “After” period = 0.94, i.e., the drivers in grid communities during weekdays in the “After” period were a little less (0.94) likely to comply than the drivers in other communities, during weekends or during the “Before” period. The OR was significant at a p-value <0.0001.
- The compliance OR in old communities during AM peak in the “After” period = 0.91, i.e., the drivers in old communities during AM peak in the “After” period were less (0.91) likely to comply than the drivers in other communities, during other periods or during the “Before” period. The OR was significant at a p-value <0.0001.
- The compliance OR in old communities during PM peak in the “After” period = 0.90, i.e., the drivers in old communities during PM peak in the “After” period were less (0.90) likely to comply than the drivers in other communities, during other periods or during the “Before” period. The OR was significant at a p-value <0.0001.

- The compliance OR in grid communities during AM peak in the "After" period = 1.04, i.e., the drivers in grid communities during AM peak in the "After" period were a little more (1.04) likely to comply than the drivers in other communities, during other periods or during the "Before" period. The OR was significant at a p-value = 0.001.

Percent compliance summary: the degree of compliance was highest for old communities and lowest for new communities. The analysis indicated that drivers in old communities during the "After" period were a little less likely to comply than the drivers in other communities or during the "Before" period. In addition, the drivers in grid communities during the "After" period were a little more likely to comply than the drivers in other communities or during the "Before" period.

Table 5.35 Logistic Regression Analysis for Average Percent Compliance

Variable	B	S.E.	Wald	df	Sig.	Exp(B)
One-way Interaction						
Neighbourhood designs			19783.533	2	.000	
Old Communities	.960	.007	18199.035	1	.000	2.613
Grid Communities	.473	.005	8588.699	1	.000	1.605
Day of Week						
Weekday	.092	.005	381.237	1	.000	1.096
Time of Day			1281.784	2	.000	
AM Peak	.150	.007	488.078	1	.000	1.162
PM Peak	-.153	.006	586.880	1	.000	.858
Before-After						
After Period	-1.203	.005	71276.827	1	.000	.300
Two-way Interaction						
Neighbourhood design * Day of Week			21.970	2	.000	
Old Communities by Weekday	-.028	.008	10.978	1	.001	.972
Grid Communities by Weekday	-.027	.006	19.474	1	.000	.973
Neighbourhood design * Time of Day			976.060	4	.000	
Old Community by AM Peak	-.080	.012	46.723	1	.000	.923
Old Community by PM Peak	-.002	.011	.051	1	.822	.998
Grid Community by AM Peak	-.222	.009	621.953	1	.000	.801
Grid Community by PM Peak	.098	.008	149.226	1	.000	1.104
Neighbourhood design * Before-After			181.495	2	.000	
Old Communities by After Period	-.054	.008	47.199	1	.000	.948
Grid Communities by After Period	.042	.006	52.852	1	.000	1.043
Day of Week * Before-After						
Weekday by After Period	.030	.006	29.352	1	.000	1.030
Time of Day * Before-After			7.362	2	.025	
AM Peak by After Periods	.015	.008	3.422	1	.064	1.015
PM Peak by After Periods	-.013	.008	2.740	1	.098	.987
Three-way Interactions						
Neighbourhood design * Day of Week * Before-After			82.757	2	.000	
Old Communities by Weekday by After Period	-.052	.009	30.723	1	.000	.949
Grid Communities by Weekday by After Period	-.063	.007	80.174	1	.000	.939
Neighbourhood design * Time of Day * Before-After			196.178	4	.000	
Old Communities by AM Peak by After Period	-.097	.013	53.840	1	.000	.907
Old Communities by PM Peak by After Period	-.111	.012	84.350	1	.000	.895
Grid Communities by AM Peak by After Period	.036	.010	11.883	1	.001	1.036
Grid Communities by PM Peak by After Period	-.001	.009	.018	1	.893	.999
Constant	-.340	.004	7574.089	1	.000	.712

5.2.3 Traffic Count

- Tables 5.36 to 5.38 summarize the traffic counts' descriptive statistics (marginal and joint means).
- Figure 5.30 reveals the number of vehicles decreased after the implementation of the pilot project in all of the treated communities.
- The number of recorded vehicles decreased from the "Before" to the "After" conditions for all neighbourhood designs. The largest decrease occurred for new (1970's/80's) and grid-based communities, while there was a slight decrease for the old communities.

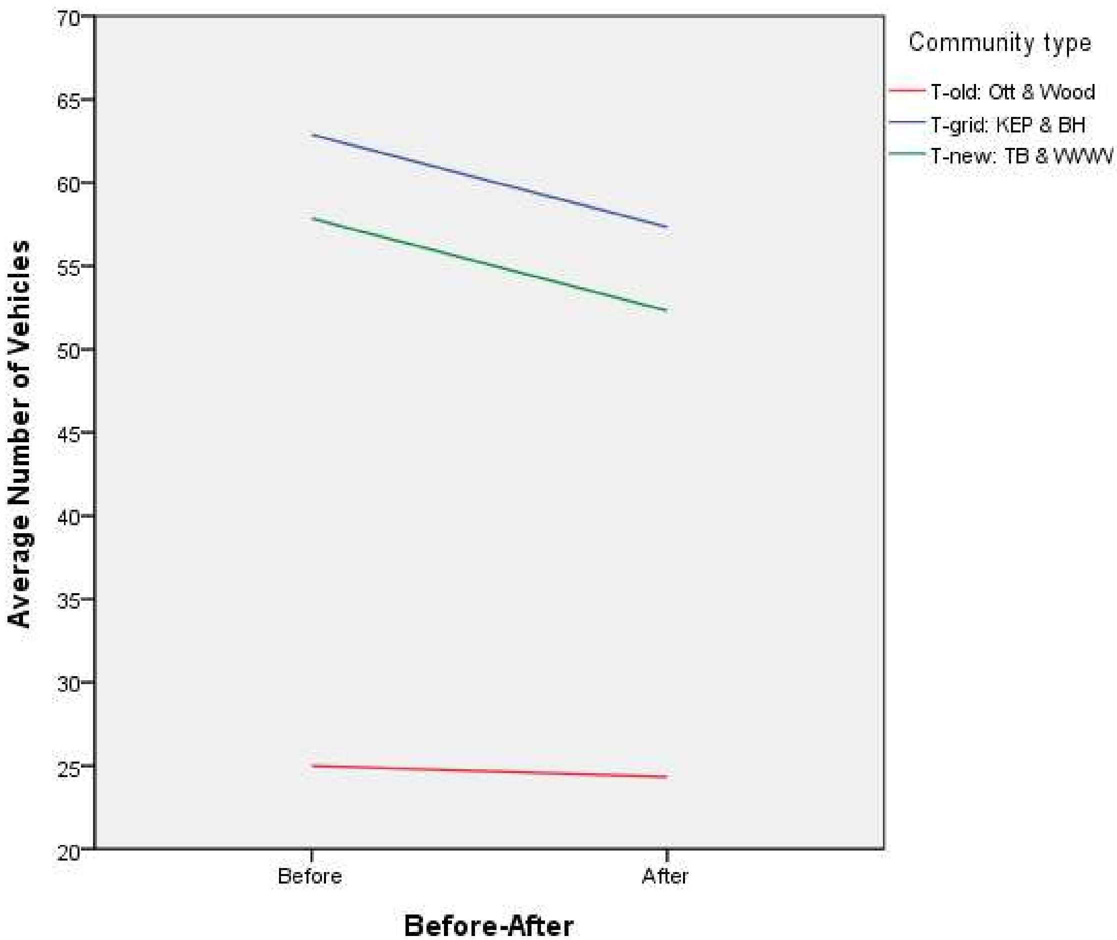


Figure 5.30 "Before" and "After" Average Number of Vehicles by Neighbourhood Design

- Figure 5.31 depicts the change in traffic counts "Before" and "After" the implementation of the pilot project for different times of day and days of the week.
- The highest number of recorded vehicles occurred during the PM peak period on weekdays. Alternatively, the lowest number of recorded vehicles was observed during the off-peak period on weekends.
- Also, the number of vehicles within each neighbourhood design decreased from the before to the "After" conditions. Depending on the day of week and time of day, the decrease could be minor or major with new (1970's/80's) and grid-based communities showing the most reduction in vehicle counts during the peak periods.

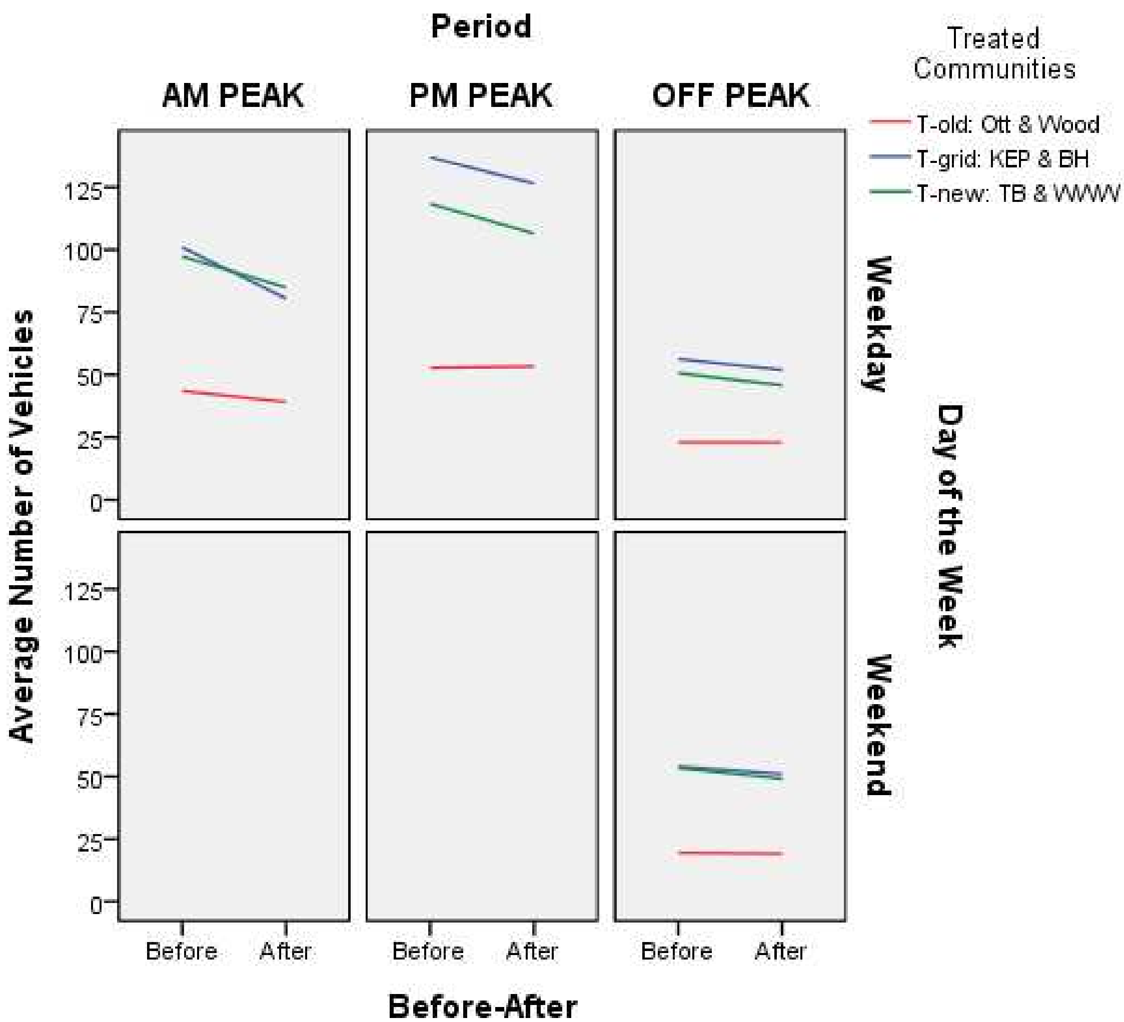


Figure 5.31 "Before" and "After" Average Number of Vehicles by Neighbourhood Design, Peak Period, and Day of Week

- Figures 5.32 shows traffic counts were subject to monthly fluctuations. Again, the highest number of recorded traffic occurred during the PM peak period on weekdays with the lowest happening during the off-peak periods on weekends.
- Note for all neighbourhood designs, there was a substantial drop in the number of vehicles during the months of June, July, and August.
- The largest reduction in the number of vehicles occurred within new (1970's/80's) communities in the summer during the peak periods.

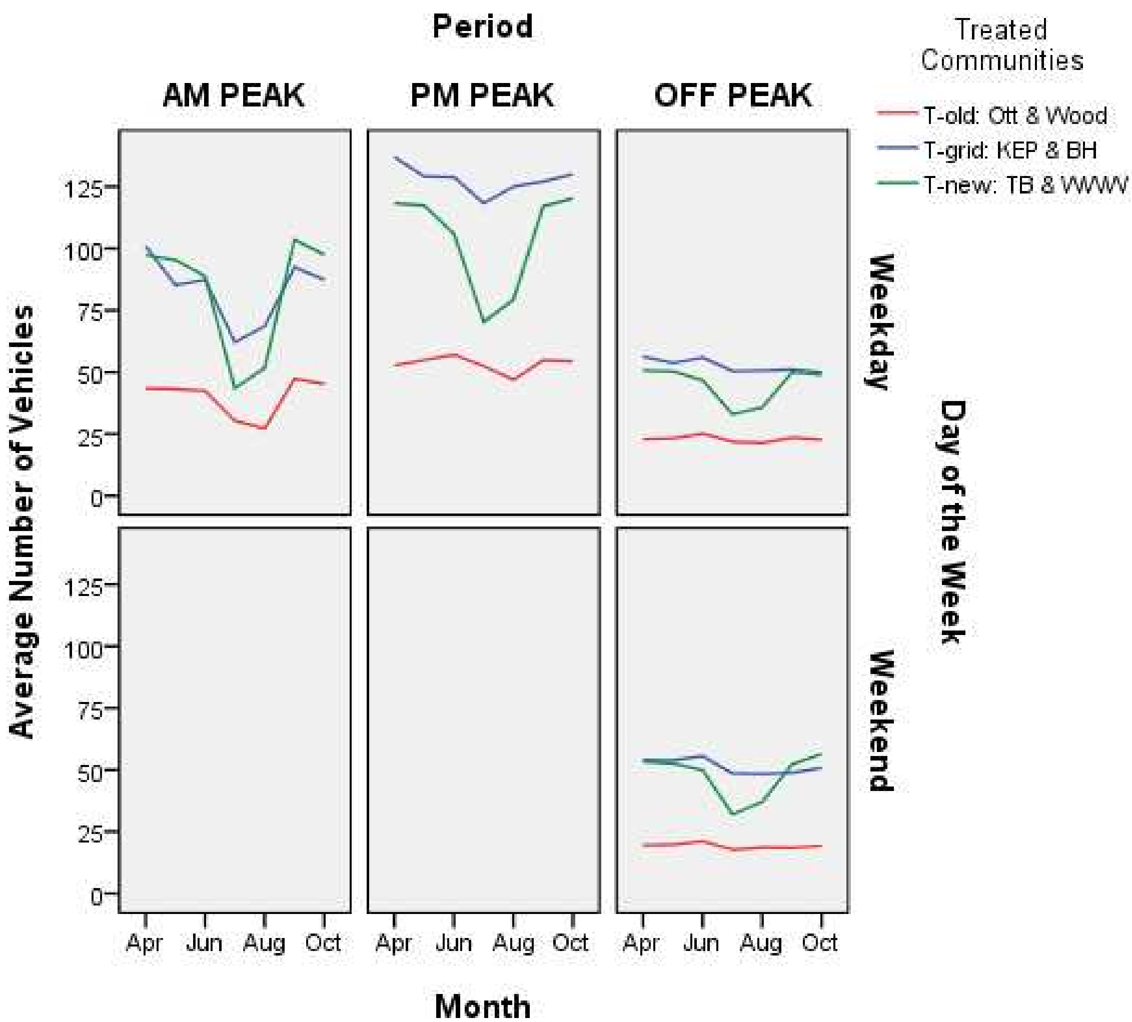


Figure 5.32 Monthly Average Number of Vehicles by Neighbourhood Design, Peak Period, and Day of Week

Table 5.36 "Before" and "After" Average Number of Vehicles by Neighbourhood Design

Neighbourhood design	Before		After	
	Mean	S.E.	Mean	S.E.
Old: Ott & Wood	25	0	24	0
Grid: KEP & BH	63	0	57	0
New: TB & WWW	58	0	52	0

Table 5.37 "Before" and "After" Average Number of Vehicles by Neighbourhood Design, Peak Period, and Day of Week

Period	Neighbourhood design	Weekday				Weekend			
		Before		After		Before		After	
		Mean	S.E.	Mean	S.E.	Mean	S.E.	Mean	S.E.
AM Peak	Old: Ott & Wood	43	1	39	0	.	.	.	.
	Grid: KEP & BH	101	2	80	1	.	.	.	.
	New: TB & WWW	97	3	85	1	.	.	.	.
PM Peak	Old: Ott & Wood	53	1	53	1	.	.	.	.
	Grid: KEP & BH	137	3	126	1	.	.	.	.
	New: TB & WWW	118	3	106	1	.	.	.	.
Off Peak	Old: Ott & Wood	23	0	23	0	19	0	19	0
	Grid: KEP & BH	56	1	52	0	54	1	51	0
	New: TB & WWW	51	1	46	0	53	1	49	0

Table 5.38 Average Number of Vehicles by Neighbourhood Design and Month

Neighbourhood design	Month													
	April		May		June		July		August		September		October	
	Mean	S.E.	Mean	S.E.	Mean	S.E.	Mean	S.E.	Mean	S.E.	Mean	S.E.	Mean	S.E.
Old: Ott & Wood	25	0	25	0	27	0	23	0	22	0	25	0	24	0
Grid: KEP & BH	63	0	59	0	62	0	54	0	55	0	57	0	56	0
New: TB & WWW	58	0	57	0	54	1	35	0	39	0	58	1	58	0

- Table 5.39 summarizes the results of the Negative Binomial Regression Analysis.
- The results reveal the number of vehicles varied significantly (p-value <0.0001) between/among: neighbourhood designs, days of the week, times of the day (peak periods), and the “Before” and “After” periods.
- Moreover, three-way interactions were not significant (p-value > 0.01), but two-way interactions were significant (p-value <0.01) except for the day of week by “Before” and “After” interaction.
- The analysis results show the number of vehicles varied significantly:
    - *By community groups for different days of the week,* implying the difference in traffic counts between new and old (or any other combination of neighbourhood designs) on weekdays was different from those on weekends. Alternatively, the difference in traffic counts between weekdays and weekends in the new communities was different from traffic counts in the grid-based or old communities;
    - *By community groups for different times of day,* implying the difference in traffic counts between new and old (or any other combination of neighbourhood designs) in the AM peak was different from traffic counts in any other time periods. Alternatively, the difference in traffic counts between AM peak and PM peak (or any other combinations of peak periods) in the new communities was different from traffic counts in the grid-based or old communities;
    - *By community groups during the “Before” and “After” periods,* implying the difference in traffic counts between new and old (or any other combination of neighbourhood designs) neighbourhood designs in the “Before” period was different from those in the “After” period. Alternatively, the difference in traffic counts between “Before” and “After” periods in the new communities was different from traffic counts in the grid-based or old communities.
- The results also show the number of vehicles varied significantly during the “Before” and “After” periods for different times of the day. This implies the difference in traffic counts between “Before” and “After” conditions in AM peak was different from those in any other time period. Alternatively, the difference in traffic counts between AM peak and PM peak (or any other combinations of peak periods) in the “Before” period was different from traffic counts in the “After” period.

Traffic count summary: the number of recorded vehicles decreased from the “Before” to the “After” conditions for all neighbourhood designs. The largest decrease occurred for new (1970’s/80’s) and grid-based communities, while there was a slight decrease for the old communities. Overall, the analysis showed that the number of recorded vehicles was marginally reduced for all neighbourhood designs.

Table 5.39 Negative Binomial Regression Analysis for Average Number of Vehicles

Source	Wald Chi-Square	df	Sig.
One-way Interaction			
(Intercept)	616454.315	1	.000
Neighbourhood design	6915.688	2	.000
Day of Week	70.776	1	.000
Time of Day	9120.089	2	.000
Before-After	69.719	1	.000
Two-way Interactions			
Neighbourhood design * Day of Week	290.237	2	.000
Neighbourhood design * Time of Day	30.644	4	.000
Neighbourhood design * Before-After	11.051	2	.004
Day of Week * Before-After	.561	1	.454
Time of Day * Before-After	20.674	2	.000
Three-way Interactions			
Neighbourhood design * Day of Week * Before-After	2.925	2	.232
Neighbourhood design * Time of Day * Before-After	4.730	4	.316

5.2.4 Proportion of Tailgating Vehicles

- Tables 5.40 to 5.42 summarize the descriptive statistics (marginal and joint means) for the proportion of tailgating vehicles.
- Figure 5.33 reveals the proportion of tailgating vehicles increased slightly for old communities (1950's/60's) while decreasing slightly for the new (1970's/80's) and grid-based communities.
- The proportion of tailgating vehicles was very small ranging from 0.003 to 0.009 (i.e., this represents 5 to 9 tailgating vehicles per thousand vehicles) and was smallest in old communities.

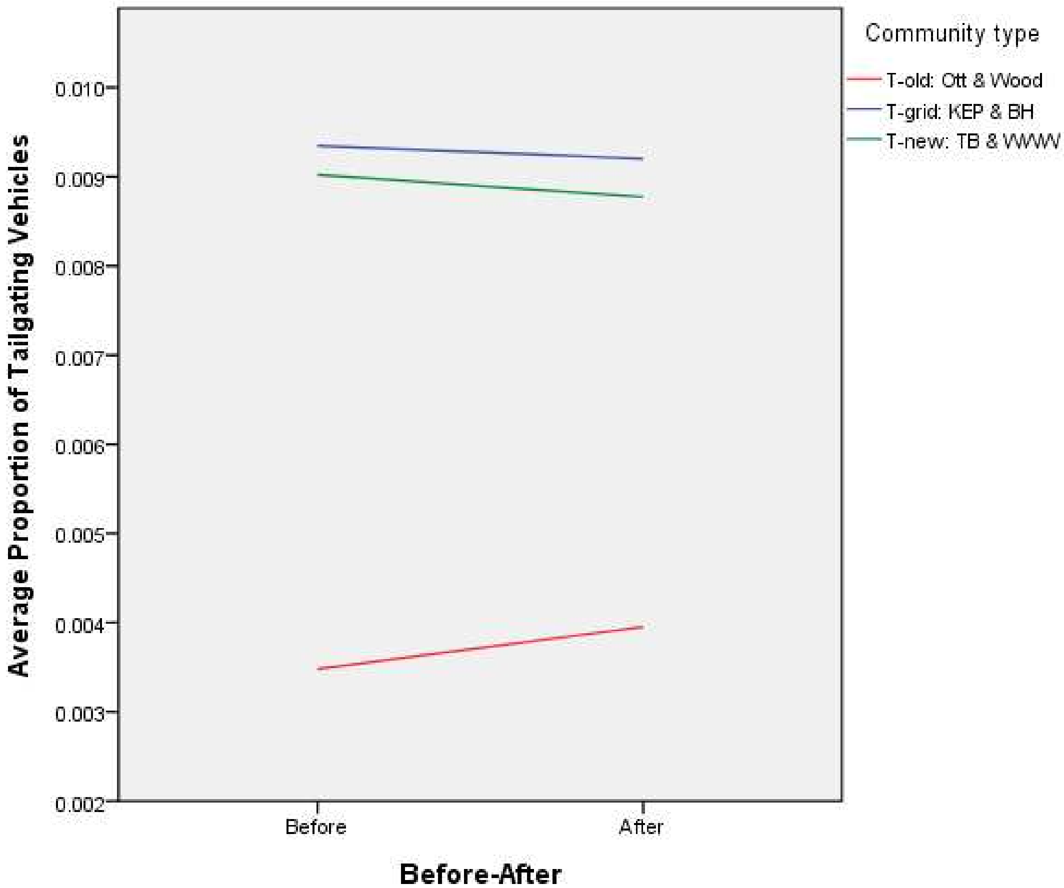


Figure 5.33 "Before" and "After" Average Proportion of Tailgating Vehicles by Neighbourhood Design

- Figure 5.34 depicts the change in proportion of tailgating vehicles “Before” and “After” the implementation of the pilot project for different times of day and days of the week.
- The highest proportion of tailgating vehicles occurred during the PM peak period on weekdays. This is a reasonable finding since rush hour traffic is associated with higher congestion levels and therefore higher proportions of tailgating vehicles.
- Alternatively, the lowest proportion of tailgating vehicles was observed during the off-peak period on weekends.
- Depending on the day of week and time of day, the proportion of tailgating vehicles within each community group increased or decreased slightly from the “Before” to the “After” conditions.
- The proportion of tailgating was smallest for old communities regardless of the day of week and time of day.

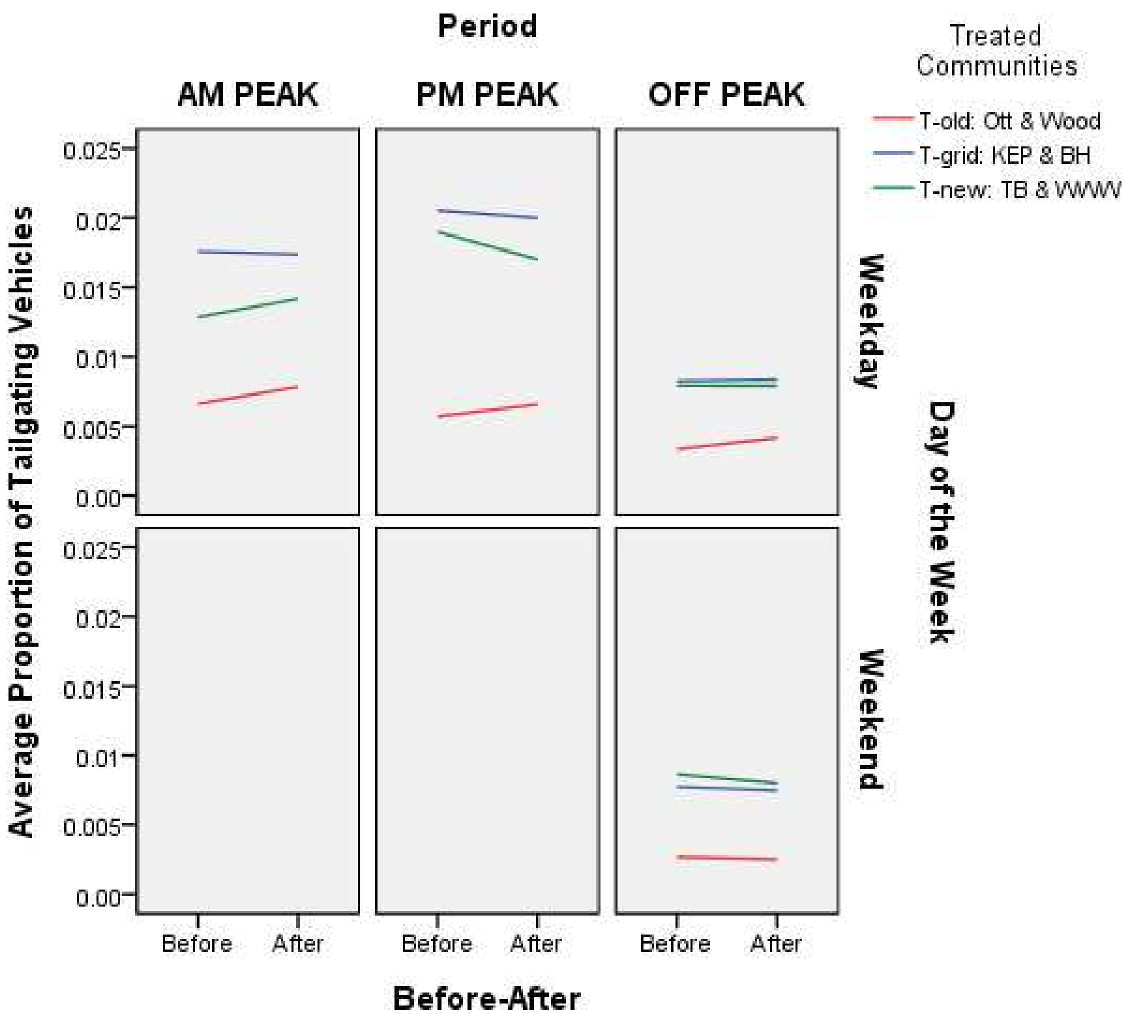


Table 5.34 “Before” and “After” Average Proportion of Tailgating Vehicles by Neighbourhood Design, Peak Period, and Day of Week

- Figures 5.35 shows the proportion of tailgating vehicles was subject to monthly fluctuations. The most fluctuation in the proportion of tailgating vehicles occurs during AM peak period for all neighbourhood designs.
- Note: for almost all community groups, there was a significant decrease in proportion of tailgating vehicles during July, (a reasonable finding) given the observed reduction in vehicle counts during the same month.

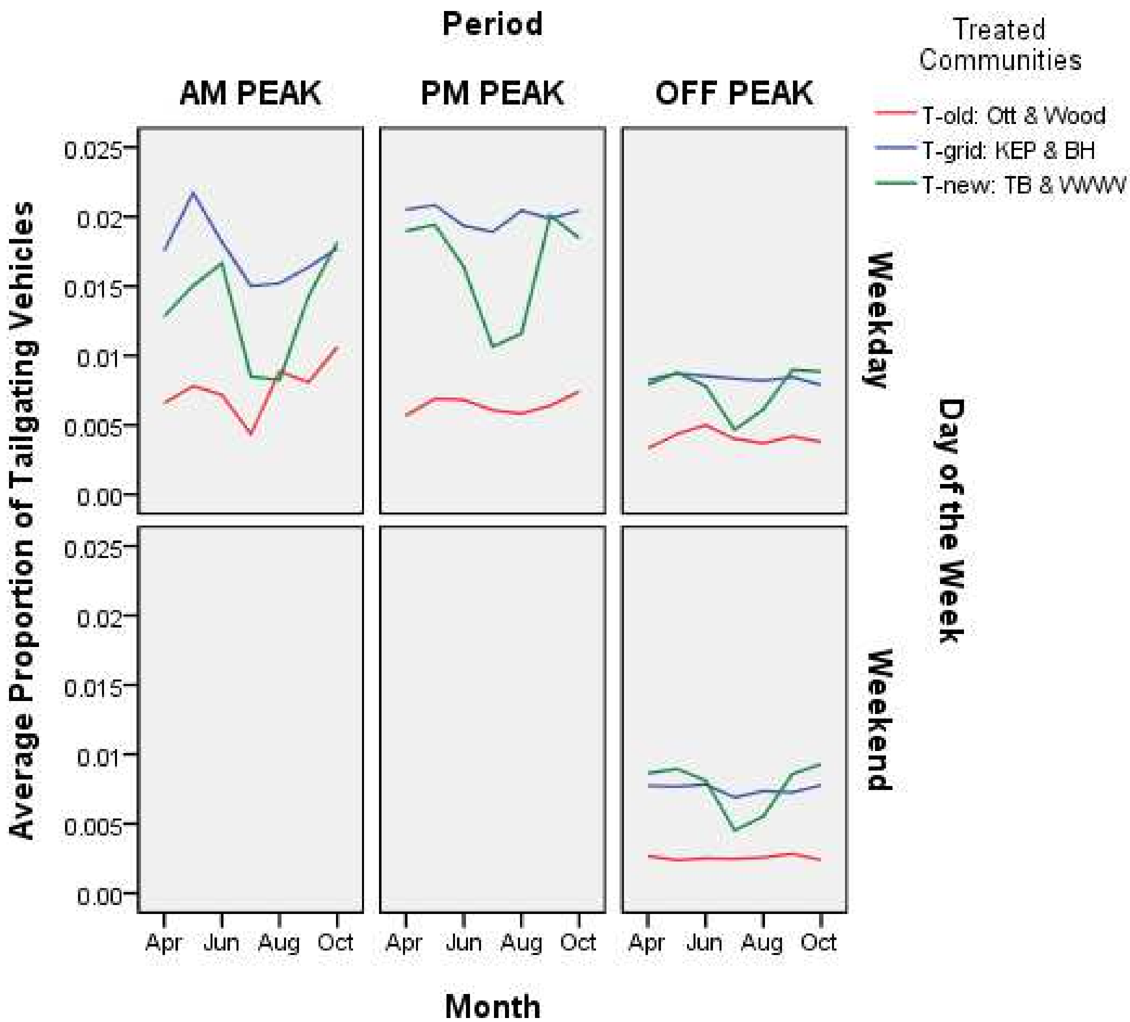


Figure 5.35 Monthly Average Proportion of Tailgating Vehicles by Neighbourhood Design, Peak Period, and Day of Week

Table 5.40 “Before” and “After” Average Proportion of Tailgating Vehicles by Neighbourhood Design

Neighbourhood design	Before		After	
	Mean	S.E.	Mean	S.E.
Old: Ott & Wood	.003	.000	.004	.000
Grid: KEP & BH	.009	.000	.009	.000
New: TB & WWW	.009	.000	.009	.000

Table 5.41 “Before” and “After” Average Proportion of Tailgating Vehicles by Neighbourhood Design, Peak Period, and Day of Week

Period	Neighbourhood design	Weekday				Weekend			
		Before		After		Before		After	
		Mean	S.E.	Mean	S.E.	Mean	S.E.	Mean	S.E.
AM Peak	Old: Ott & Wood	.007	.000	.008	.000	.	.	.	.
	Grid: KEP & BH	.018	.001	.017	.000	.	.	.	.
	New: TB & WWW	.013	.001	.014	.000	.	.	.	.
PM Peak	Old: Ott & Wood	.006	.000	.007	.000	.	.	.	.
	Grid: KEP & BH	.021	.001	.020	.000	.	.	.	.
	New: TB & WWW	.019	.001	.017	.000	.	.	.	.
Off Peak	Old: Ott & Wood	.003	.000	.004	.000	.003	.000	.003	.000
	Grid: KEP & BH	.008	.000	.008	.000	.008	.000	.007	.000
	New: TB & WWW	.008	.000	.008	.000	.009	.000	.008	.000

Table 5.42 Average Proportion of Tailgating Vehicles by Neighbourhood Design and Month

Neighbourhood design	Month													
	April		May		June		July		August		September		October	
	Mean	S.E.	Mean	S.E.	Mean	S.E.	Mean	S.E.	Mean	S.E.	Mean	S.E.	Mean	S.E.
Old: Ott & Wood	.003	.000	.004	.000	.004	.000	.004	.000	.004	.000	.004	.000	.004	.000
Grid: KEP & BH	.009	.000	.010	.000	.010	.000	.009	.000	.009	.000	.009	.000	.009	.000
New: TB & WWW	.009	.000	.010	.000	.009	.000	.005	.000	.006	.000	.010	.000	.010	.000

- Table 5.43 summarizes the results of the Logistic Regression Analysis.
- The proportion of tailgating vehicles OR in old communities during weekdays = 1.44, i.e., the drivers in old communities during weekdays were much more (1.44) likely to tailgate than the drivers in other communities or during weekends. The OR was significant at a p-value <0.0001.
- The proportion of tailgating vehicles OR in grid-based communities during weekdays = 1.13, i.e., the drivers in grid-based communities during weekdays were more (1.13) likely to tailgate than the drivers in other communities or during weekends. The OR was significant at a p-value <0.0001.
- The proportion of tailgating vehicles OR in grid-based communities during AM peak = 1.07, i.e., the drivers in grid-based communities during AM peak were a little more (1.07) likely to tailgate than the drivers in other communities or during other periods. The OR was significant at a p-value = 0.013.
- The proportion of tailgating vehicles OR in grid-based communities during PM peak = 1.28, i.e., the drivers in grid-based communities during PM peak were more (1.28) likely to tailgate than the drivers in other communities or during other periods. The OR was significant at a p-value <0.0001.
- The proportion of tailgating vehicles OR during AM peak in the “After” period = 1.04, i.e., the drivers during AM peak in the “After” period were a little more (1.04) likely to tailgate than the drivers during other periods or during the “Before” period. The OR was significant at a p-value < 0.05.
- The proportion of tailgating vehicles OR in old communities during AM peak in the “After” period = 0.88, i.e., the drivers in old communities during AM peak in the “After” period were less (0.88) likely to tailgate than the drivers in other communities, during other periods or during the “Before” period. The OR was significant at a p-value < 0.05.
- The proportion of tailgating vehicles OR in grid-based communities during AM peak in the “After” period = 0.92, i.e., the drivers in grid-based communities during AM peak in the “After” period were a little less (0.92) likely to tailgate than the drivers in other communities, during other periods or during the “Before” period. The OR was significant at a p-value <0.01.

Proportion of tailgating vehicles summary: the proportion of tailgating vehicles was again very small ranging from 0.003 to 0.009 (i.e., representing 3 to 9 tailgating vehicles per thousand vehicles) and was smallest in old communities. The results indicate that there were no statistical differences in the proportion of tailgating vehicles across the different community classifications from the “Before” to the “After” conditions.

Table 5.43 Logistic Regression Analysis for Mean Proportion of Tailgating Vehicles

Variables	B	S.E.	Wald	df	Sig.	Exp(B)
One-way Interaction						
Neighbourhood designs			937.224	2	.000	
Old Communities	-1.403	.046	931.071	1	.000	.246
Grid-based Communities	-.098	.020	24.182	1	.000	.907
Weekdays	-.047	.018	6.881	1	.009	.954
Time of Day			859.483	2	.000	
AM Peak	.443	.022	388.132	1	.000	1.557
PM Peak	.519	.020	662.245	1	.000	1.681
After Period	-.055	.016	11.562	1	.001	.946
Two-way Interactions						
Neighbourhood designs * Day of Week			60.780	2	.000	
Old Communities by Weekdays	.367	.052	48.859	1	.000	1.443
Grid-based Communities by Weekdays	.123	.024	26.517	1	.000	1.131
Neighbourhood designs * Time of Day			125.075	4	.000	
Old Communities by AM Peak	-.052	.055	.898	1	.343	.949
Old Communities by PM Peak	-.070	.049	2.038	1	.153	.932
Grid-based Communities by AM Peak	.072	.029	6.128	1	.013	1.074
Grid-based Communities by PM Peak	.249	.025	99.524	1	.000	1.283
Neighbourhood designs * Before-After			1.735	2	.420	
Old Communities by After Period	.063	.050	1.608	1	.205	1.065
Grid-based Communities by After Period	.014	.022	.433	1	.510	1.014
Weekdays by After Period	-.007	.020	.109	1	.742	.993
Time of Day * Before-After			3.229	2	.199	
AM Peak by After Period	.042	.025	2.741	1	.098	1.043
PM Peak by After Period	-.007	.023	.081	1	.776	.994
Three-way Interactions						
Neighbourhood designs * Day of Week * Before-After			1.562	2	.458	
Old Communities by Weekdays by After Period	.056	.057	.960	1	.327	1.057
Grid-based Communities by Weekdays by After Period	.027	.026	1.021	1	.312	1.027
Neighbourhood designs * Time of Day * Before-After			10.802	4	.029	
Old Communities by AM Peak by After Period	-.125	.061	4.209	1	.040	.883
Old Communities by PM Peak by After Period	.052	.054	.931	1	.335	1.053
Grid-based Communities by AM Peak by After Period	-.084	.033	6.706	1	.010	.919
Grid-based Communities by PM Peak by After Period	-.016	.028	.325	1	.568	.984
(Constant)	-4.048	.015	74697.06	1	.000	.017

6. TRAFFIC & SPEED ANALYSIS BY NEIGHBOURHOOD DESIGN

This section summarizes the results of the individual analysis by neighbourhood design (old, new, and grid-based communities). The analysis focused on evaluating the operating (85th percentile) speed and percent of vehicles in compliance with the posted speed limit.

6.1 Analysis of Grid-based Communities

This section provides detailed speed and traffic results for the grid-based communities.

6.1.1 Operating (85th Percentile) Speeds

- Tables 6.3 to 6.5 summarize the descriptive statistics (marginal and joint means) for the operating speed (85th percentile speed).
- Figure 6.1 reveals the operating speed in the treated grid-based communities decreased after the implementation of the pilot project. Albeit not as substantial, the speed in the control group was slightly decreased. At the same time, the adjacent group witnessed a slight increase in the operating speeds.
- Table 6.1 shows the operating speed in the treated grid-based communities was reduced by 4.5% resulting in a 2.49 km/h reduction in speed. However, if the influence of other variables in the road system was accounted for (achieved by using a control group), the operating speed in the treated communities was reduced to 4.3%. This corresponds to a reduction of 2.38 km/h in operating speed. In the adjacent communities, the operating speed increased by 0.4% resulting in a 0.22 km/h increase. Alternatively, the percent reduction was further increased to 0.6% (i.e., 0.33 km/h increase in operating speed) by using a control group.

Table 6.1 Percent Change in Average Operating Speed (85th Percentile Speed) with and without using a Control Group

Community Group		Without Control*		With Control**	
		%	km/h	%	km/h
King Edward Park and Beverly Heights	Treated	-4.5%	-2.49	-4.3%	-2.38
Hazeldean	Adjacent	0.4%	0.22	0.6%	0.33

*A simple before-after percent change was used to calculate the percentages without the control group i.e., [(after-before)/before]*100

** The cross-product ratio (also known as the odds ratio) was used to calculate the percent change in speed after accounting for the trends in the control group i.e., ([before control/after control]/[before treated/after treated])-1

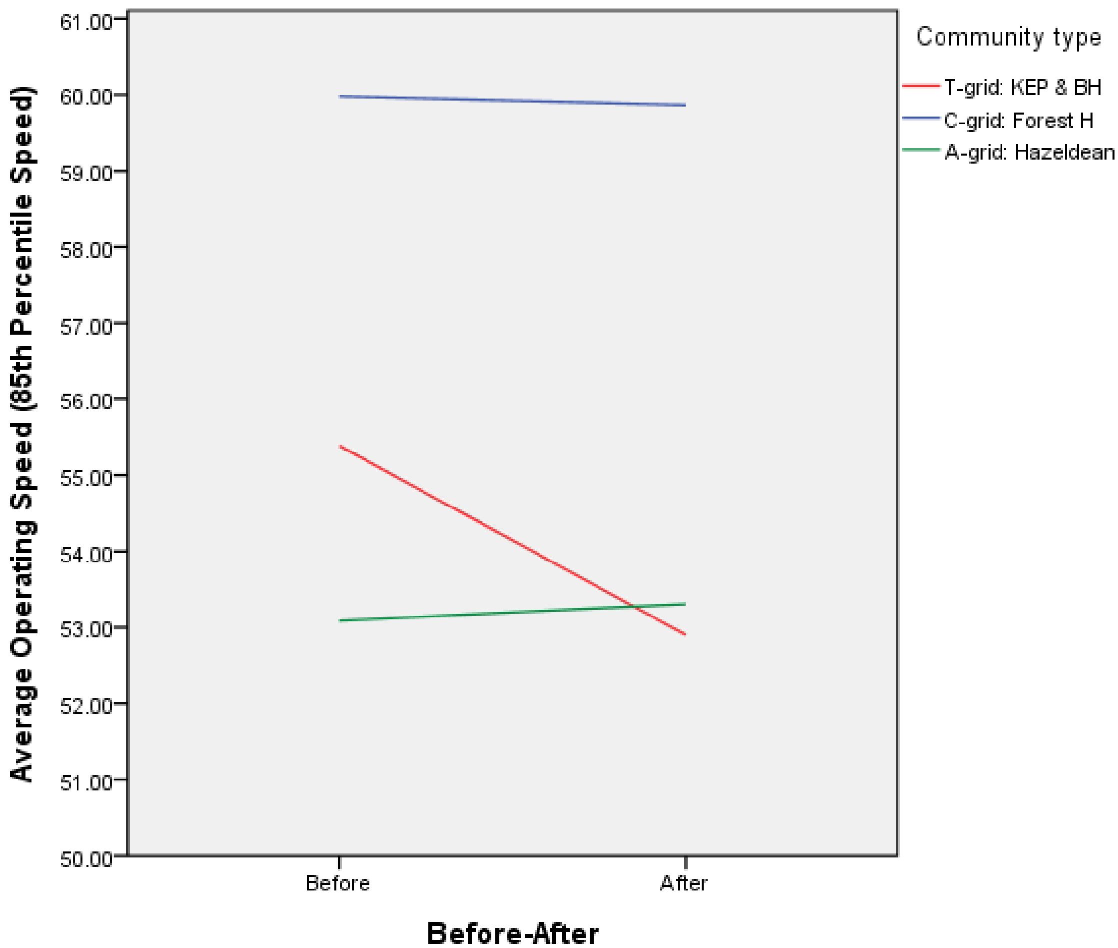


Figure 6.1 “Before” and “After” Average Operating Speed (85th Percentile Speed) by Grid-based Community Groups

- Figure 6.2 depicts the change in operating speed “Before” and “After” the implementation of the pilot project for different times of day and days of the week. The figure shows the operating speed decreased consistently in the treated communities regardless of time of day or day of week.

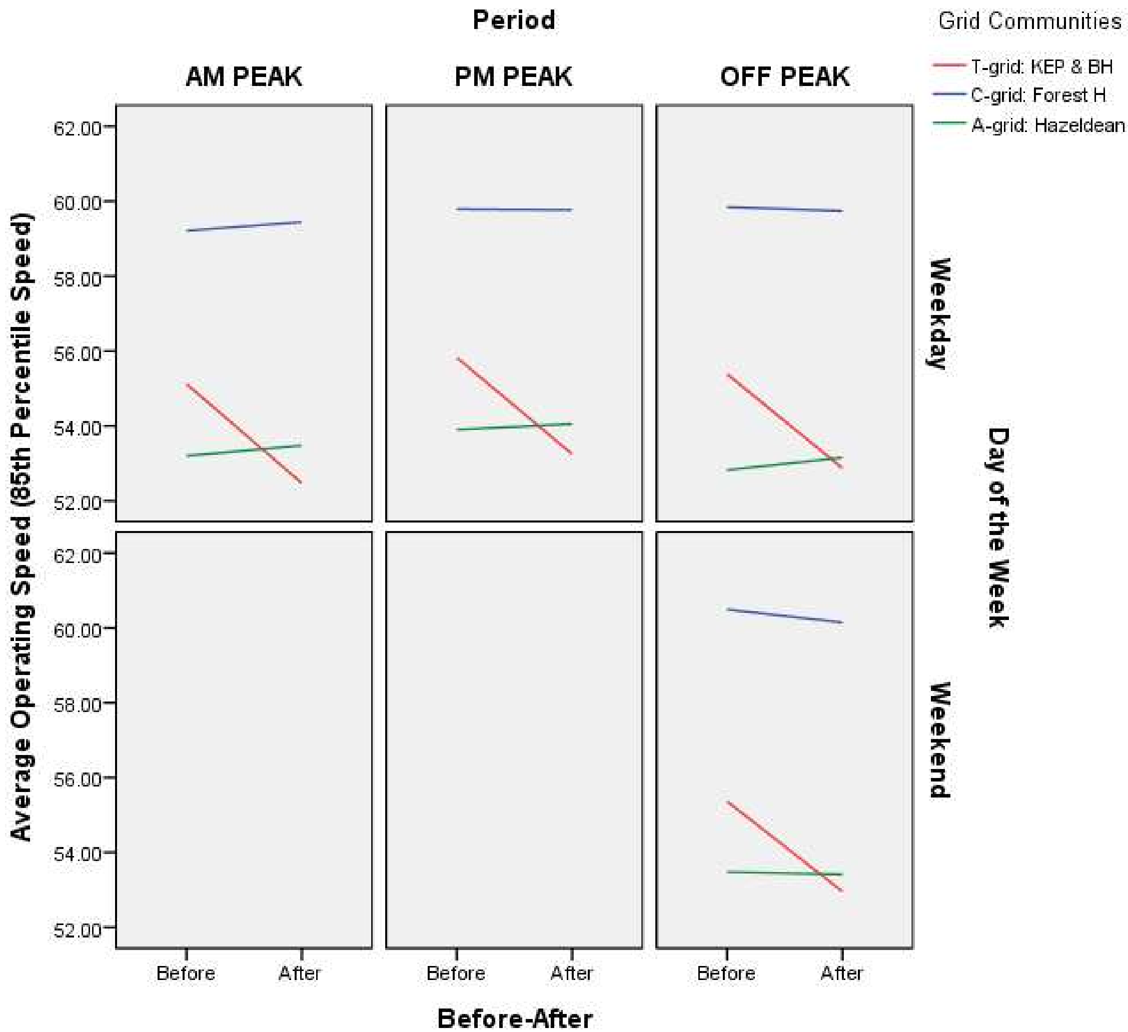


Figure 6.2 “Before” and “After” Average Operating Speed (85th Percentile Speed) by Grid-based Community Groups, Peak Period, and Day of Week

- Table 6.2 summarizes the percent change in operating speed with and without using a control group for different times of day and days of the week. The results show the operating speed decreased consistently in the treated grid-based communities regardless of time of day or day of week.
- The table shows the reductions in operating speed were highly influenced by the corresponding fluctuation in the control communities. As a result, the simple “Before” to “After” reduction was sometimes lower or greater than the reductions adjusted by the control group.
- Note: the operating speed reduction ranged from 3.8% to 5.2% in the treated communities.
- In the treated communities, the highest reduction in the operating speed (2.86 km/h) occurred during the AM peak on weekdays.

Table 6.2 Percent Change in Average Operating Speed (85th Percentile Speed) by Community Group, Peak Period, and Day of Week with and without using a Control Group

Period	Community Group		Weekday				Weekend			
			Without Control*		With Control**		Without Control*		With Control**	
			%	km/h	%	km/h	%	km/h	%	km/h
AM Peak	King Edward Park and Beverly Heights	Treated	-4.8%	-2.65	-5.2%	-2.86	.	.	.	.
	Hazeldean	Adjacent	0.5%	0.28	0.1%	0.06	.	.	.	.
PM Peak	King Edward Park and Beverly Heights	Treated	-4.6%	-2.57	-4.6%	-2.55	.	.	.	.
	Hazeldean	Adjacent	0.3%	0.15	0.3%	0.17	.	.	.	.
Off Peak	King Edward Park and Beverly Heights	Treated	-4.5%	-2.51	-4.4%	-2.42	-4.3%	-2.40	-3.8%	-2.09
	Hazeldean	Adjacent	0.6%	0.33	0.8%	0.42	-0.1%	-0.07	0.5%	0.24

*A simple before-after percent change was used to calculate the percentages without the control group i.e., [(after-before)/before]*100

** The cross-product ratio (also known as the odds ratio) was used to calculate the percent change in speed after accounting for the trends in the control group i.e., ([before control/after control]/[before treated/after treated])-1

- Figure 6.3 shows there were monthly fluctuations in the operating speed for all community groups. Note: for the treated grid-based communities, the largest reduction in speeds occurred at the start of the project (from April to June) with the speeds rising slightly in July before dropping and leveling off.

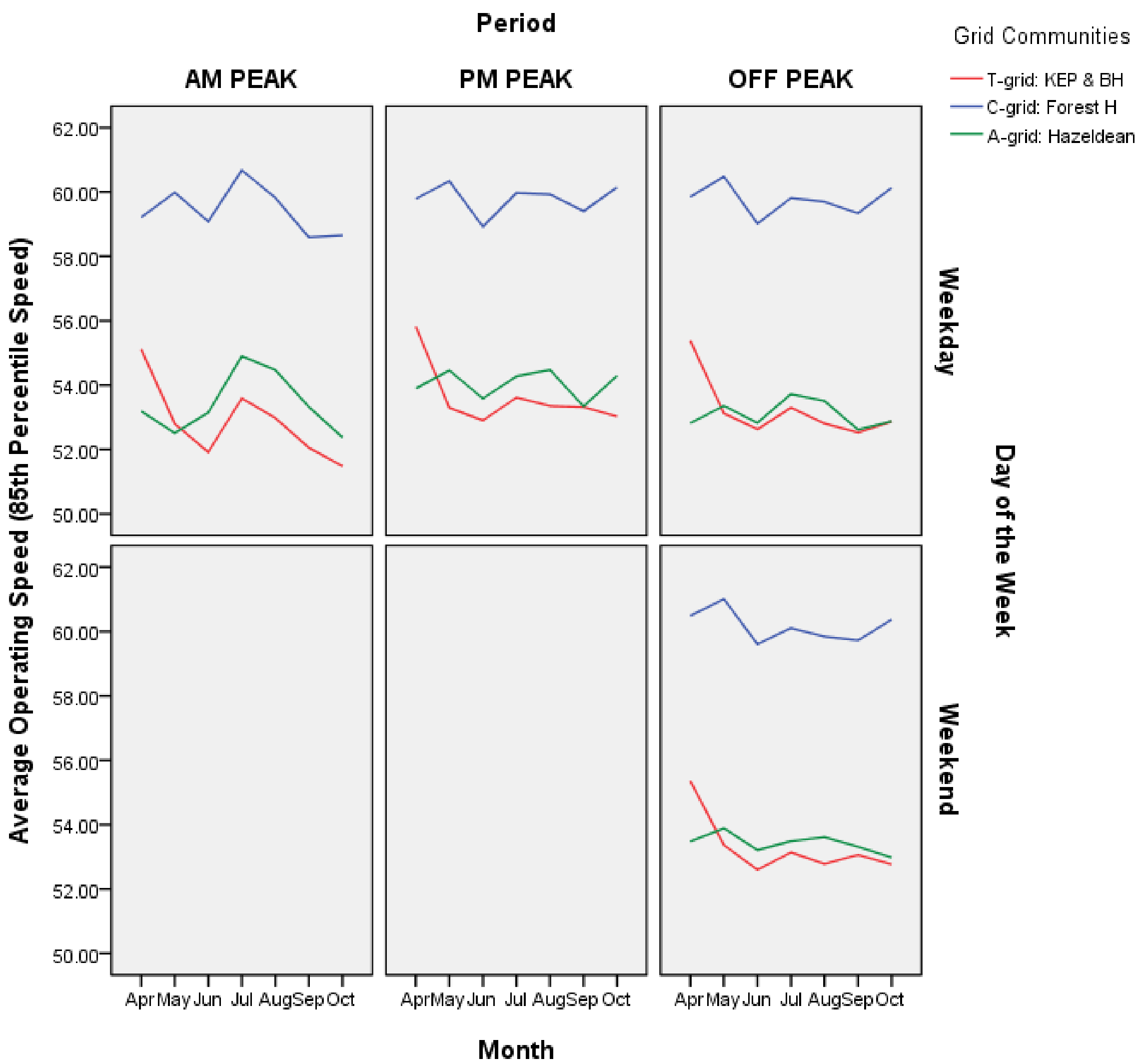


Figure 6.3 Monthly Average Operating Speed (85th Percentile Speed) by Grid-based Community Groups, Peak Period, and Day of Week

- Figure 6.4 shows a panel histogram of the operating speed for each of the grid-based community groups. Note the solid red line represents the "Before" posted speed limit (i.e., 50 km/h). After the implementation of the pilot project, the speed distribution for the treated communities shifted towards the solid line indicating a reduction in the speed distribution. Alternatively, the speed distributions for the control and adjacent communities remained relatively unchanged.

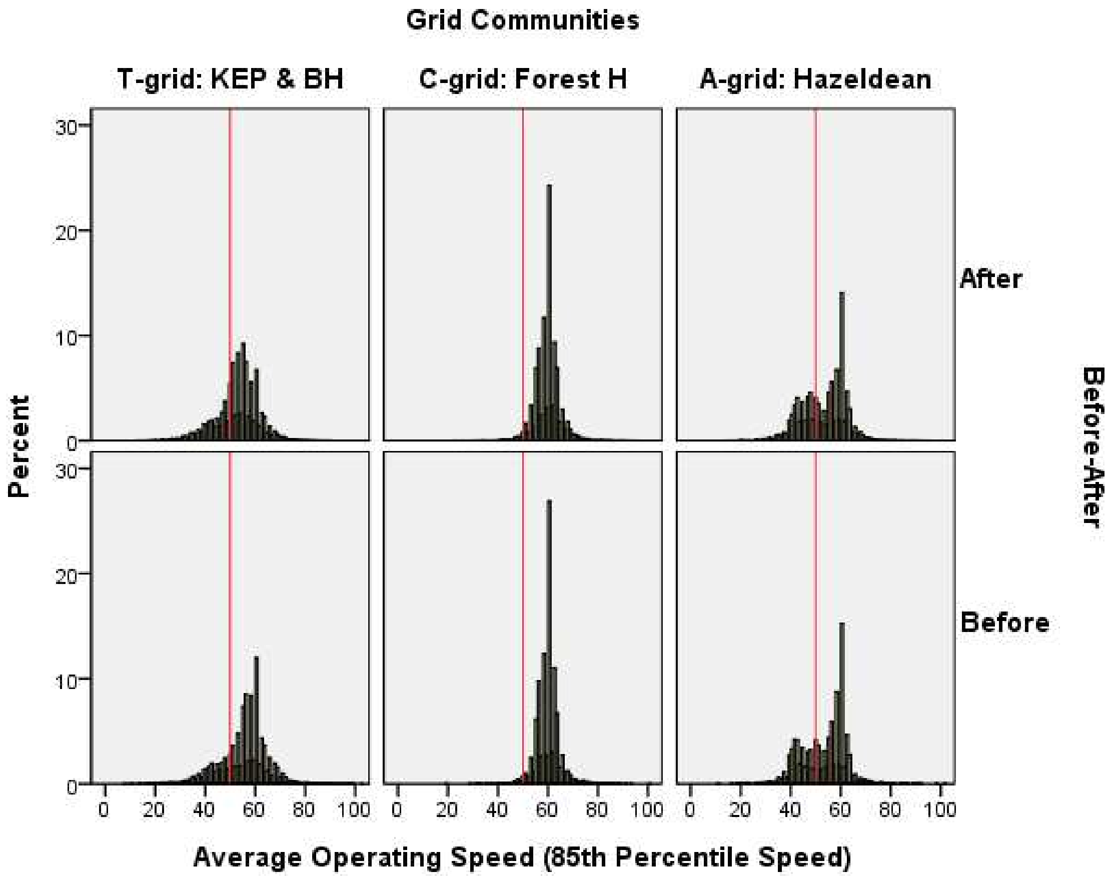


Figure 6.4 "Before" and "After" Histogram showing Average Operating Speed (85th Percentile Speed) by Grid-based Community Groups

- Figure 6.5 shows the "Before" and "After" cumulative distributions for the operating speed for each of the grid-based community groups. After the implementation of the pilot project, the cumulative distribution for the treated grid-based communities shifted to the left indicating a reduction in the speed. Alternatively, the operating speed distribution for the control and adjacent grid-based communities remained relatively unchanged during the "After" period.

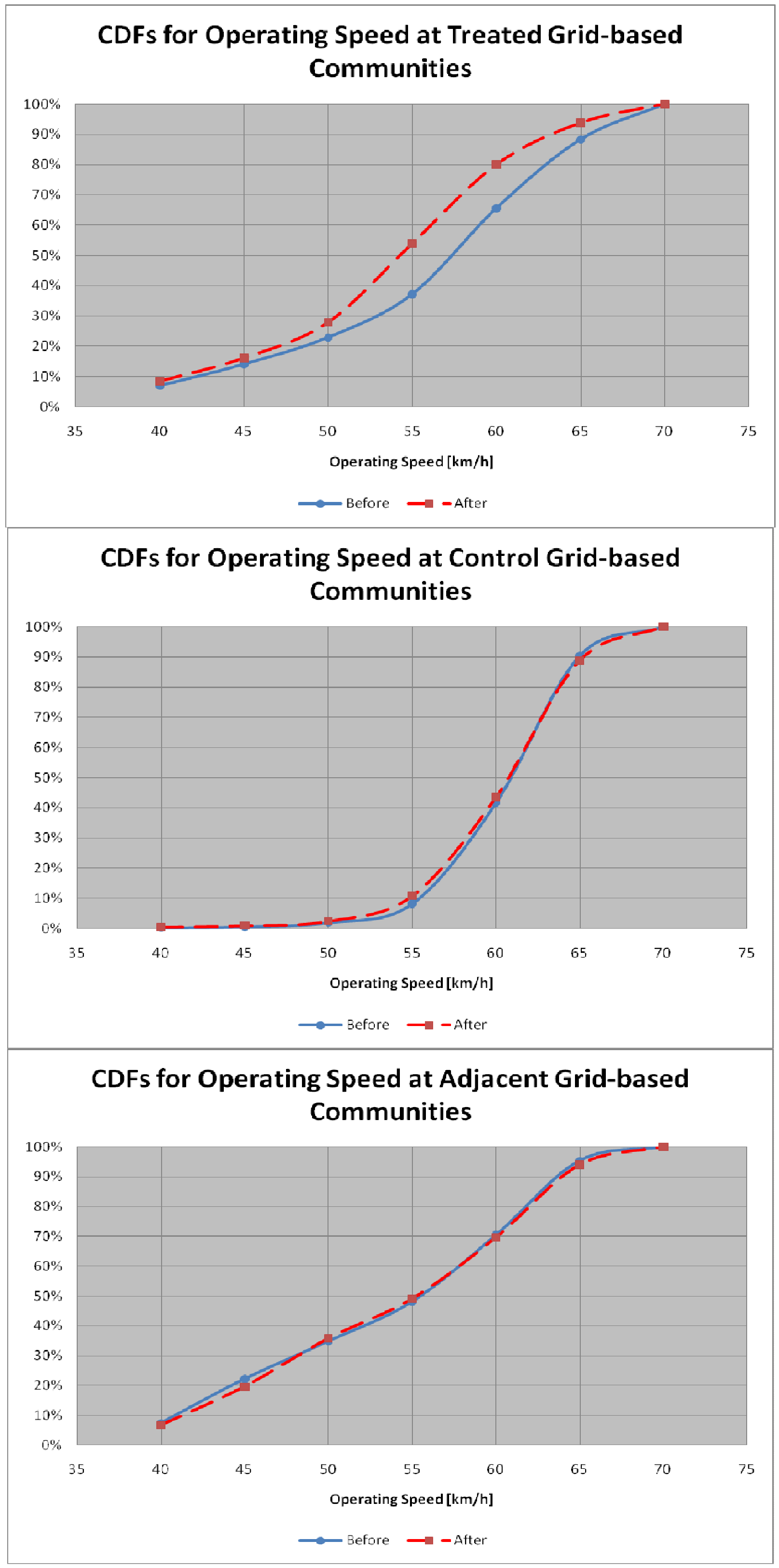


Figure 6.5 “Before” and “After” Cumulative Distributions for Average Operating Speed (85^{th} Percentile Speed) by Grid-based Community Groups

Table 6.3 "Before" and "After" Average Operating Speed (85th Percentile Speed) by Grid-based Community Groups

Community Group	Before		After	
	Mean	S.E.	Mean	S.E.
KEP & Beverly Heights	55.39	.06	52.90	.02
Forest Heights	59.98	.07	59.86	.03
Hazeldean	53.09	.13	53.31	.05

Table 6.4 "Before" and "After" Average Operating Speed by Grid-based Community Groups, Peak Period, and Day of Week

Period	Community Group	Weekday				Weekend			
		Before		After		Before		After	
		Mean	S.E.	Mean	S.E.	Mean	S.E.	Mean	S.E.
AM Peak	KEP & Beverly Heights	55.12	.22	52.47	.10	.	.	.	.
	Forest Heights	59.21	.23	59.45	.11	.	.	.	.
	Hazeldean	53.19	.50	53.47	.21	.	.	.	.
PM Peak	KEP & Beverly Heights	55.82	.18	53.25	.08	.	.	.	.
	Forest Heights	59.79	.17	59.77	.08	.	.	.	.
	Hazeldean	53.90	.45	54.05	.17	.	.	.	.
Off Peak	KEP & Beverly Heights	55.38	.08	52.87	.03	55.36	.12	52.96	.04
	Forest Heights	59.84	.09	59.74	.05	60.49	.12	60.14	.05
	Hazeldean	52.82	.18	53.15	.08	53.48	.26	53.41	.09

Table 6.5 Average Operating Speed (85th Percentile Speed) by Grid-based Community Groups and Month

Community Group	Month													
	April		May		June		July		August		September		October	
	Mean	S.E.	Mean	S.E.	Mean	S.E.	Mean	S.E.	Mean	S.E.	Mean	S.E.	Mean	S.E.
KEP & Beverly Heights	55.39	.06	53.20	.06	52.59	.06	53.28	.06	52.84	.06	52.71	.06	52.77	.06
Forest Heights	59.98	.07	60.64	.07	59.21	.09	59.97	.09	59.76	.08	59.42	.08	60.14	.08
Hazeldean	53.09	.13	53.56	.14	53.01	.14	53.74	.13	53.65	.13	52.91	.14	52.96	.13

- Tables 6.6 and 6.7 summarize the results of mixed ANOVA.
- The results reveal the differences in operating speed was significant (p-value <0.05) for grid-based community group, day of week, time of day, and the "Before" and "After" periods.
- The three-way interactions were not significant (p-value >0.05).
- The interaction between the grid-based community group and days of the week was statistically significant. This implies the difference in operating speed between treated and control (or any other combination of community groups) on weekdays was different from those on weekends. Alternatively, the difference in speeds between weekdays and weekends in the treated group was different from operating speeds in the control or adjacent communities.
- The interaction between the grid-based community group and the "Before" and "After" periods was statistically significant. This implies the difference in speeds between treated and control (or any other combination of community groups) in the "Before" period was different from operating speeds in the "After" period. Alternatively, the difference in speeds between the "Before" and "After" periods in the treated group was different from operating speeds in the control or adjacent communities.
- Street variation within each community group explained 56% of the total variation.

Operating speed summary: the operating speed was reduced by 4%. This corresponds to a reduction of 2.39 km/h in operating speed. This reduction was statistically significant indicating that the pilot project was successful in reducing the operating speeds in the treated grid-based communities.

Table 6.6 Mixed ANOVA for Average Operating Speed (85th Percentile Speed)

Source	Numerator df	F	Sig.
(Intercept)	1	2043.438	.000
Vehicles	1	3291.243	.000
One-way Interaction			
Grid-based Community Groups	2	3.476	.039
Day of Week	1	50.664	.000
Time of Day	2	235.221	.000
Before-After	1	103.466	.000
Two-way Interactions			
Grid-based Community Groups * Day of Week	2	4.548	.011
Grid-based Community Groups * Time of Day	4	1.865	.113
Grid-based Community Groups * Before-After	2	187.278	.000
Day of Week * Before-After	1	1.354	.245
Time of Day * Before-After	2	.615	.541
Three-way Interactions			
Grid-based Community Groups * Day of Week * Before-After	2	1.122	.326
Grid-based Community Groups * Time of Day * Before-After	4	.235	.919

Table 6.7 Estimates of Covariance Parameters for Average Operating Speed (85th Percentile Speed)

Parameter		Estimate	Std. Error
Residual		40.369603	0.118633
Site Variations within Community Group	Variance	51.828518	10.437332

6.1.2 Percent Compliance

- Tables 6.8 to 6.10 summarize the descriptive statistics (marginal and joint means) for the percentage of vehicles in compliance with the posted speed limit within the grid-based community groups.
- Figure 6.6 reveals the percent compliance to the posted speed limit (40 km/h) in the treated communities decreased substantially (62% to 36%) after the implementation of the pilot project. Alternatively, the percent compliance to the posted speed (50 km/h) improved marginally for the control community (44% to 45%) and adjacent community (67% to 68%).

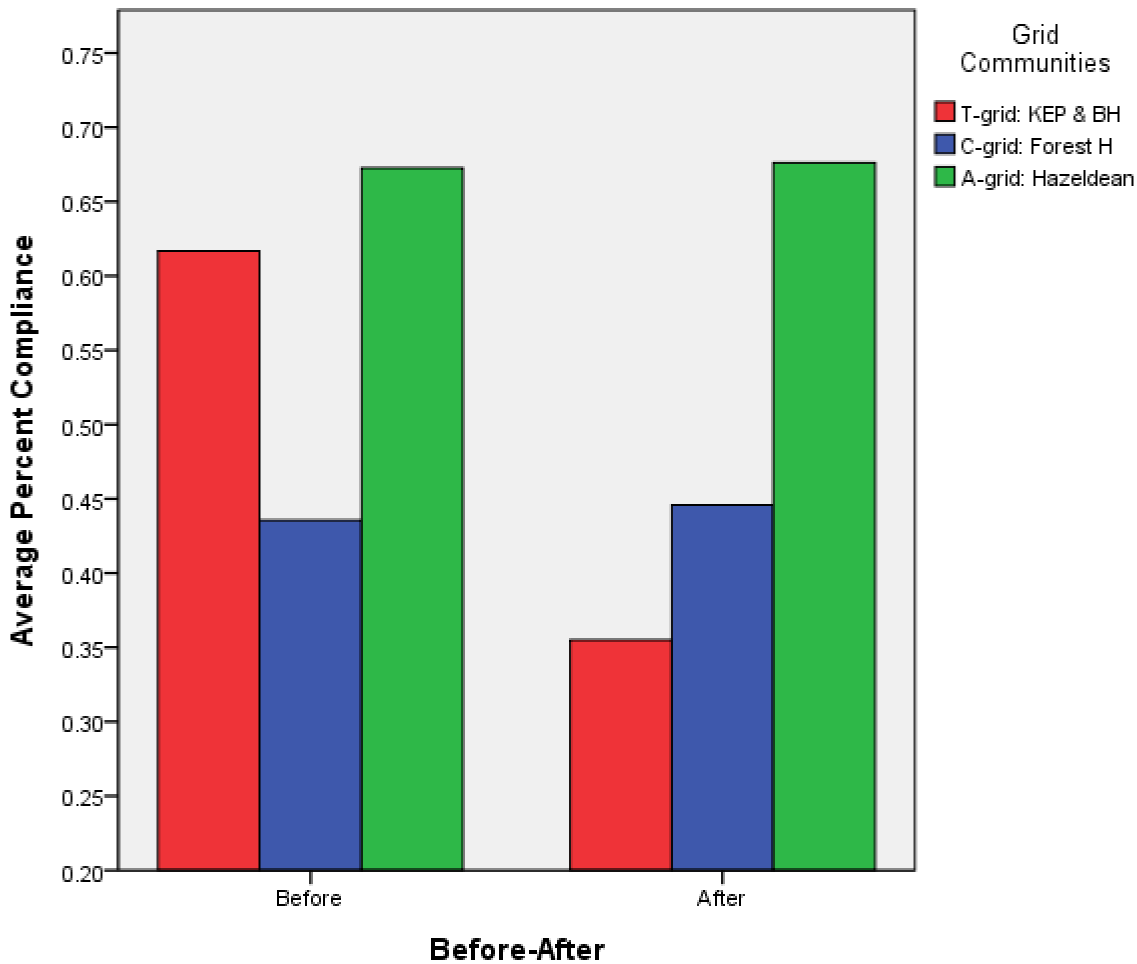


Figure 6.6 "Before" and "After" Average Percent Compliance by Grid-based Community Groups

- Figure 6.7 depicts the change in percent compliance with the posted speed limit "Before" and "After" the implementation of the pilot project for different times of day and days of the week. The figure shows the operating speed decreased consistently in the treated grid-based communities regardless of time of day or day of week. Alternatively, a slight increase or decrease in the percent of vehicles in compliance with the posted speed limit was observed for the control and adjacent communities.

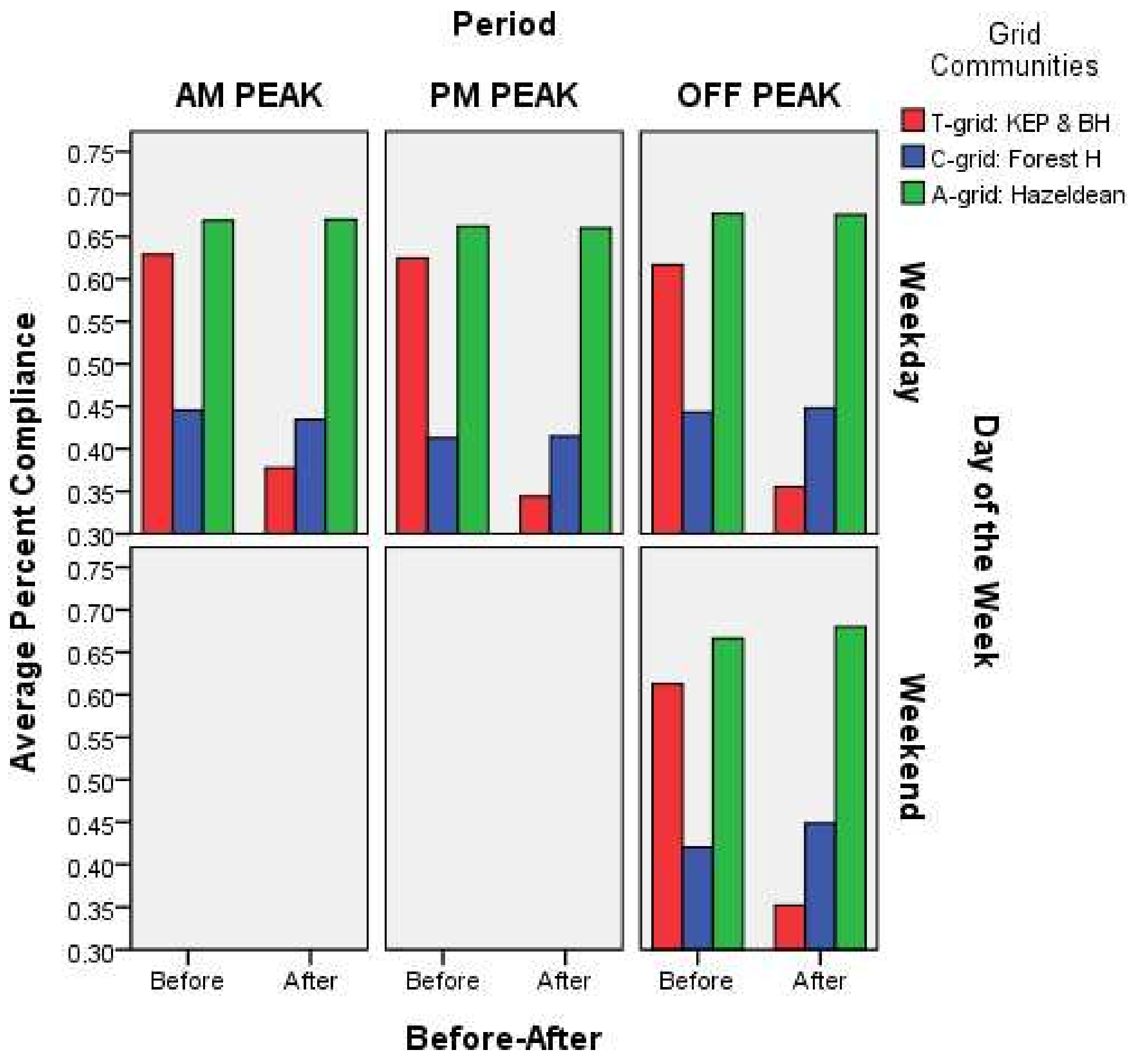


Figure 6.7 "Before" and "After" Average Percent Compliance by Grid-based Community Groups, Peak Period, and Day of Week

- Figures 6.8 shows there were some monthly fluctuations in compliance percentages for the treated, control, and adjacent grid-based communities. Note: for the treated communities, a large reduction in compliance percentage occurred at the start of the project (from April to May) which leveled off at approximately 35% for the remaining months.

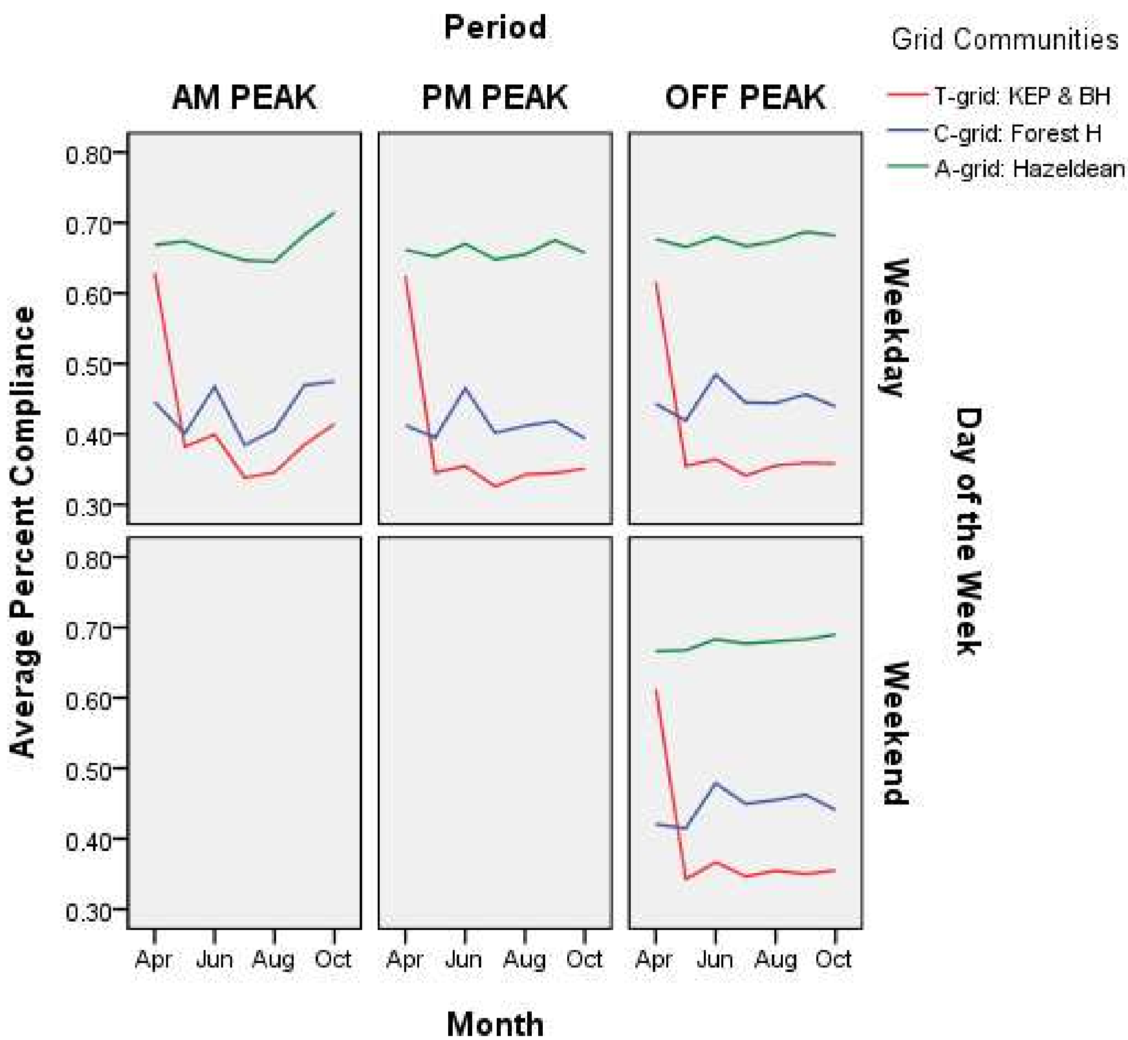


Figure 6.8 Monthly Average Percent Compliance by Grid-based Community Groups, Peak Period, and Day of Week

Table 6.8 "Before" and "After" Average Percent Compliance by Grid-based Community Groups

Community Group	Before		After	
	Mean	S.E.	Mean	S.E.
KEP & Beverly Heights	.62	.00	.36	.00
Forest Heights	.44	.00	.45	.00
Hazeldean	.67	.00	.68	.00

Table 6.9 "Before" and "After" Average Percent Compliance by Grid-based Community Groups, Peak Period, and Day of Week

Period	Community Group	Weekday				Weekend			
		Before		After		Before		After	
		Mean	S.E.	Mean	S.E.	Mean	S.E.	Mean	S.E.
AM Peak	KEP & Beverly Heights	.63	.01	.38	.00	.	.	.	.
	Forest Heights	.45	.01	.43	.00	.	.	.	.
	Hazeldean	.67	.02	.67	.01	.	.	.	.
PM Peak	KEP & Beverly Heights	.62	.01	.34	.00	.	.	.	.
	Forest Heights	.41	.01	.42	.00	.	.	.	.
	Hazeldean	.66	.01	.66	.01	.	.	.	.
Off Peak	KEP & Beverly Heights	.62	.00	.36	.00	.61	.00	.35	.00
	Forest Heights	.44	.00	.45	.00	.42	.00	.45	.00
	Hazeldean	.68	.00	.68	.00	.67	.01	.68	.00

Table 6.10 Average Percent Compliance by Grid-based Community Groups and Month

Community Group	Month													
	April		May		June		July		August		September		October	
	Mean	S.E.	Mean	S.E.	Mean	S.E.	Mean	S.E.	Mean	S.E.	Mean	S.E.	Mean	S.E.
KEP & Beverly Heights	.62	.00	.35	.00	.37	.00	.34	.00	.35	.00	.36	.00	.36	.00
Forest Heights	.44	.00	.42	.00	.48	.00	.44	.00	.44	.00	.46	.00	.44	.00
Hazeldean	.67	.00	.67	.00	.68	.00	.67	.00	.67	.00	.69	.00	.69	.00

- Table 6.11 summarizes the results of the Logistic Regression Analysis.
- The compliance OR in treated communities during AM peak = 0.82, i.e., the drivers in treated communities during the AM peak were less (0.82) likely to comply than the drivers in other communities or during other periods. The OR was significant at a p-value <0.0001.
- The compliance OR in treated communities during PM peak = 1.06, i.e., the drivers in treated communities during the PM peak were a little more (1.06) likely to comply than the drivers in other communities or during other periods. The OR was significant at a p-value <0.0001.
- The compliance OR in treated communities during the “After” period = 0.28, i.e., the drivers in treated communities during the “After” period were much less (0.28) likely to comply than the drivers in other communities or during the “Before” period. The OR was significant at a p-value <0.0001.
- The compliance OR during weekdays in the “After” period = 0.93, i.e., the drivers during weekdays in the “After” period were a little less (0.93) likely to comply than the drivers during weekends or during the “Before” period. The OR was significant at a p-value <0.0001.
- The compliance OR during AM peak in the “After” period = 0.95, i.e., the drivers during AM peak in the “After” period were a little less (0.95) likely to comply than the drivers during other periods or during the “Before” period. The OR was significant at a p-value <0.0001.
- The compliance OR during PM peak in the “After” period = 0.96, i.e., the drivers during PM peak in the “After” period were a little less (0.96) likely to comply than the drivers during other periods or during the “Before” period. The OR was significant at a p-value <0.0001.
- The compliance OR in treated communities during weekdays in the “After” period = 1.04, i.e., the drivers in treated communities during weekdays in the “After” period were a little more (1.04) likely to comply than the drivers in other communities, during weekends in the “Before” period. The OR was significant at a p-value <0.0001.
- The compliance OR in treated communities during AM peak in the “After” period = 1.11, i.e., the drivers in treated communities during AM peak in the “After” period were more (1.11) likely to comply than the drivers in other communities, during other periods in the “Before” period. The OR was significant at a p-value <0.0001.
- The compliance OR in treated communities during PM peak in the “After” period = 1.03, i.e., the drivers in treated communities during PM peak in the “After” period were a little more (1.03) likely to comply than the drivers in other communities, during other periods in the “Before” period. The OR was significant at a p-value <0.05.

Percent compliance summary: the analysis showed that the drivers in treated grid-based communities during the “After” period were much less likely to comply than the drivers in other grid-based communities or during the “Before” period and that there was a significant decrease in the percent compliance to the posted speed limit in the treated grid-based communities.

Table 6.11 Logistic Regression Analysis for Average Percent Compliance

Variables	B	S.E.	Wald	df	Sig.	Exp(B)
One-way Interaction						
Grid-based Community Groups			4081.120	2	.000	
Treated Communities	.422	.007	3334.493	1	.000	1.525
Adjacent Communities	.573	.010	3017.008	1	.000	1.773
Day of Week						
Weekdays	.052	.008	46.755	1	.000	1.054
Time of Day			420.505	2	.000	
AM Peak	.125	.009	177.638	1	.000	1.133
PM Peak	-.115	.009	161.652	1	.000	.892
Before-After						
After Period	.099	.007	201.895	1	.000	1.105
Two-way Interactions						
Grid-based Community Groups * Day of Week			10.214	2	.006	
Treated Communities by Weekdays	.012	.009	2.067	1	.150	1.012
Adjacent Communities by Weekdays	-.020	.013	2.588	1	.108	.980
Grid-based Community Groups * Time of Day			491.515	4	.000	
Treated Communities by AM Peak	-.197	.011	319.971	1	.000	.821
Treated Communities by PM Peak	.060	.010	33.524	1	.000	1.061
Adjacent Communities by AM Peak	-.233	.017	183.164	1	.000	.792
Adjacent Communities by PM Peak	-.061	.015	15.491	1	.000	.941
Grid-based Community Groups * Before-After			36643.674	2	.000	
Treated Communities by After Period	-1.260	.008	25624.712	1	.000	.284
Adjacent Communities by After Period	-.021	.011	3.474	1	.062	.979
Weekdays by Before-After						
Weekdays by After Period	-.072	.008	74.894	1	.000	.931
Time of Day * Before-After			33.756	2	.000	
AM Peak by After Period	-.051	.010	24.295	1	.000	.950
PM Peak by After Period	-.039	.010	15.767	1	.000	.961
Three-way Interactions						
Grid-based Community Groups * Day of Week * Before-After			18.505	2	.000	
Treated Communities by Weekdays by After Period	.039	.009	17.110	1	.000	1.040
Adjacent Communities by Weekdays by After Period	.017	.014	1.589	1	.207	1.017
Grid-based Community Groups * Time of Day * Before-After			85.999	4	.000	
Treated Communities by AM Peak by After Period	.102	.012	68.671	1	.000	1.107
Treated Communities by PM Peak by After Period	.026	.011	5.014	1	.025	1.026
Adjacent Communities by AM Peak by After Period	.018	.019	.897	1	.344	1.018
Adjacent Communities by PM Peak by After Period	.045	.017	7.293	1	.007	1.046
(Constant)	-.289	.007	1955.829	1	.000	.749

6.2 Analysis of Old (1950's/1960's) Communities

This section provides detailed speed and traffic results for the old communities.

6.2.1 Operating (85th Percentile) Speeds

- Tables 6.14 to 6.16 summarize the descriptive statistics (marginal and joint means) for the operating speed (85^{th} percentile speed).
- Figure 6.9 reveals the operating speed in the treated and adjacent old communities decreased after the implementation of the pilot project. At the same time, the control community witnessed an increase in the operating speeds.
- The operating speed was lowest for the treated old communities.
- Table 6.12 shows the operating speed in the treated old (1950's/1960's) communities was reduced by 3.3% resulting in a 1.74 km/h reduction in speed. However, if the influence of other variables in the road system was accounted for (achieved by using a control group), the operating speed in the treated communities was further reduced to 5.6%. This corresponds to a reduction of 2.96 km/h in operating speed. In the adjacent communities, the operating speed was reduced by 5.2% resulting in a 2.96 km/h reduction in speed. Alternatively, the percent reduction was further reduced to 7.5% (i.e., 4.26 km/h reduction in operating speed) by using a control group.

Table 6.12 Percent Change in Average Operating Speed (85th Percentile Speed) with and without using a Control Group

Community Group		Without Control*		With Control**	
		%	km/h	%	km/h
Ottewell and Woodcroft	Treated	-3.3%	-1.74	-5.6%	-2.96
Dovercourt	Adjacent	-5.2%	-2.96	-7.5%	-4.26

*A simple before-after percent change was used to calculate the percentages without the control group i.e., [(after-before)/before]*100

** The cross-product ratio (also known as the odds ratio) was used to calculate the percent change in speed after accounting for the trends in the control group i.e., ([before control/after control]/[before treated/after treated])-1

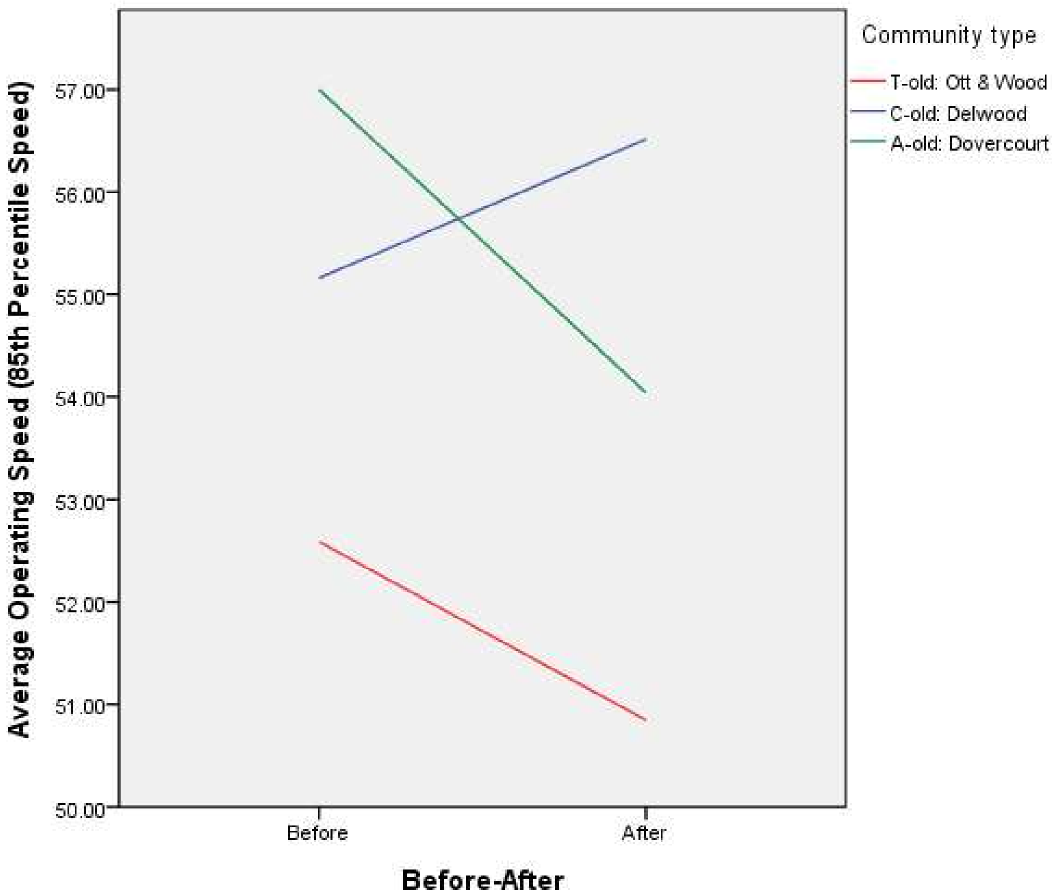


Figure 6.9 “Before” and “After” Average Operating Speed (85th Percentile Speed) by Old (1950’s/1960’s) Community Groups

- Figure 6.10 depicts the change in operating speed "Before" and "After" the implementation of the pilot project for different times of day and days of the week.
- The figure shows the operating speed decreased consistently in both treated and adjacent communities while increasing gradually in the control communities regardless of time of day or day of week.
- The operating speed was lowest for the treated old communities regardless of day of week and time of day.

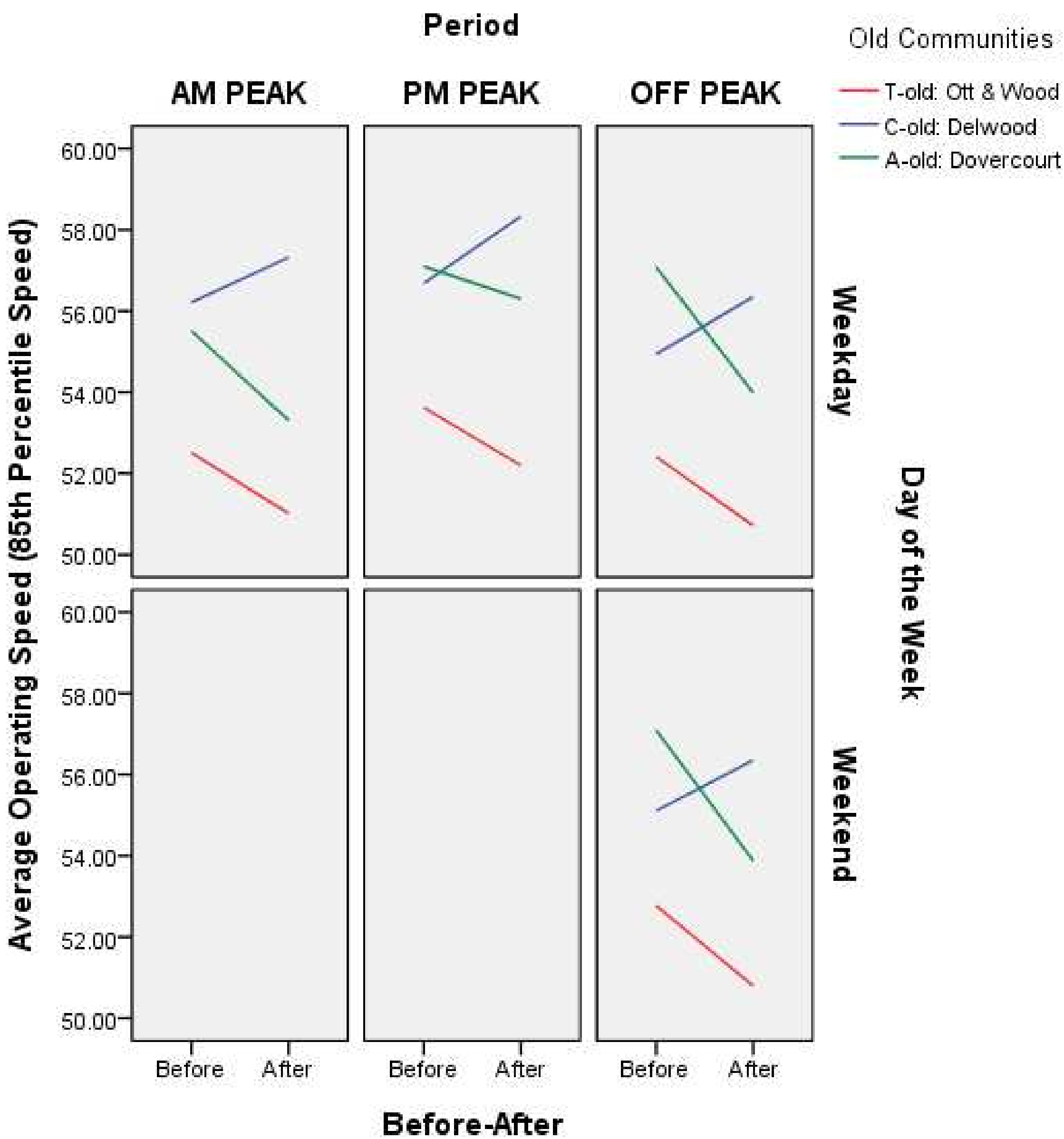


Figure 6.10 "Before" and "After" Average Operating Speed (85th Percentile Speed) by Old (1950's/1960's) Community Groups, Peak Period, and Day of Week

- Table 6.13 summarizes the percent change in operating speed with and without using a control group for different times of day and days of the week. The results show the operating speed decreased consistently in the treated communities regardless of time of day or day of week.
- The table shows the reductions in operating speed were highly influenced by the corresponding increase in the control communities. As a result, the simple “Before” to “After” reduction was consistently smaller than the reductions which were adjusted by the control group.
- Note: the operating speed reduction ranged from 4.7% to 5.9% in the treated communities.
- In the treated communities, the highest reduction in the operating speed (3.09 km/h) occurred during the off peak on weekends.

Table 6.13 Percent Change in Average Operating Speed (85th Percentile Speed) by Community Group, Peak Period, and Day of Week with and without using a Control Group

Period	Community Group		Weekday				Weekend			
			Without Control*		With Control**		Without Control*		With Control**	
			%	km/h	%	km/h	%	km/h	%	km/h
AM Peak	Ottewell and Woodcroft	Treated	-2.8%	-1.49	-4.7%	-2.48	.	.	.	.
	Dovercourt	Adjacent	-4.0%	-2.20	-5.8%	-3.23	.	.	.	.
PM Peak	Ottewell and Woodcroft	Treated	-2.6%	-1.42	-5.4%	-2.89	.	.	.	.
	Dovercourt	Adjacent	-1.4%	-0.80	-4.2%	-2.38	.	.	.	.
Off Peak	Ottewell and Woodcroft	Treated	-3.2%	-1.69	-5.6%	-2.96	-3.7%	-1.97	-5.9%	-3.09
	Dovercourt	Adjacent	-5.4%	-3.10	-7.8%	-4.45	-5.6%	-3.21	-7.7%	-4.40

*A simple before-after percent change was used to calculate the percentages without the control group i.e., [(after-before)/before]*100

** The cross-product ratio (also known as the odds ratio) was used to calculate the percent change in speed after accounting for the trends in the control group i.e., ([before control/after control]/[before treated/after treated])-1

- Figure 6.11 shows there were monthly fluctuations in the operating speed for all community groups. Away from these seasonal fluctuations, the operating speed was high in April and was reduced in later months in the treated old communities, but in the control community the operating speed increased in later months compared to April. So while the operating speed was reduced in the treated group over time, it increased in the control group.
- Note: for the treated old communities, the largest reduction in operating speed occurred at the start of the project (from April to June) with the operating speed rising slightly in July before dropping eventually.
- Also note the operating speeds for the treated old communities were consistently lower than the operating speeds in the control and adjacent communities.

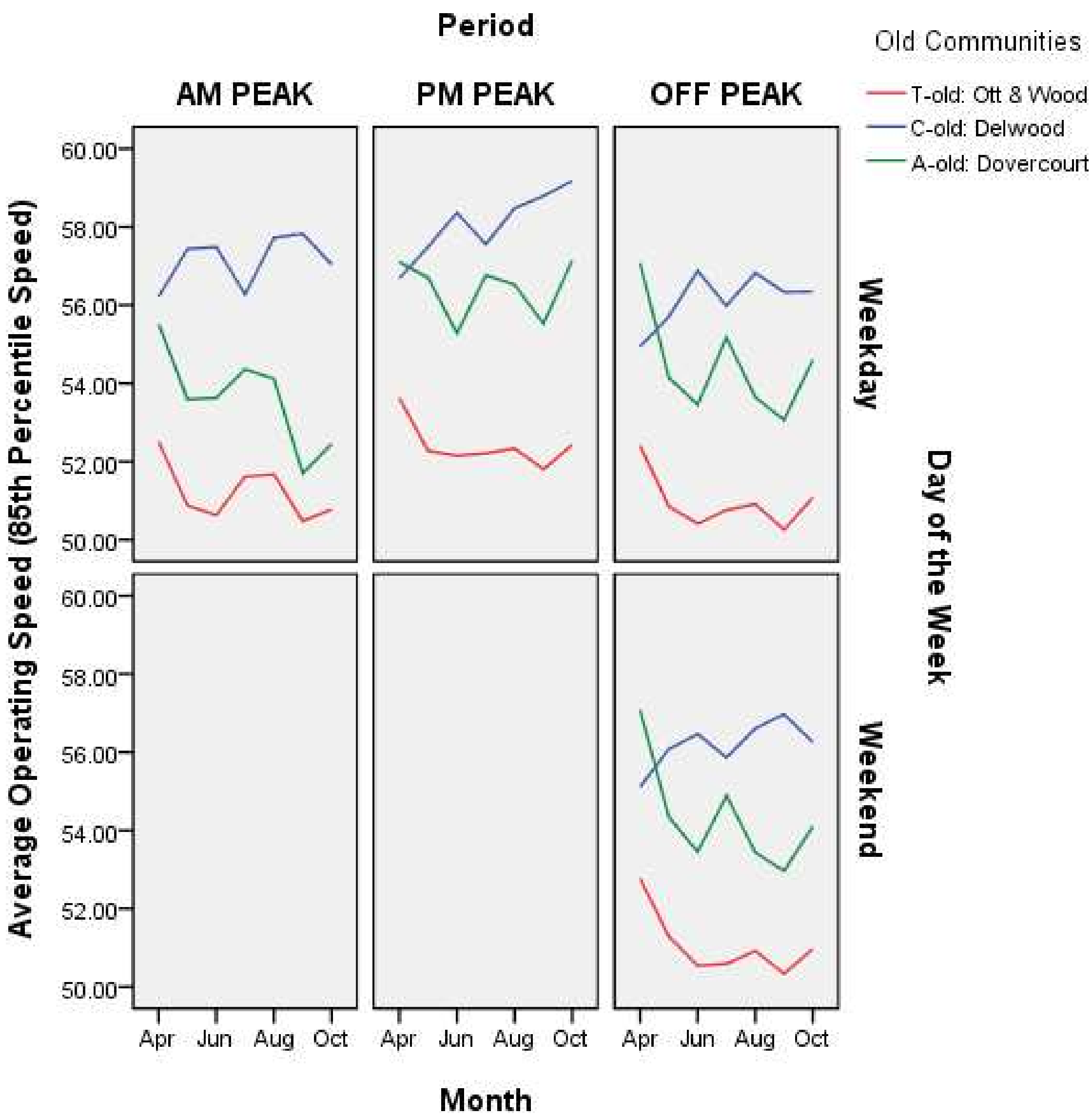


Figure 6.11 Monthly Average Operating Speed (85th Percentile Speed) by Old (1950's/1960's) Community Groups, Peak Period, and Day of Week

- Figure 6.12 shows a panel histogram of the operating speed for each of the community groups. Note: the solid red line represents the "Before" posted speed limit (i.e., 50 km/h). After the implementation of the pilot project, the operating speed distribution for the treated old communities shifted slightly towards the solid line indicating a reduction in the operating speed distribution. Alternatively, the speed distributions for the control and adjacent communities remained relatively unchanged.

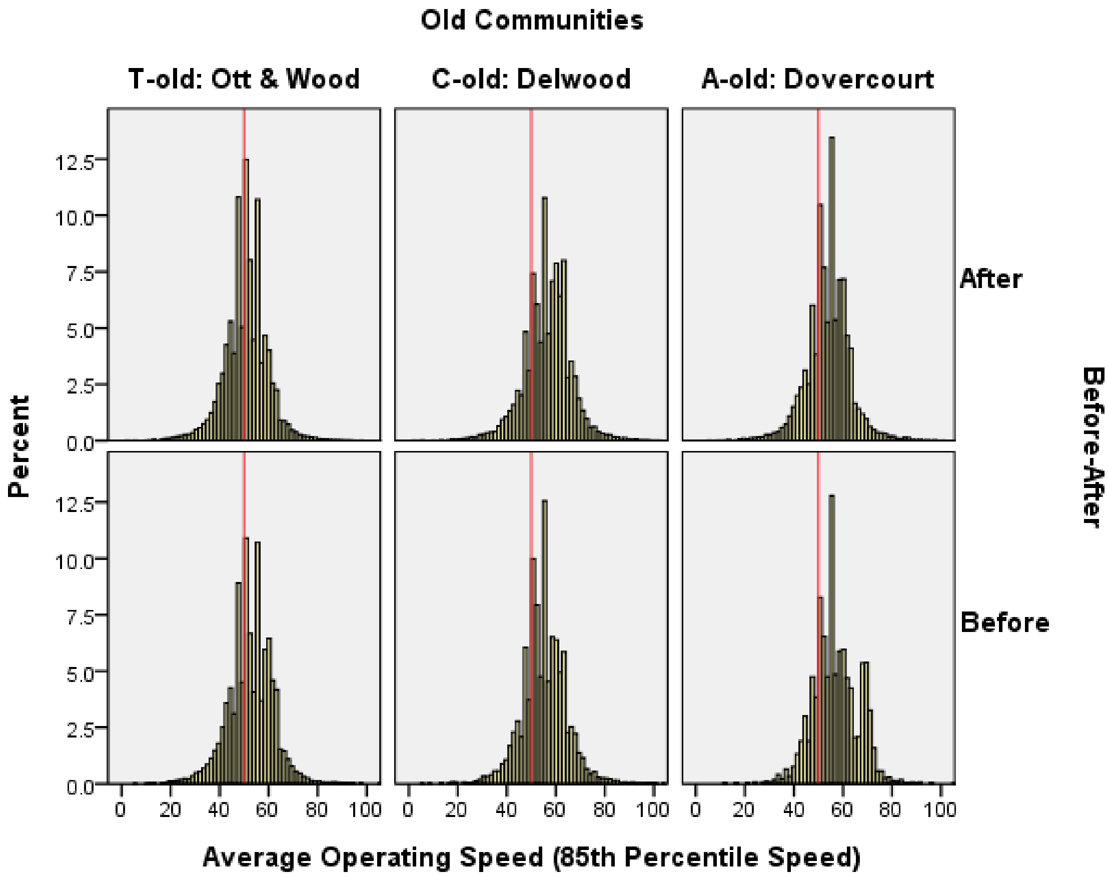


Figure 6.12 "Before" and "After" Histogram showing Average Operating Speed (85th Percentile Speed) by Old (1950's/1960's) Community Groups

- Figure 6.13 shows the "Before" and "After" cumulative distributions for the operating speed for each of the old (1950's/1960's) community groups. After the implementation of the pilot project, the cumulative distribution for the treated old communities shifted to the left indicating a reduction in the speed. In contrast, the speed distribution for the control old communities shifted to the right, whereas the speed distribution for the adjacent old communities shifted slightly to the left. This implies the speed increased in the control old communities while decreasing slightly in the adjacent old communities during the "After" period.

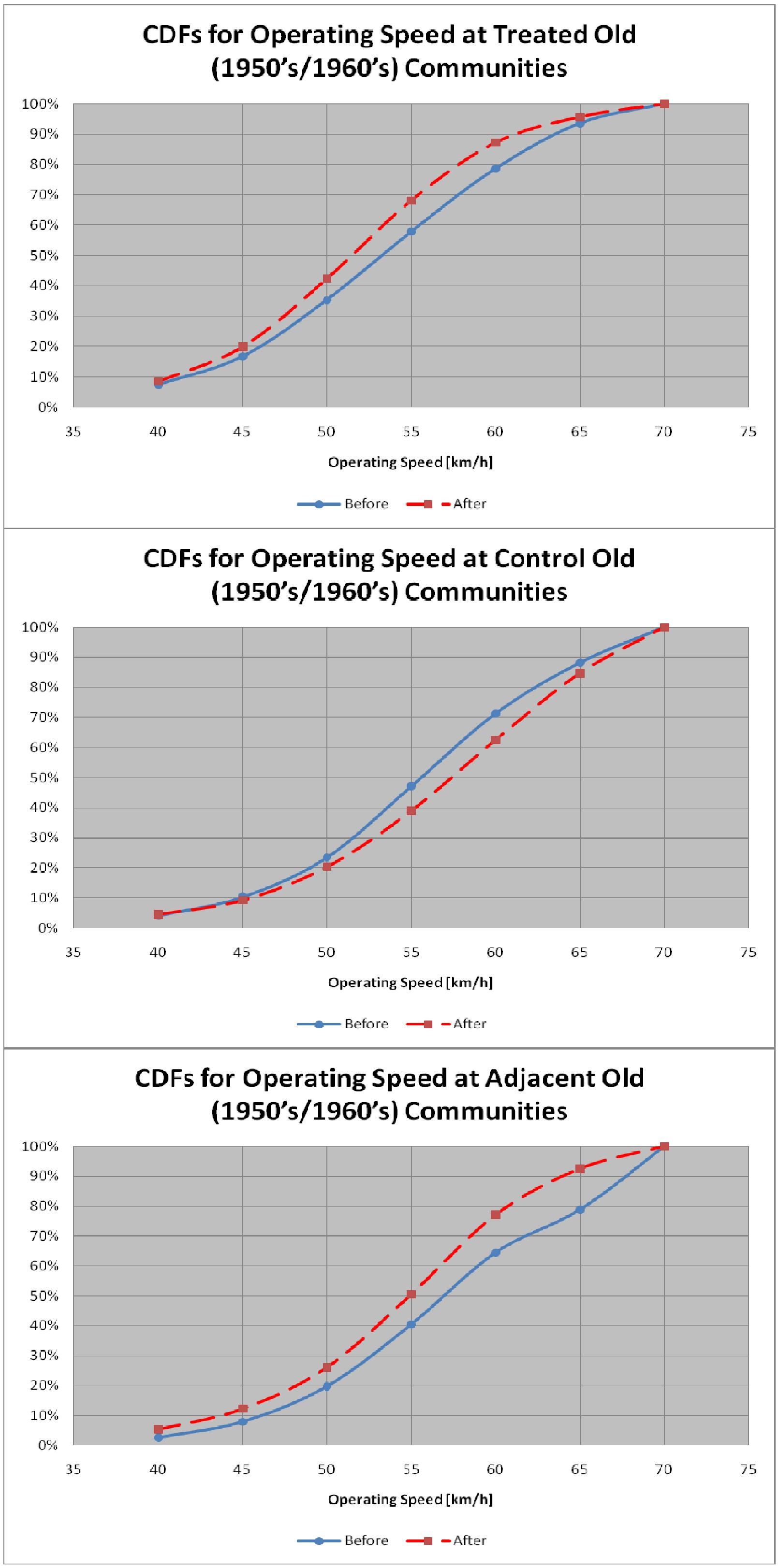


Figure 6.13 "Before" and "After" Cumulative Distributions for Average Operating Speed (85th Percentile Speed) by Old (1950's/1960's) Community Groups

Table 6.14 “Before” and “After” Average Operating Speed (85th Percentile Speed) by Old (1950’s/1960’s) Community Groups

Community Group	Before		After	
	Mean	S.E.	Mean	S.E.
Ottewell & Woodcroft	52.59	.06	50.85	.03
Delwood	55.16	.11	56.52	.05
Dovercourt	57.00	.18	54.04	.06

Table 6.15 “Before” and “After” Average Operating Speed by Old (1950’s/1960’s) Community Groups, Peak Period, and Day of Week

Period	Community Group	Weekday				Weekend			
		Before		After		Before		After	
		Mean	S.E.	Mean	S.E.	Mean	S.E.	Mean	S.E.
AM Peak	Ottewell & Woodcroft	52.51	.19	51.02	.09	.	.	.	.
	Delwood	56.21	.36	57.32	.22	.	.	.	.
	Dovercourt	55.51	.53	53.31	.22	.	.	.	.
PM Peak	Ottewell & Woodcroft	53.62	.18	52.20	.07	.	.	.	.
	Delwood	56.69	.31	58.33	.14	.	.	.	.
	Dovercourt	57.10	.48	56.30	.17	.	.	.	.
Off Peak	Ottewell & Woodcroft	52.41	.08	50.72	.04	52.77	.12	50.80	.04
	Delwood	54.94	.15	56.35	.07	55.11	.22	56.35	.09
	Dovercourt	57.08	.24	53.98	.09	57.09	.35	53.88	.11

Table 6.16 Average Operating Speed (85th Percentile Speed) by Old (1950’s/1960’s) Community Groups and Month

Community Group	Month													
	April		May		June		July		August		September		October	
	Mean	S.E.	Mean	S.E.	Mean	S.E.	Mean	S.E.	Mean	S.E.	Mean	S.E.	Mean	S.E.
Ottewell & Woodcroft	52.59	.06	51.09	.06	50.58	.06	50.83	.06	51.04	.06	50.39	.06	51.10	.06
Delwood	55.16	.11	56.03	.12	56.87	.13	56.04	.13	56.90	.13	56.76	.13	56.51	.13
Dovercourt	57.00	.18	54.32	.14	53.58	.15	55.13	.15	53.77	.16	53.11	.15	54.43	.16

- Tables 6.17 to 6.18 summarize the results of the mixed ANOVA.
- The results reveal the differences in the operating speed were significant for the old community groups, day of week, time of day, and the “Before” and “After” periods.
- The three-way interactions were not significant (p-value >0.05).
- The interaction between the old community groups and time of day was statistically significant. This implies the difference in operating speed between treated and control (or any other combination of community groups) in the AM peak was different from operating speeds during the PM peak or any other peak periods. Alternatively, the difference in speeds between AM peak and PM peak (or any other combination of peak periods) in the treated group was different from operating speeds in the control or adjacent communities.
- The interaction between the old community groups and the “Before” and “After” periods was statistically significant. This implies the difference in speeds between treated and control (or any other combination of community groups) in the “Before” period was different from operating speeds in the “After” period. Alternatively, the difference in speeds between the “Before” and “After” periods in the treated group was different from operating speeds in the control or adjacent communities.
- Street variation within each community group explained 30% of the total variation.

Operating speed summary: the operating speed was reduced by 6%. This corresponds to a reduction of 2.96 km/h in operating speed. The statistical analysis revealed that this reduction was significant indicating that the project was successful in reducing the operating speeds in the treated old communities.

Table 6.17 Mixed ANOVA for Average Operating Speed (85th Percentile Speed)

Source	Numerator df	F	Sig.
(Intercept)	1	4197.879	.000
Vehicles	1	86.094	.000
One-way Interactions			
Old Community Groups	2	6.023	.004
Day of Week	1	7.937	.005
Time of Day	2	71.608	.000
Before-After	1	3.105	.078
Two-way Interactions			
Old Community Groups * Day of Week	2	.107	.899
Old Community Groups * Time of Day	4	5.980	.000
Old Community Groups * Before-After	2	100.015	.000
Day of Week * Before-After	1	2.644	.104
Time of Day * Before-After	2	2.406	.090
Three-way Interactions			
Old Community Groups * Day of Week * Before-After	2	.148	.862
Old Community Groups * Time of Day * Before-After	4	.785	.534

Table 6.18 Estimates of Covariance Parameters for Average Operating Speed (85th Percentile Speed)

Parameter		Estimate	Std. Error
Residual		61.121390	0.188448
Site Variations within Community Group	Variance	26.769006	5.283378

6.2.2 Percent Compliance

- Tables 6.19 to 6.21 summarize the descriptive statistics (marginal and joint means) for the percentage of vehicles in compliance with the posted speed limit.
- Figure 6.14 reveals the percent compliance to the posted speed limit (40 km/h) in the treated old communities decreased substantially (71% to 43%) after the implementation of the pilot project. Albeit not as steep, the compliance percentages to the posted speed (50 km/h) in the control group decreased from 65% to 62%. In contrast, the percent compliance to the posted speed (50 km/h) improved marginally for the adjacent communities from (57% to 68%).

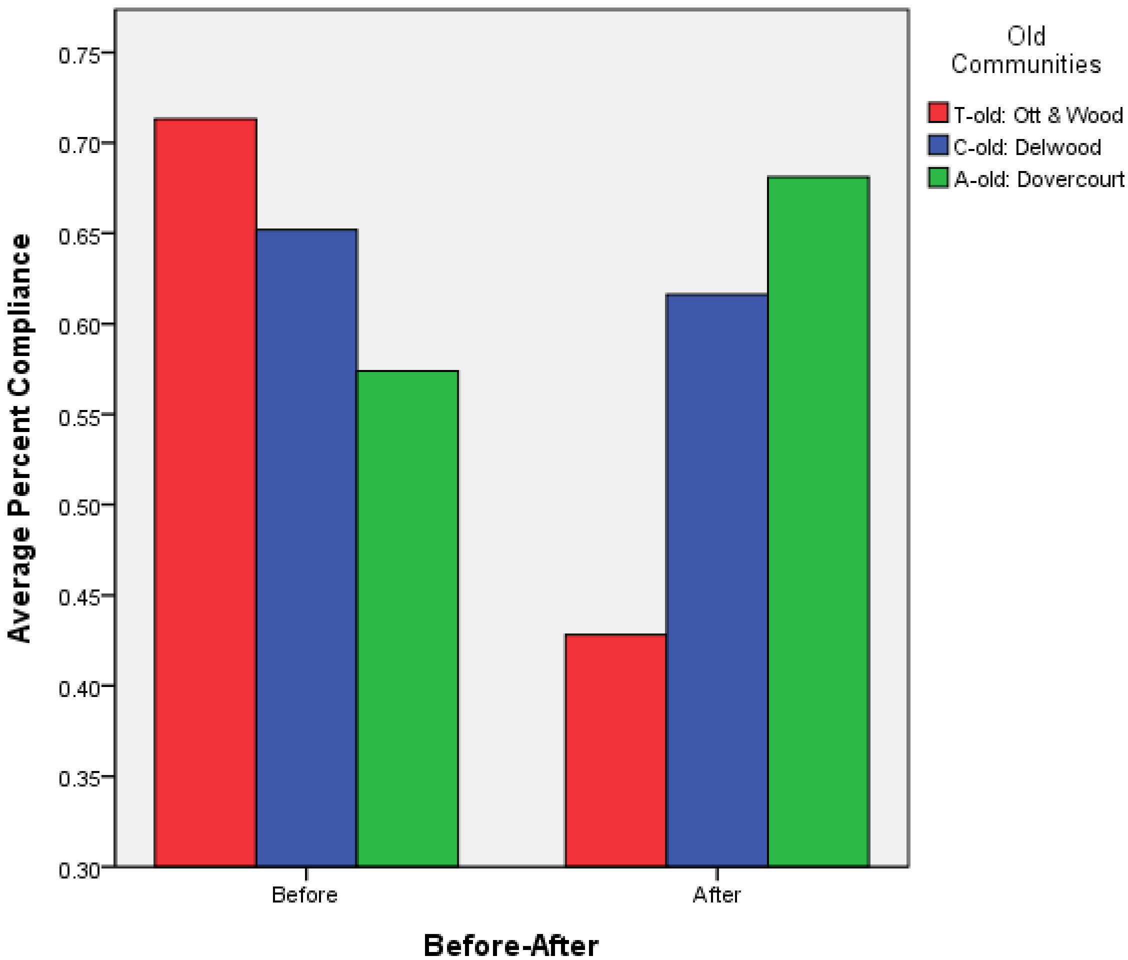


Figure 6.14 “Before” and “After” Average Percent Compliance by Old (1950’s/1960’s) Community Groups

- Figure 6.15 depicts the change in percent compliance with the posted speed limit "Before" and "After" the implementation of the pilot project for different times of day and days of the week. The figure shows the operating speed decreased consistently in both treated and control communities (albeit with varying rates) while slightly increasing in the adjacent communities regardless of time of day or day of week.

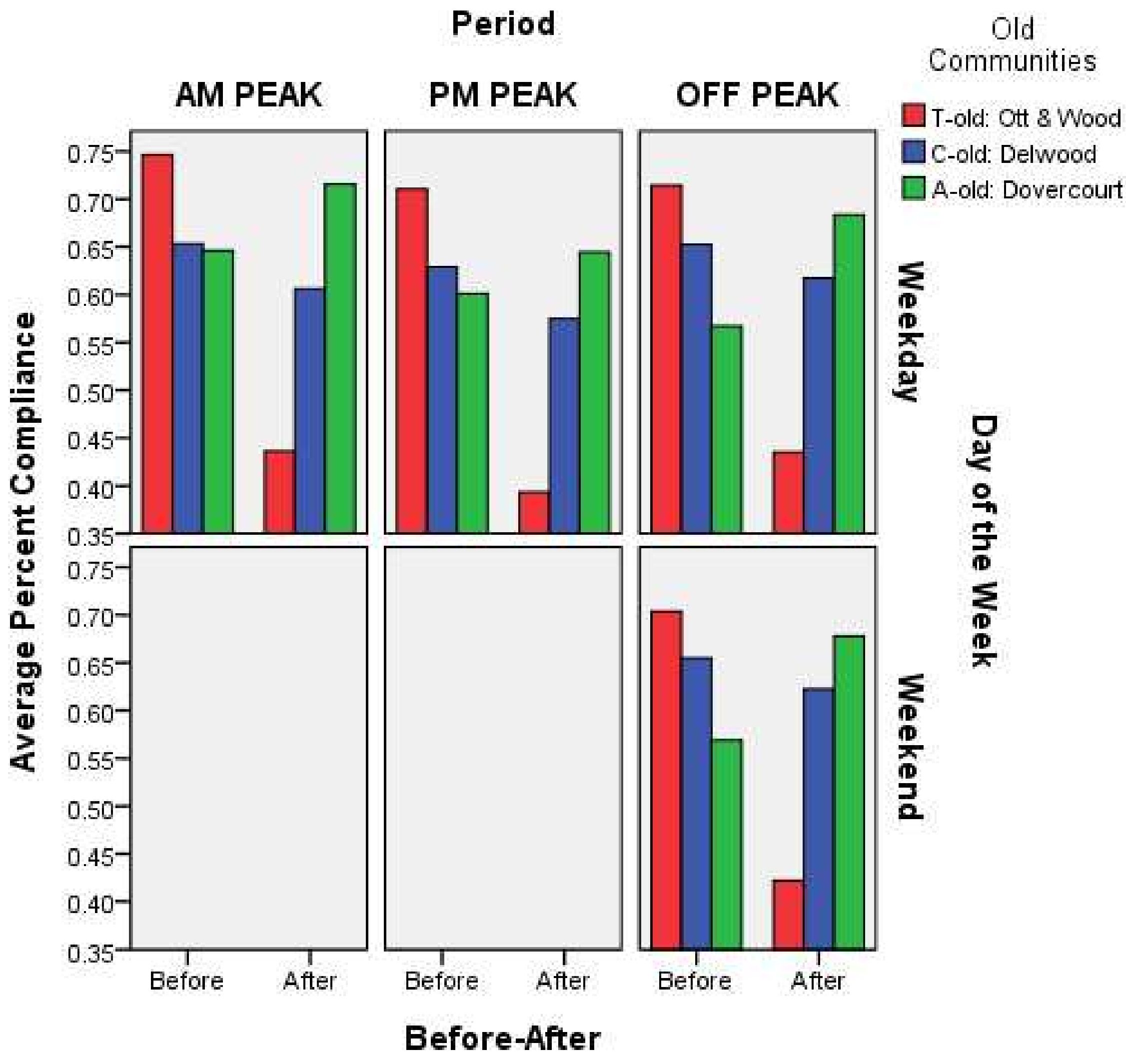


Figure 6.15 "Before" and "After" Average Percent Compliance by Old (1950's/1960's) Community Groups, Peak Period, and Day of Week

- Figure 6.16 shows there were some monthly fluctuations in compliance percentages for all old community groups.
- Compliance rates in the control communities were declining slightly while the rates for the adjacent group were improving slightly.
- In the treated and old communities the compliance rates were high in April and were reduced in later months.
- So while the compliance rate was reduced in the treated and control groups over time, it increased in the adjacent group.
- Note: for the treated old communities, a large reduction in the percentage of compliance occurred at the start of the project (from April to May) which leveled off and stabilized at approximately 42% for the remaining months.

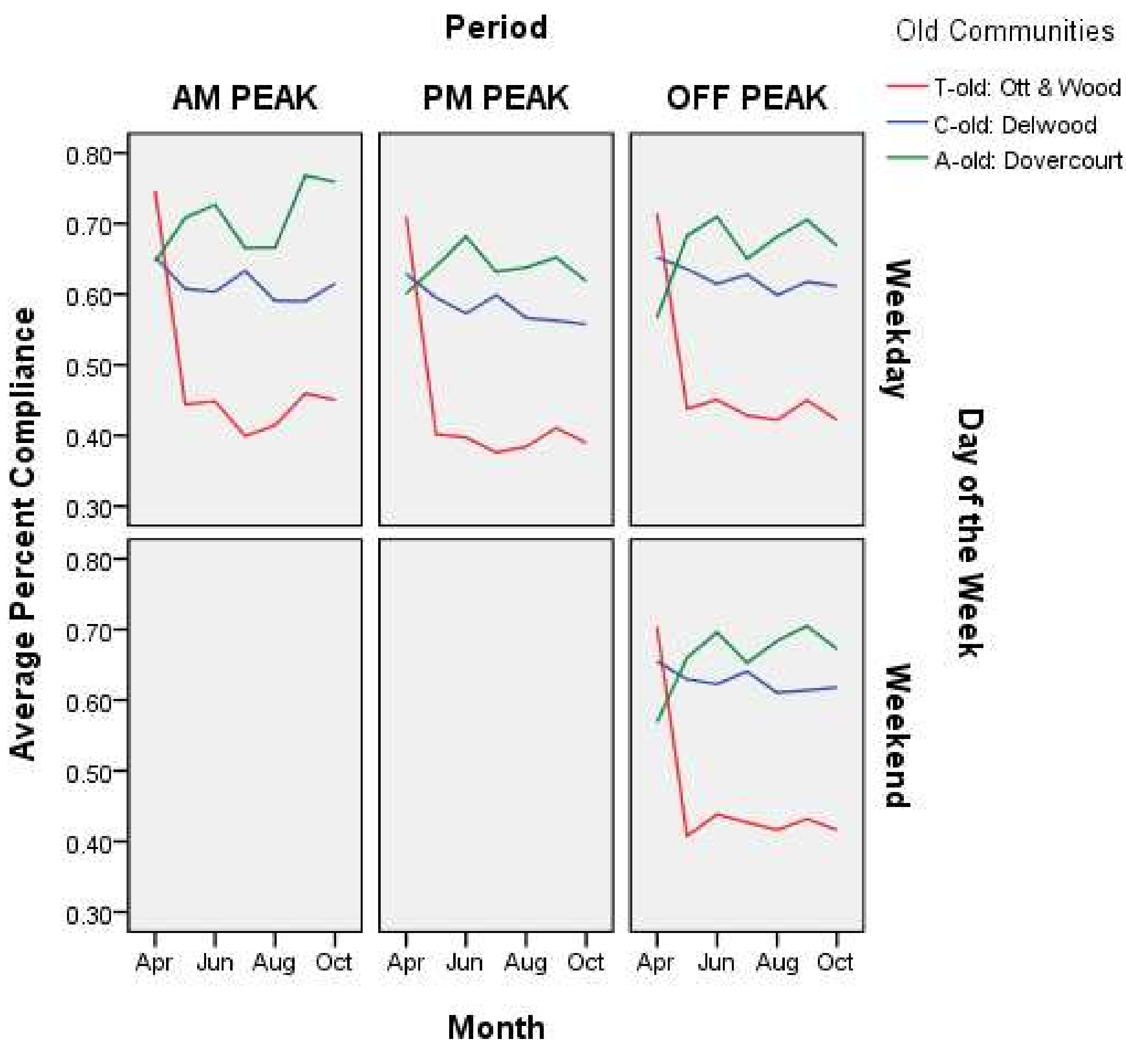


Figure 6.16 Monthly Average Percent Compliance by Old (1950's/1960's) Community Groups, Peak Period, and Day of Week

Table 6.19 "Before" and "After" Average Percent Compliance by Old (1950's/1960's) Community Groups

Community Group	Before		After	
	Mean	S.E.	Mean	S.E.
Ottewell & Woodcroft	.71	.00	.43	.00
Delwood	.65	.00	.62	.00
Dovercourt	.57	.01	.68	.00

Table 6.20 "Before" and "After" Average Percent Compliance by Old (1950's/1960's) Community Groups, Peak Period, and Day of Week

Period	Community Group	Weekday				Weekend			
		Before		After		Before		After	
		Mean	S.E.	Mean	S.E.	Mean	S.E.	Mean	S.E.
AM Peak	Ottewell & Woodcroft	.75	.01	.44	.00	.	.	.	.
	Delwood	.65	.01	.61	.01	.	.	.	.
	Dovercourt	.65	.02	.72	.01	.	.	.	.
PM Peak	Ottewell & Woodcroft	.71	.01	.39	.00	.	.	.	.
	Delwood	.63	.01	.57	.00	.	.	.	.
	Dovercourt	.60	.02	.64	.00	.	.	.	.
Off Peak	Ottewell & Woodcroft	.71	.00	.43	.00	.70	.00	.42	.00
	Delwood	.65	.00	.62	.00	.65	.01	.62	.00
	Dovercourt	.57	.01	.68	.00	.57	.01	.68	.00

Table 6.21 Average Percent Compliance by Old (1950's/1960's) Community Groups and Month

Community Group	Month													
	April		May		June		July		August		September		October	
	Mean	S.E.	Mean	S.E.	Mean	S.E.	Mean	S.E.	Mean	S.E.	Mean	S.E.	Mean	S.E.
Ottewell & Woodcroft	.71	.00	.43	.00	.44	.00	.42	.00	.42	.00	.44	.00	.42	.00
Delwood	.65	.00	.63	.00	.61	.00	.63	.00	.60	.00	.61	.00	.61	.00
Dovercourt	.57	.01	.67	.00	.70	.00	.65	.00	.68	.00	.71	.00	.67	.00

- Table 6.22 summarizes the results of the Logistic Regression Analysis.
- The compliance OR in treated old communities during AM peak = 1.21, i.e., the drivers in treated old communities during AM peak were more (1.21) likely to comply than the drivers in other communities or during other periods. The OR was significant at a p-value <0.0001.
- The compliance OR in treated old communities during PM peak = 1.15, i.e., the drivers in treated old communities during PM peak were more (1.15) likely to comply than the drivers in other communities or during other periods. The OR was significant at a p-value <0.0001.
- The compliance OR in treated old communities during the “After” period = 0.33, i.e., the drivers in treated old communities during the “After” period were much less (0.33) likely to comply than the drivers in other communities or during the “Before” period. The OR was significant at a p-value <0.0001.
- The compliance OR during weekdays in the “After” period = 0.93, i.e., the drivers during weekdays in the “After” period were a little less (0.93) likely to comply than the drivers during weekends or during the “Before” period. The OR was significant at a p-value <0.0001.
- The compliance OR during AM peak in the “After” period = 0.90, i.e., the drivers during AM peak in the “After” period were less (0.90) likely to comply than the drivers during other periods or during the “Before” period. The OR was significant at a p-value <0.0001.
- The compliance OR in treated old communities during weekdays in the “After” period = 1.05, i.e., the drivers in treated old communities during weekdays in the “After” period were a little more (1.05) likely to comply than the drivers in other communities, during weekends in the “Before” period. The OR was significant at a p-value = 0.001.
- The compliance OR in treated old communities during PM peak in the “After” period = 0.88, i.e., the drivers in treated old communities during PM peak in the “After” period were much less (0.88) likely to comply than the drivers in other communities, during other periods in the “Before” period. The OR was significant at a p-value <0.0001.

Percent Compliance: the analysis showed that the drivers in treated old communities during the “After” period were much less likely to comply than the drivers in other old communities or during the “Before” period and that there was a significant decrease in the percent compliance to the posted speed limit in the treated old communities as a result of the pilot project.

Table 6.22 Logistic Regression Analysis for Average Percent Compliance

Variables	B	S.E.	Wald	df	Sig.	Exp(B)
One-way Interaction						
Old Community Groups			10346.698	2	.000	
Treated Communities	.213	.012	310.399	1	.000	1.238
Adjacent Communities	-1.302	.017	5700.658	1	.000	.272
Day of Week						
Weekdays	.041	.013	10.832	1	.001	1.042
Time of Day			382.098	2	.000	
AM Peak	-.120	.017	48.587	1	.000	.887
PM Peak	-.299	.016	368.484	1	.000	.741
Before-After						
After Period	-.137	.011	146.565	1	.000	.872
Two-way Interactions						
Old Community Groups * Weekdays			297.452	2	.000	
Treated Communities by Weekdays	.023	.014	2.479	1	.115	1.023
Adjacent Communities by Weekdays	-.274	.020	184.368	1	.000	.760
Old Community Groups * Time of Day			1381.289	4	.000	
Treated Communities by AM Peak	.190	.020	92.887	1	.000	1.210
Treated Communities by PM Peak	.143	.018	65.373	1	.000	1.154
Adjacent Communities by AM Peak	.668	.026	641.741	1	.000	1.951
Adjacent Communities by PM Peak	.714	.025	839.428	1	.000	2.041
Old Community Groups * Before-After			32758.466	2	.000	
Treated Communities by After Period	-1.120	.013	7451.990	1	.000	.326
Adjacent Communities by After Period	1.721	.019	8302.031	1	.000	5.591
Day of Week * Before-After						
Weekdays by After Period	-.072	.014	27.914	1	.000	.931
Time of Day * Before-After			29.185	2	.000	
AM Peak by After Period	-.101	.019	27.722	1	.000	.904
PM Peak by After Period	.005	.017	.080	1	.778	1.005
Three-way Interactions						
Old Community Groups * Day of Week * Before-After			326.589	2	.000	
Treated Communities by Weekdays by After Period	.049	.016	10.107	1	.001	1.051
Adjacent Communities by Weekdays by After Period	.376	.022	281.855	1	.000	1.457
Old Community Groups * Time of Day * Before-After			985.009	4	.000	
Treated Communities by AM Peak by After Period	.019	.022	.728	1	.393	1.019
Treated Communities by PM Peak by After Period	-.128	.019	43.329	1	.000	.880
Adjacent Communities by AM Peak by After Period	-.568	.030	362.046	1	.000	.566
Adjacent Communities by PM Peak by After Period	-.647	.028	539.515	1	.000	.524
(Constant)	.408	.011	1499.365	1	.000	1.503

6.3 Analysis of New (1970's/1980's) Communities

This section provides detailed speed and traffic results for new (1970's/1980's) communities.

6.3.1 Operating (85th Percentile) Speeds

- Tables 6.25 to 6.27 summarize the descriptive statistics (marginal and joint means) for the operating speed (85th percentile speed).
- Figure 6.17 reveals the operating speed in the treated new communities decreased after the implementation of the pilot project. At the same time, the control group witnessed an increase in the operating speed.
- Table 6.23 shows the operating speed in the treated new (1970's/1980's) communities was reduced by 5.2% resulting in a 3.11 km/h reduction in speed. However, if the influence of other variables in the road system was accounted for (achieved by using a control group), the operating speed in the treated communities was further reduced to 10.7%. This corresponds to a reduction of 6.43 km/h in operating speed.

Table 6.23 Percent Change in Average Operating Speed (85th Percentile Speed) with and without using a Control Group

Community Group		Without Control*		With Control**	
		%	km/h	%	km/h
Twin Brooks & WW/W	Treated	-5.2%	-3.11	-10.7%	-6.43

*A simple before-after percent change was used to calculate the percentages without the control group i.e., [(after-before)/before]*100
** The cross-product ratio (also known as the odds ratio) was used to calculate the percent change in speed after accounting for the trends in the control group i.e., ([before control/after control]/[before treated/after treated])-1

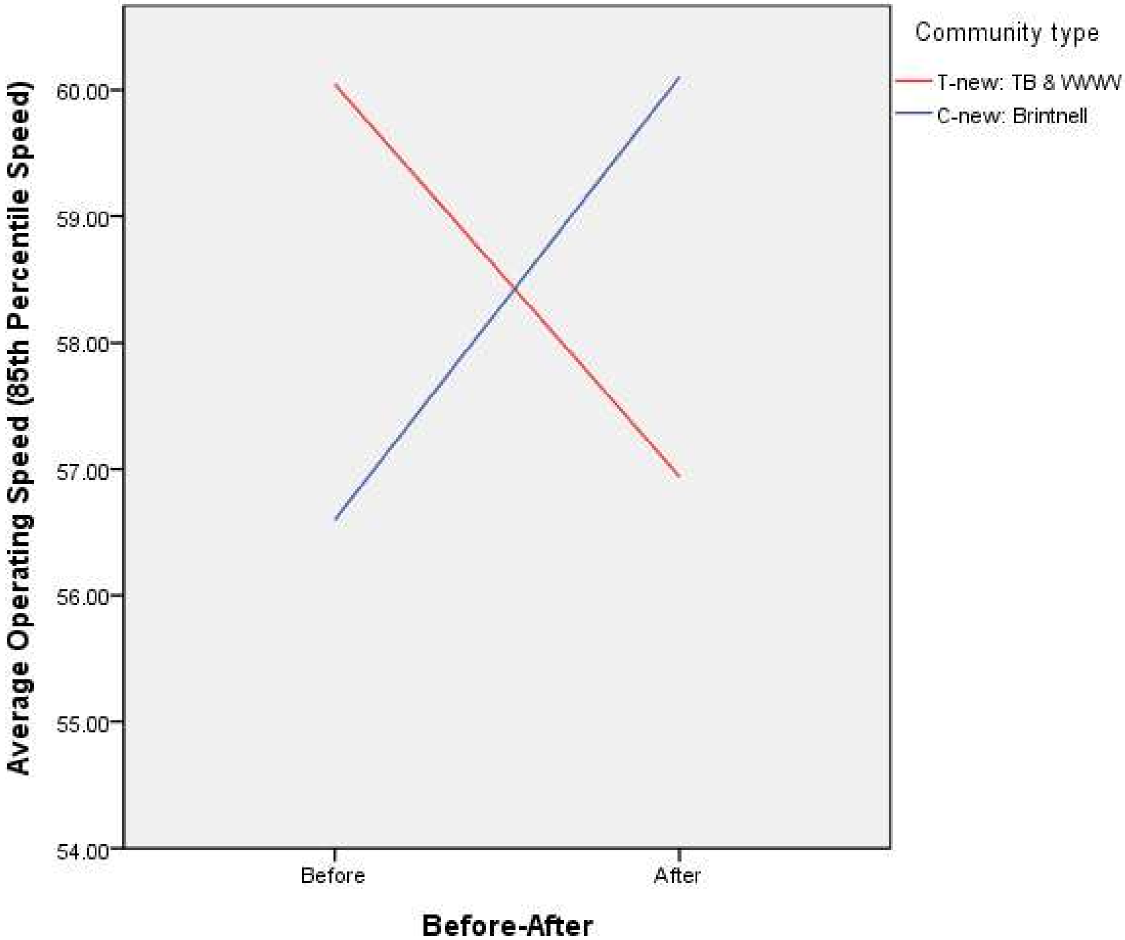


Figure 6.17 “Before” and “After” Average Operating Speed (85th Percentile Speed) by New (1970’s/1980’s) Community Groups

- Figure 6.18 depicts the change in operating speed "Before" and "After" the implementation of the pilot project for different times of day and days of the week. The figure shows the operating speed decreased consistently in the treated new communities while increasing gradually in the control community regardless of time of day or day of week.

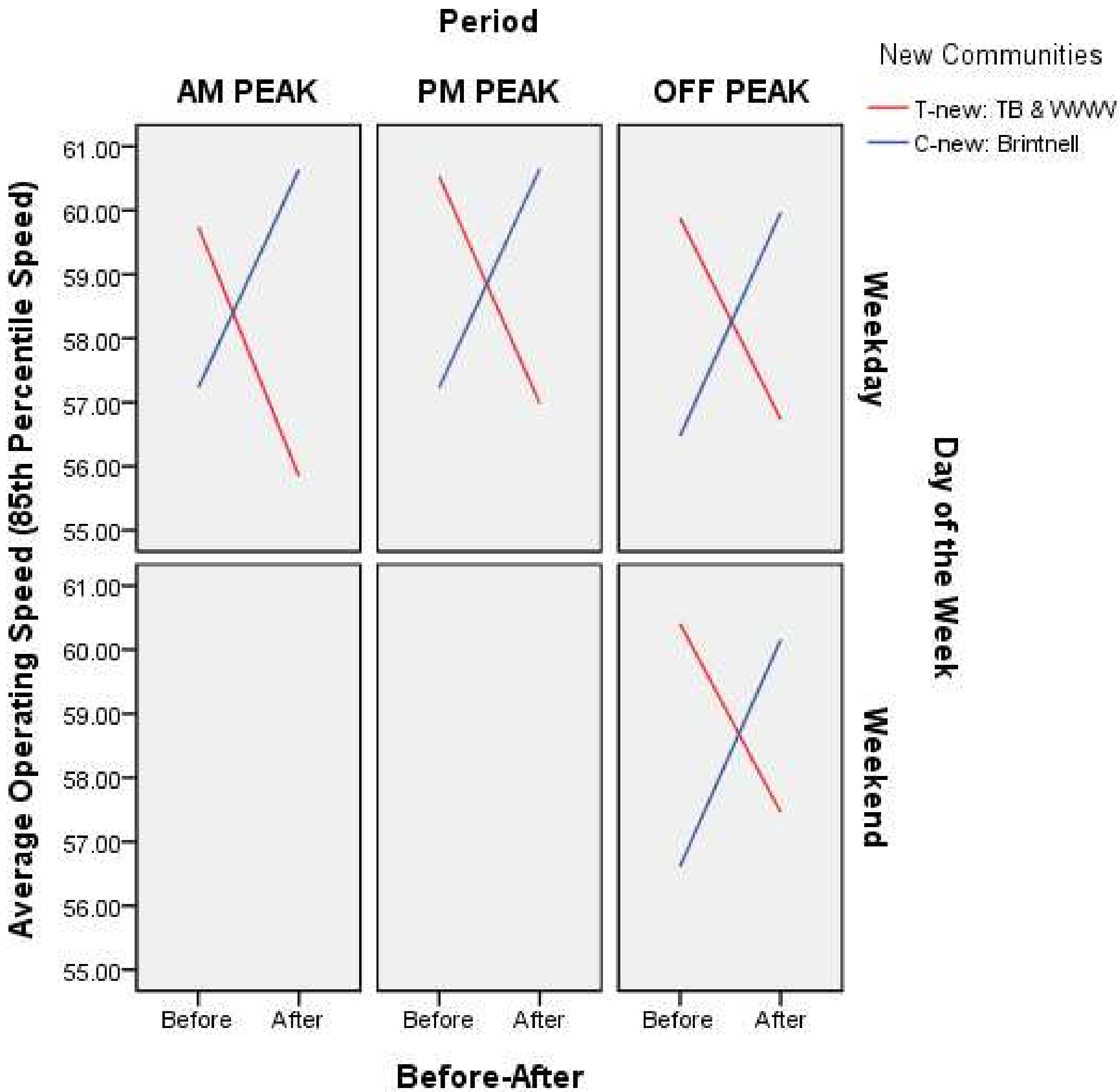


Figure 6.18 "Before" and "After" Average Operating Speed (85th Percentile Speed) by New (1970's/1980's) Community Groups, Peak Period, and Day of Week

- Table 6.24 summarizes the percent change in operating speed with and without using a control group for different times of day and days of the week. The results show the operating speed decreased consistently in the treated communities regardless of time of day or day of week.
- The table shows the reductions in operating speed were highly influenced by the corresponding increase in the control communities. As a result, the simple “Before” to “After” reduction was consistently smaller than the reductions which were adjusted by the control group.
- Note: the operating speed reduction ranged from 10.5% to 11.8% in the treated communities.
- In the treated communities, the highest reduction in the operating speed (7.03 km/h) occurred during the AM peak on weekdays.

Table 6.24 Percent Change in Average Operating Speed (85th Percentile Speed) by Community Group, Peak Period, and Day of Week with and without using a Control Group

Period	Community Group		Weekday				Weekend			
			Without Control*		With Control**		Without Control*		With Control**	
			%	km/h	%	km/h	%	km/h	%	km/h
AM Peak	Twin Brooks & WW/W	Treated	-6.5%	-3.90	-11.8%	-7.03	.	.	.	.
PM Peak	Twin Brooks & WW/W	Treated	-5.9%	-3.55	-11.2%	-6.76	.	.	.	.
Off Peak	Twin Brooks & WW/W	Treated	-5.2%	-3.14	-10.8%	-6.45	-4.9%	-2.94	-10.5%	-6.32

*A simple before-after percent change was used to calculate the percentages without the control group i.e., [(after-before)/before]*100

** The cross-product ratio (also known as the odds ratio) was used to calculate the percent change in speed after accounting for the trends in the control group i.e., ([before control/after control]/[before treated/after treated])-1

- Figure 6.19 shows there were monthly fluctuations in the operating speed for the treated and control new communities. The operating speed in the treated communities was reduced while the operating speed in the control group was increasing steadily.
- Note: for the treated communities, the largest reduction in operating speed occurred at the start of the project (from April to June) with the operating speed rising slightly in July before dropping again.
- Also note after the implementation of the pilot project, the operating speeds for the treated new communities were consistently lower than the operating speeds in the control community.

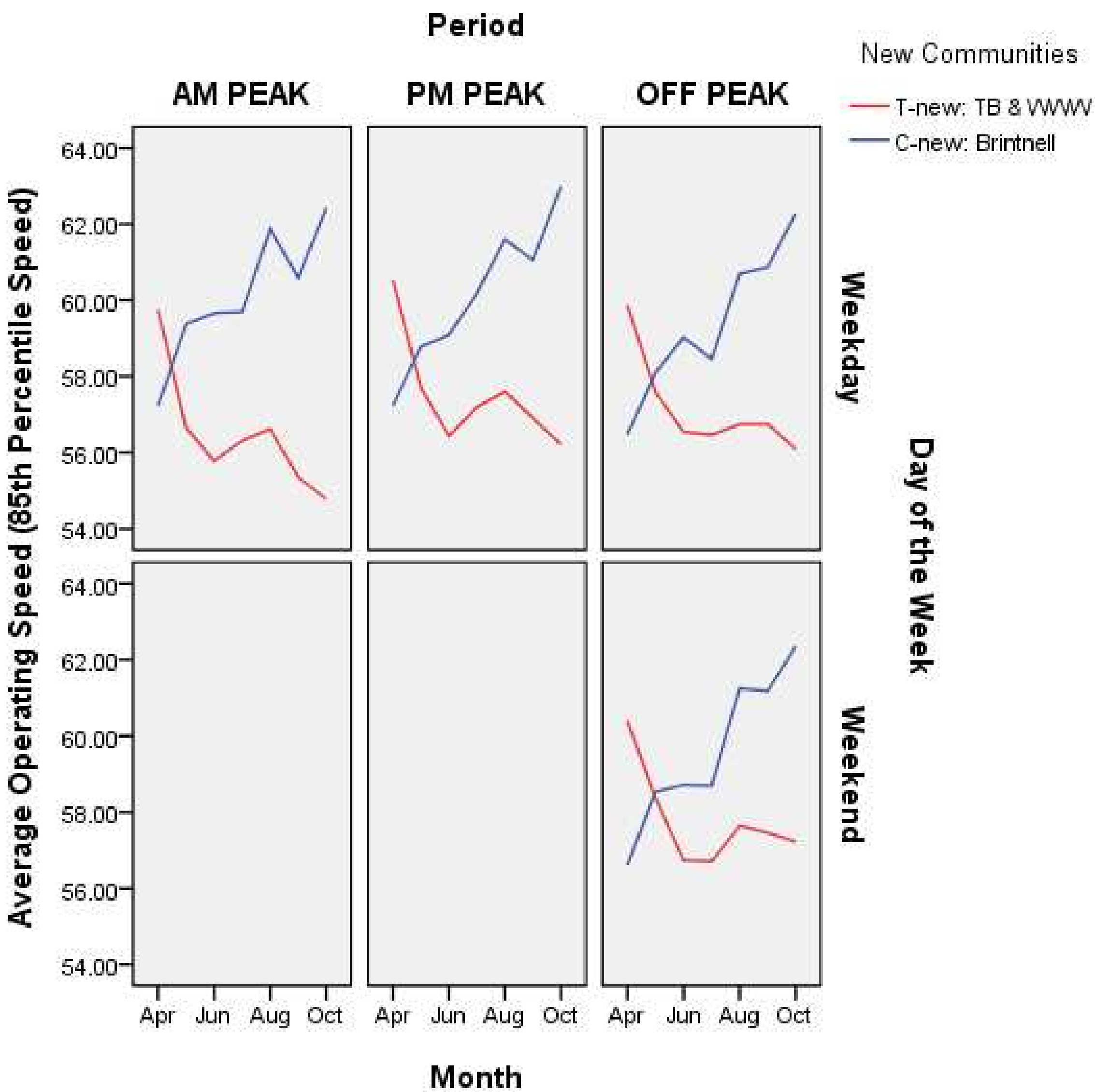


Figure 6.19 Monthly Average Operating Speed (85th Percentile Speed) by New (1970's/1980's) Community Groups, Peak Period, and Day of Week

- Figure 6.20 shows a panel histogram of the operating speed for each of the community groups. Note: the solid red line represents the “Before” posted speed limit (i.e., 50 km/h). Since the implementation of the pilot project, the operating speed distribution for the treated new communities shifted towards the solid line indicating a reduction in the operating speed distribution. In contrast, the operating speed distribution for the control community shifted to the right.

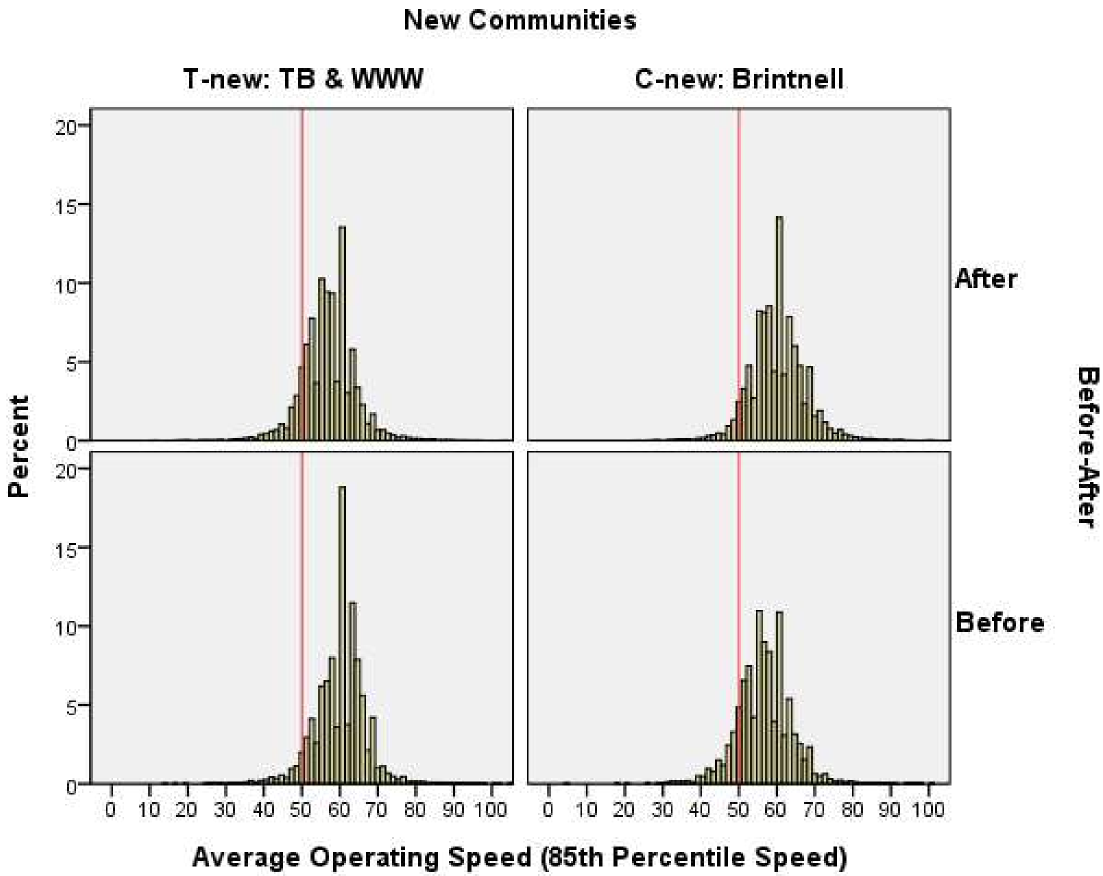


Figure 6.20 “Before” and “After” Histogram showing Average Operating Speed (85th Percentile Speed) by New (1970’s/1980’s) Community Groups

- Figure 6.21 shows the “Before” and “After” cumulative distributions for the operating speed for each of the new (1970’s/1980’s) community groups. After the implementation of the pilot project, the cumulative distribution for the treated new communities shifted to the left indicating a reduction in the speed. In contrast, the speed distribution for the control new communities shifted to the right which implies that the speed increased in the control communities during the “After” period.

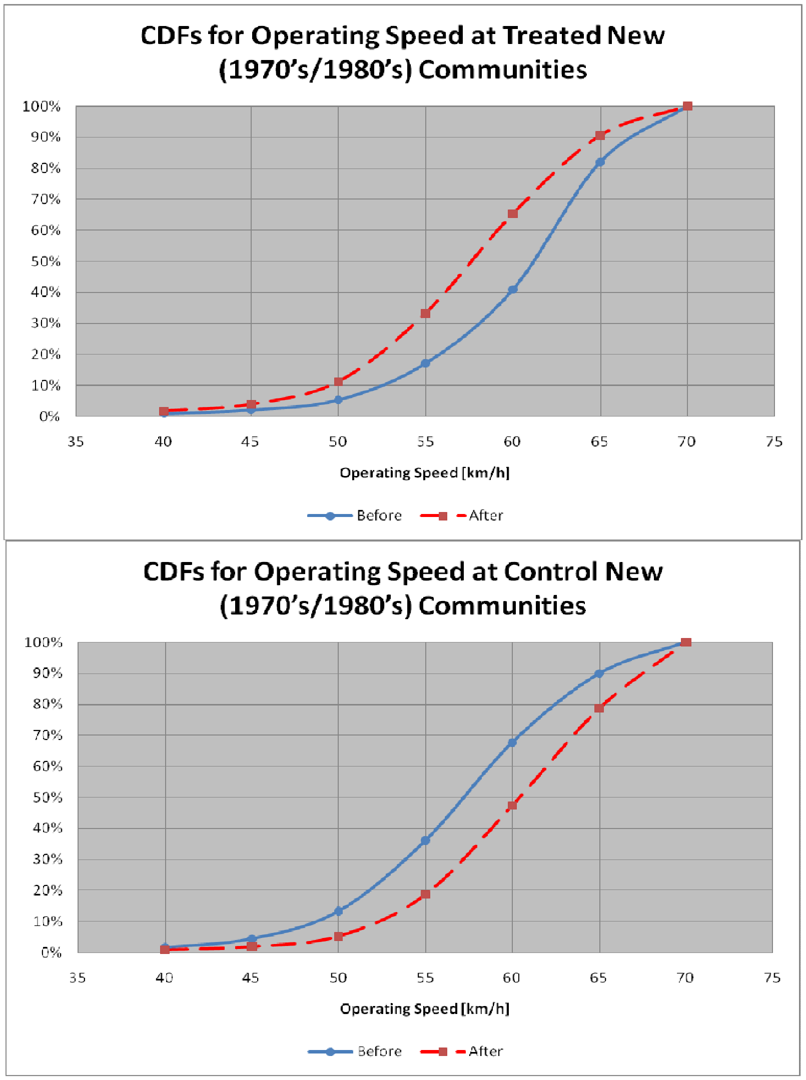


Figure 6.21 “Before” and “After” Cumulative Distributions for Average Operating Speed (85th Percentile Speed) by New (1970’s/1980’s) Community Groups

Table 6.25 "Before" and "After" Average Operating Speed (85th Percentile Speed) by New (1970's/1980's) Community Groups

Community Group	Before		After	
	Mean	S.E.	Mean	S.E.
Twin Brooks & WW/W	60.05	.05	56.94	.03
Brintnell	56.60	.11	60.10	.04

Table 6.26 "Before" and "After" Average Operating Speed by New (1970's/1980's) Community Groups, Peak Period, and Day of Week

Period	Community Group	Weekday				Weekend			
		Before		After		Before		After	
		Mean	S.E.	Mean	S.E.	Mean	S.E.	Mean	S.E.
AM Peak	Twin Brooks & WW/W	59.75	.17	55.85	.11	.	.	.	.
	Brintnell	57.23	.36	60.63	.18	.	.	.	.
PM Peak	Twin Brooks & WW/W	60.53	.13	56.98	.07	.	.	.	.
	Brintnell	57.23	.31	60.65	.14	.	.	.	.
Off Peak	Twin Brooks & WW/W	59.87	.07	56.73	.04	60.40	.10	57.46	.04
	Brintnell	56.47	.14	59.97	.06	56.62	.20	60.16	.07

Table 6.27 Average Operating Speed (85th Percentile Speed) by New (1970's/1980's) Community Groups and Month

Community Group	Month													
	April		May		June		July		August		September		October	
	Mean	S.E.	Mean	S.E.	Mean	S.E.	Mean	S.E.	Mean	S.E.	Mean	S.E.	Mean	S.E.
Twin Brooks & WW/W	60.05	.05	57.82	.05	56.55	.07	56.58	.08	57.08	.08	56.90	.06	56.46	.06
Brintnell	56.60	.11	58.36	.10	58.97	.11	58.70	.12	60.99	.10	60.96	.11	62.36	.10

- Tables 6.28 and 6.29 summarize the results of mixed ANOVA.
- The interaction between the new community groups and day of the week was statistically significant. This implies the difference in operating speed between treated and control communities on weekdays was different from operating speeds on weekends. Alternatively, the difference in speeds between weekdays and weekends in the treated new communities was different from those in the control community.
- The interaction between the new community groups and time of day was statistically significant. This implies the difference in operating speed between treated and control communities in the AM peak was different from operating speeds in the PM peak or any other peak periods. Alternatively, the difference in operating speed between AM peak and PM peak (or any other combination of peak periods) in the treated new communities was different from operating speeds in the control community.
- The interaction between the new community groups and the “Before” and “After” periods was statistically significant. This implies the difference in operating speed between treated and control communities in the “Before” period was different from the operating speeds in the “After” period. Alternatively, the difference in speeds between the “Before” and “After” periods in the treated new communities was different from operating speeds in the control community.
- The interaction between the new community groups, time of day, and the “Before” and “After” periods was statistically significant. This implies the difference in operating speed between treated and control communities during the AM peak in the “Before” period was different from operating speeds during other peak periods or in the “After” period.
- Street variation within each community group explained 30% of the total variation.

Operating speed summary: the operating speed was reduced by 11%. This corresponds to a reduction of 6.43 km/h in operating speed. Given the statistically significant interaction between the new community groups and the “Before” and “After” periods, it was concluded that the project was successful in reducing the operating speeds in the treated new communities.

Table 6.28 Mixed ANOVA for Average Operating Speed (85th Percentile Speed)

Source	Numerator df	F	Sig.
(Intercept)	1	5448.861	.000
Vehicles	1	446.289	.000
One-way Interaction			
New Community Groups	1	.906	.347
Day of Week	1	48.577	.000
Time of Day	2	30.915	.000
Before-After	1	24.626	.000
Two-way Interactions			
New Community Groups * Day of Week	1	12.821	.000
New Community Groups * Time of Day	2	3.955	.019
New Community Groups * Before-After	1	709.227	.000
Day of Week * Before-After	1	.295	.587
Time of Day * Before-After	2	.573	.564
Three-way Interactions			
New Community Groups * Day of Week * Before-After	1	1.242	.265
New Community Groups * Time of Day * Before-After	2	3.700	.025

Table 6.29 Estimates of Covariance Parameters for Average Operating Speed (85th Percentile Speed)

Parameter		Estimate	Std. Error
Residual		44.627101	0.171516
Site Variations within Community Group	Variance	19.062556	4.418616

6.3.2 Percent Compliance

- Tables 6.30 to 6.32 summarize the descriptive statistics (marginal and joint means) for the compliance percentages.
- Figure 6.22 reveals the percent compliance to the posted speed limit (40 km/h) in the treated new communities decreased substantially (48% to 23%) after the implementation of the pilot project. Albeit not as steep, the compliance percentage to the posted speed (50 km/h) in the control group decreased from 64% to 53%.

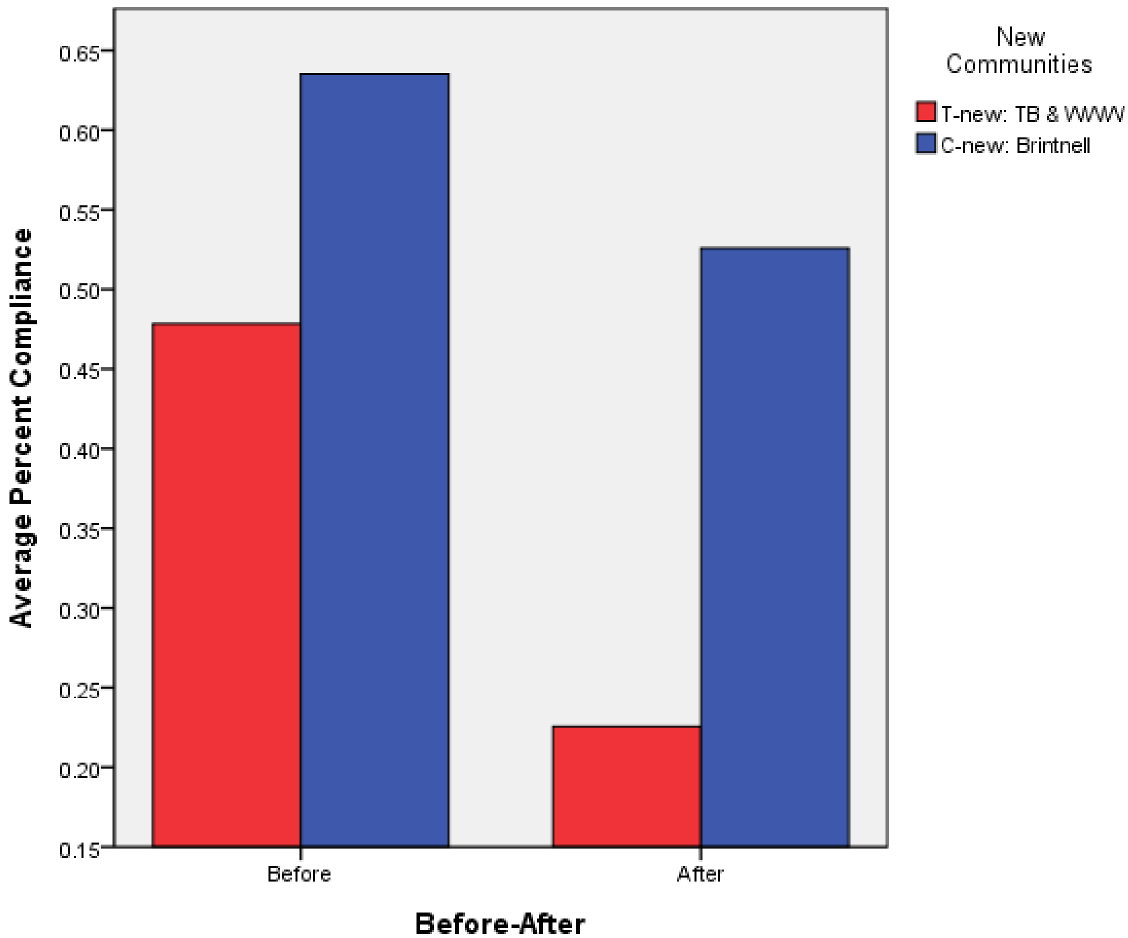


Figure 6.22 “Before” and “After” Average Percent Compliance by New (1970’s/1980’s) Community Groups

- Figure 6.23 depicts the change in percent compliance with the posted speed limit "Before" and "After" the implementation of the pilot project for different times of day and days of the week. The figure shows the operating speed decreased consistently in both treated and control new communities (albeit with varying rates) regardless of time of day or day of week.

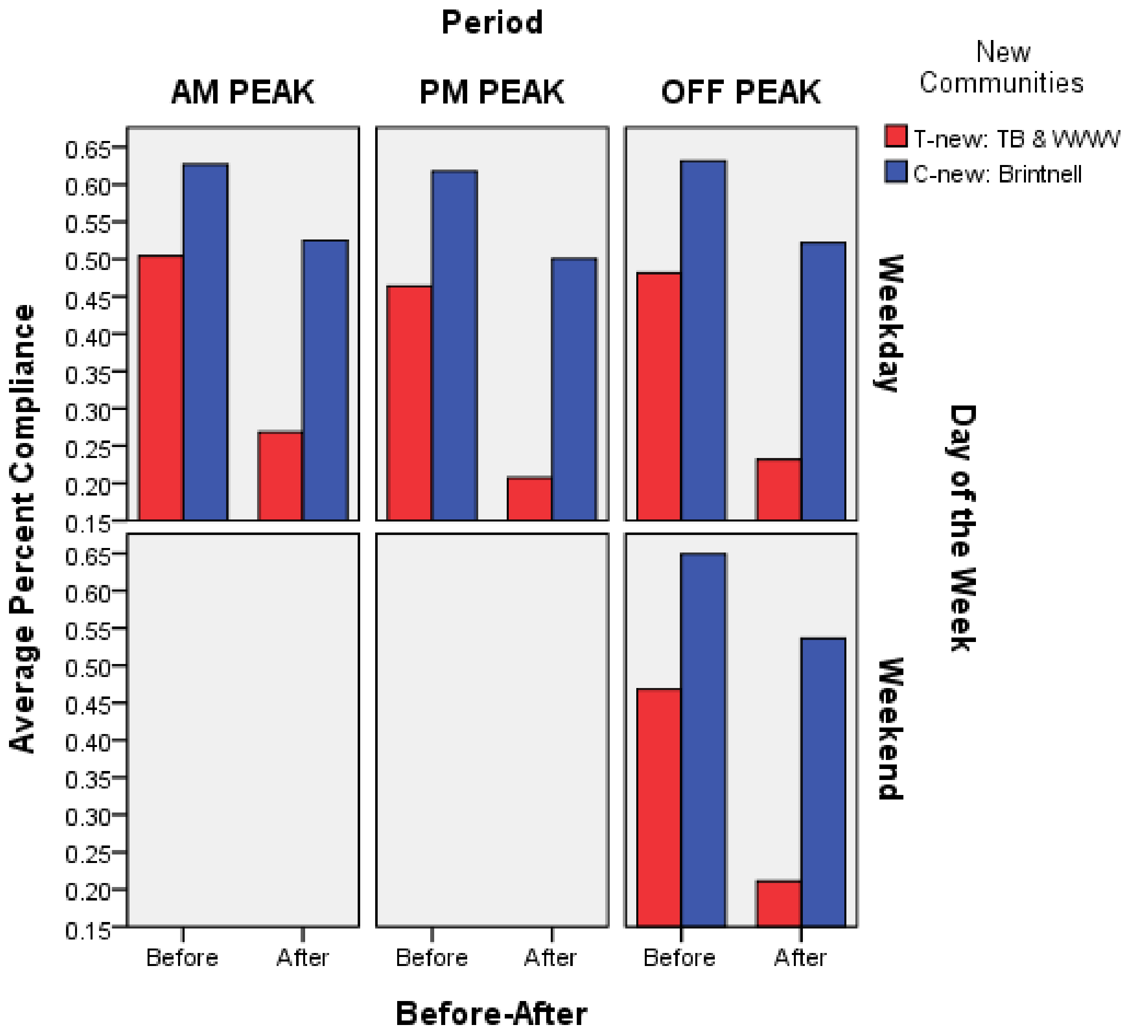


Figure 6.23 "Before" and "After" Average Percent Compliance by New (1970's/1980's) Community Groups, Peak Period, and Day of Week

- Figures 6.24 shows there were some monthly fluctuations in compliance percentages for all new community groups. In the treated and control new communities, the compliance rates were high in April and were reduced in later months.
- Note: for the treated new communities, a large reduction in compliance percentage occurred at the start of the project (from April to May) which leveled off at approximately 23% for the remaining months.

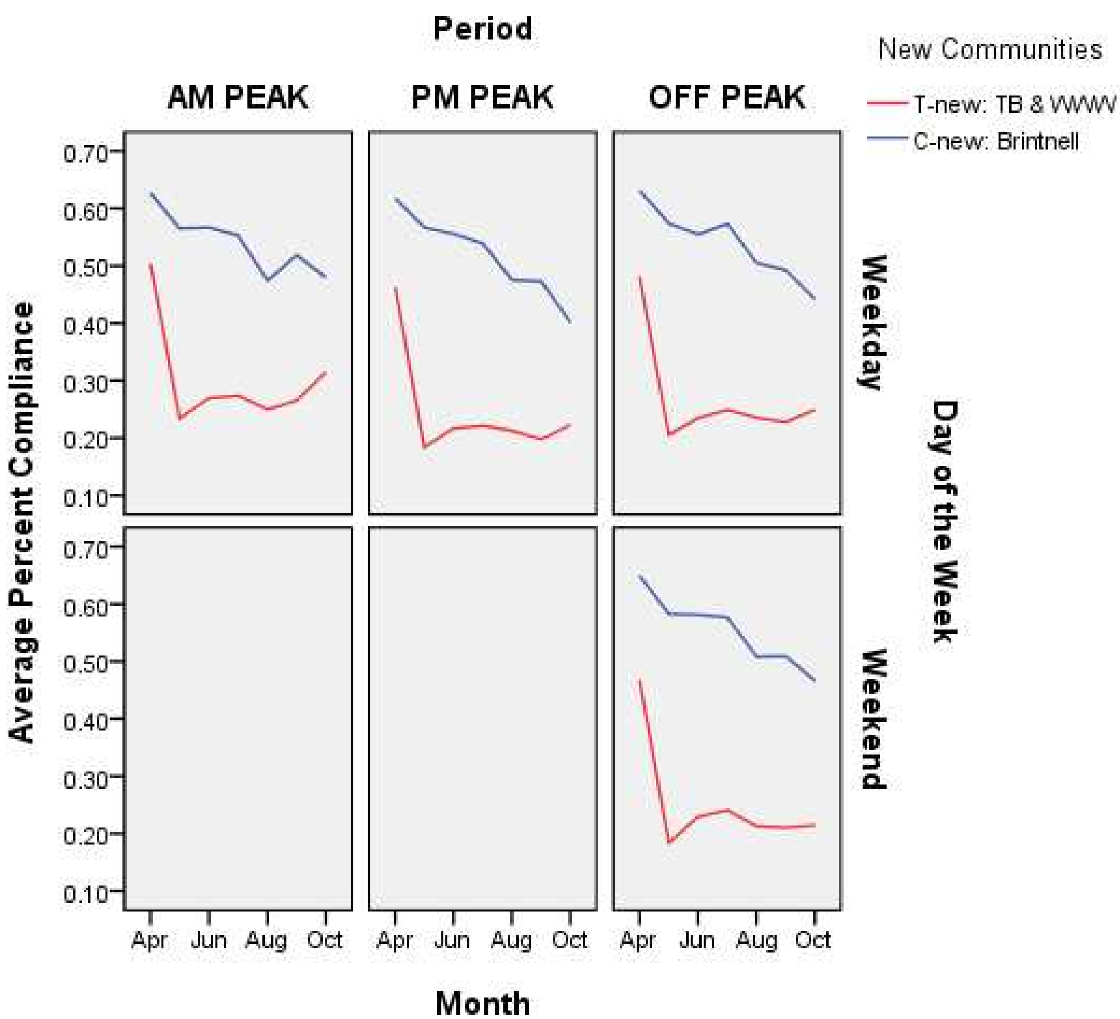


Figure 6.24 Monthly Average Percent Compliance by New (1970's/1980's) Community Groups, Peak Period, and Day of Week

Table 6.30 "Before" and "After" Average Percent Compliance by New (1970's/1980's) Community Groups

Community Group	Before		After	
	Mean	S.E.	Mean	S.E.
Twin Brooks & WW/W	.48	.00	.23	.00
Brintnell	.64	.00	.53	.00

Table 6.31 "Before" and "After" Average Percent Compliance by New (1970's/1980's) Community Groups, Peak Period, and Day of Week

Period	Community Group	Weekday				Weekend			
		Before		After		Before		After	
		Mean	S.E.	Mean	S.E.	Mean	S.E.	Mean	S.E.
AM Peak	Twin Brooks & WW/W	.50	.01	.27	.00	.	.	.	.
	Brintnell	.63	.01	.53	.00	.	.	.	.
PM Peak	Twin Brooks & WW/W	.46	.01	.21	.00	.	.	.	.
	Brintnell	.62	.01	.50	.00	.	.	.	.
Off Peak	Twin Brooks & WW/W	.48	.00	.23	.00	.47	.00	.21	.00
	Brintnell	.63	.00	.52	.00	.65	.01	.54	.00

Table 6.32 Average Percent Compliance by New (1970's/1980's) Community Groups and Month

Community Group	Month													
	April		May		June		July		August		September		October	
	Mean	S.E.	Mean	S.E.	Mean	S.E.	Mean	S.E.	Mean	S.E.	Mean	S.E.	Mean	S.E.
Twin Brooks & WW/W	.48	.00	.20	.00	.23	.00	.25	.00	.23	.00	.22	.00	.24	.00
Brintnell	.64	.00	.58	.00	.56	.00	.57	.00	.50	.00	.50	.00	.45	.00

- Table 6.33 summarizes the results of the Logistic Regression Analysis.
- The compliance OR in treated new communities during weekdays = 1.22, i.e., the drivers in treated new communities during weekdays were more (1.22) likely to comply than the drivers in the control community during weekends. The OR was significant at a p-value <0.0001.
- The compliance OR in treated new communities during AM peak = 1.22, i.e., the drivers in treated new communities during AM peak were more (1.22) likely to comply than the drivers in the control community during other periods. The OR was significant at a p-value <0.0001.
- The compliance OR in treated new communities during PM peak = 0.88, i.e., the drivers in treated new communities during PM peak were less (0.88) likely to comply than the drivers in the control community during other periods. The OR was significant at a p-value <0.0001.
- The compliance OR in treated new communities during the “After” period = 0.50, i.e., the drivers in treated new communities during the “After” period were much less (0.50) likely to comply than the drivers in the control community during the “Before” period. The OR was significant at a p-value <0.0001.
- The compliance OR during weekdays in the “After” period = 1.04, i.e., the drivers during weekdays in the “After” period were a little more (1.04) likely to comply than the drivers during weekends or during the “Before” period. The OR was significant at a p-value = 0.01.
- The compliance OR during PM peak in the “After” period = 0.92, i.e., the drivers during PM peak in the “After” period were a little less (0.92) likely to comply than the drivers during other periods or during the “Before” period. The OR was significant at a p-value <0.0001.
- The compliance OR in treated new communities during PM peak in the “After” period = 1.08, i.e., the drivers in treated new communities during PM peak in the “After” period were a little more (1.08) likely to comply than the drivers in the control community during other periods in the “Before” period. The OR was significant at a p-value <0.0001.

Percent compliance summary: the statistical analysis revealed that the drivers in treated new communities during the “After” period were much less likely to comply than the drivers in the control community or during the “Before” period. This indicates there was a significant decrease in the percent compliance to the posted speed limit in the treated new communities.

Table 6.33 Logistic Regression Analysis for Average Percent Compliance

Variables	B	S.E.	Wald	df	Sig.	Exp(B)
One-way Interaction						
New Community Groups						
Treated Communities	-1.057	.011	9130.947	1	.000	.348
Day of Week						
Weekdays	-.104	.012	69.526	1	.000	.901
Time of Day			9.042	2	.011	
AM Peak	-.050	.019	6.949	1	.008	.951
PM Peak	-.030	.016	3.391	1	.066	.971
Before-After						
After Period	-.501	.011	2106.629	1	.000	.606
Two-way Interactions						
New Community Groups * Day of Week						
Treated Communities by Weekdays	.196	.013	216.412	1	.000	1.216
New Community Groups * Time of Day			176.571	2	.000	
Treated Communities by AM Peak	.200	.020	98.880	1	.000	1.222
Treated Communities by PM Peak	-.124	.017	51.032	1	.000	.884
New Community Groups * Before-After						
Treated Communities by *After Period*	-.702	.012	3529.649	1	.000	.496
Day of Week * Before-After						
Weekday by After Period	.034	.013	6.661	1	.010	1.035
Time of Day * Before-After			31.326	2	.000	
AM Peak by After Period	.029	.020	1.942	1	.163	1.029
PM Peak by After Period	-.089	.017	26.369	1	.000	.915
Three-way Interactions						
New Community Groups * Day of Week * Before-After						
Treated Communities by Weekday by After Period	-.004	.014	.089	1	.765	.996
New Community Groups * Time of Day * Before-After			17.864	2	.000	
Treated Communities by AM Peak by After Period	-.014	.022	.386	1	.534	.986
Treated Communities by PM Peak by After Period	.076	.019	16.244	1	.000	1.079
(Constant)	.717	.010	4803.704	1	.000	2.049

7. COLLISION ANALYSIS

This section summarizes the results of the collision analysis.

7.1 Summary of Descriptive Statistics

To recap, a total of six communities were selected for treatment within a before-after experimental design. Each treated community was matched with six control communities, satisfying the proximity conditions indicated in the collision analysis plan. The new speed limit (i.e., 40 km/h) was implemented on May 1st, 2010.

Table 7.1 provides a summary of the historical collision data from January 2006 to October 2010 for all community groups. The historical trends for each of the six treated communities are shown in Figures 7.1 to 7.6. Note: the 2010 data was split into two portions representing the pre-pilot (from January to April) and post-pilot (from May to October) periods.

Once again, the research team acknowledges the "After" period was relatively short (i.e., only 6 months of "After" data) and does not adequately represent the usual seasons in a city like Edmonton. However, as stated earlier, the results provide initial insight into the effect of reducing the posted speed limit on the frequency and severity of collisions.

Figure 7.7 shows a time series plot of the actual number of collisions from May to October during the "Before" years (2006 to 2009) and during the "After" year (2010) in all six treated communities. For visualization purposes the maximum value on the y-axis was held fixed to illustrate the observed collision frequencies varied by each community.

The figure presents a number of insightful findings:

- Property Damage Only (PDO) collisions were consistently higher than severe collisions in all of the six treated communities;
- The observed collision counts were subject to moderate fluctuations;
- Severe and PDO collisions in Woodcroft were lower when compared to the other communities. In contrast, collisions in King Edward Park were amongst the highest;
- Generally, severe and PDO collisions were slightly declining in all of the treated communities from 2006 to 2010;
- The frequency of severe collisions was lower "After" the pilot project (in 2010) except for Westridge/Wolf Willow which experienced an increase in the number of severe collisions (4 severe collisions);
- The frequency of PDO collisions was lower "After" the pilot project (in 2010) except for Beverly Heights and King Edward Park (which is showing a slight increase).

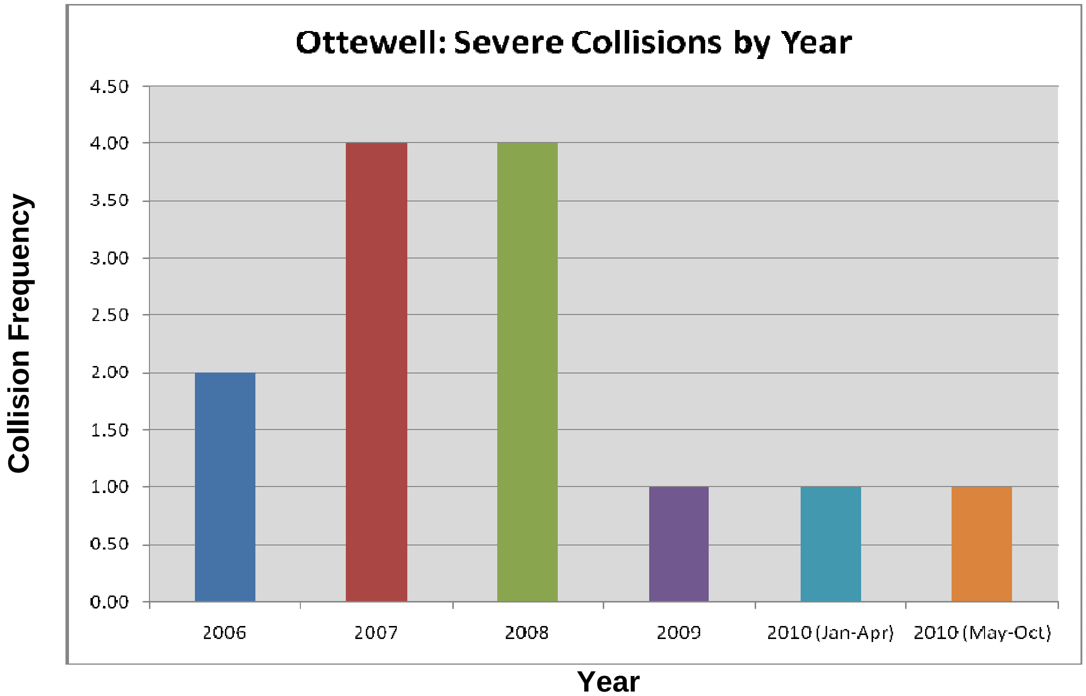
The above findings revealed an increase in the number of severe collisions during the "After" period in the Westridge/Wolf Willow community (i.e., the number of severe collisions in 2010 was double the number of collisions observed during the same time period) (May to October) in the last four years combined. As a result, a preliminary inspection of the collision types and causes was conducted. The inspection revealed two of the severe collisions involved a cyclist; the causes of these two collisions were: i) stop

sign violation and ii) left of centerline collision. The third collision was caused by failure to yield to a pedestrian at an intersection and the last collision involved a ran-off-the-road vehicle. All four collisions occurred in different times of the day and days of the week. Two of these collisions occurred in September and the other two occurred in July and August. The results showed there were no common patterns or consistent causal factors which might have precipitated such an increase. However, given the short “After” period and considering the numbers of severe collisions in residential areas are typically small and relatively high fluctuations in small-number statistics and probability are not unusual, the observed 4 severe collisions may not be a cause of concern at this time. A subsequent analysis may be proposed in the future to understand the circumstances which resulted in an increase in collisions at this specific community.

Table 7.1 Summary of Collision Statistics by Year, Severity, and Community Group

	Year	**2006**		**2007**		**2008**		**2009**		**2010**		**2010**	
	Months	**Jan-Dec**		**Jan-Dec**		**Jan-Dec**		**Jan-Dec**		**Jan-Apr**		**May-Oct**	
	Severity												
Community	***Group***	**SEV**	**PDO**	**SEV**	**PDO**	**SEV**	**PDO**	**SEV**	**PDO**	**SEV**	**PDO**	**SEV**	**PDO**
Beverly Heights	Treated	9	28	5	43	8	33	3	38	2	11	1	16
Highlands and District	Control	0	14	2	19	2	19	5	27	0	7	0	7
Beacon Heights	Control	11	57	4	52	10	47	18	46	1	22	8	18
Delwood	Control	1	22	2	28	2	21	2	33	1	8	0	10
Brintnell	Control	1	10	1	24	1	24	1	30	2	9	1	10
Homesteader	Control	6	36	9	29	9	29	4	43	1	9	3	9
Montrose	Control	4	23	4	26	3	29	3	32	0	6	0	9
Newton	Control	1	19	5	12	2	15	1	24	1	9	0	6
King Edward Park	Treated	10	24	3	39	6	37	6	52	1	11	1	17
Avonmore	Control	0	9	0	4	1	5	0	5	0	1	0	1
Hazeldean	Control	2	16	2	12	0	20	3	31	0	6	0	3
Ritchie	Control	7	31	4	44	3	35	8	52	1	12	2	14
Argyll	Control	1	9	1	5	0	5	0	11	0	3	0	3
Bonnie Doon	Control	13	47	6	59	7	59	2	39	2	14	2	23
Idylwylde	Control	2	15	6	5	5	11	1	19	0	6	0	6
Ottewell	Treated	2	29	4	23	4	29	1	45	1	10	1	14
Holyrood	Control	1	22	1	17	3	18	3	17	1	6	2	6
Forest/Terrace Heights	Control	5	28	4	21	4	30	8	28	4	11	0	4
Capilano	Control	1	9	1	3	1	9	1	13	1	4	0	7
Fulton Place	Control	1	4	0	11	0	6	0	8	0	2	0	5
Gold Bar	Control	2	8	4	15	2	14	2	7	1	1	2	5
Kenilworth	Control	4	13	1	17	1	12	0	14	0	0	0	6
Twin Brooks	Treated	1	26	3	22	3	16	0	25	0	11	0	4
Yellowbird (East)	Control	3	19	8	19	2	21	3	27	1	10	0	10
Blue Quill	Control	5	33	2	41	2	41	6	34	0	8	1	12
Ermineskin	Control	4	30	5	35	6	38	7	42	1	10	1	19
Aspen Gardens	Control	2	11	0	18	1	13	0	18	0	2	0	8
Hodgson	Control	0	10	0	10	0	12	0	11	0	5	1	4
Ogilvie Ridge	Control	0	4	0	5	0	9	0	4	0	2	1	2
Westridge/Wolf Willow	Treated	1	15	1	20	2	17	0	24	0	13	4	5
Callingwood-Lymburn	Control	6	45	6	37	7	47	5	64	0	12	0	22
Willowby	Control	5	33	4	46	4	47	4	55	0	15	0	24
Rio Terrace	Control	2	12	1	16	0	17	1	16	0	3	2	7
Elmwood	Control	2	5	0	8	1	6	0	12	0	2	2	2
Lessard	Control	1	17	0	6	1	12	0	19	0	6	0	1
Thorncliff	Control	1	14	3	10	1	11	3	11	0	2	0	8
Woodcroft	Treated	2	12	4	18	1	8	1	20	2	5	0	5
Dovercourt	Control	2	8	1	10	1	5	0	5	0	4	1	3
High Park	Control	2	2	2	10	2	3	1	7	1	2	1	2
Inglewood	Control	4	27	5	30	2	29	3	47	0	17	3	10
McQueen	Control	0	5	0	7	2	6	2	6	0	3	0	1
North Glenora	Control	1	2	1	7	2	13	2	7	0	2	0	2
Westmount	Control	1	38	4	46	1	36	4	56	1	14	0	17

SEV stands for severe collisions calculated as the sum of fatal and injury collisions
PDO stand for Property Damage Only collisions



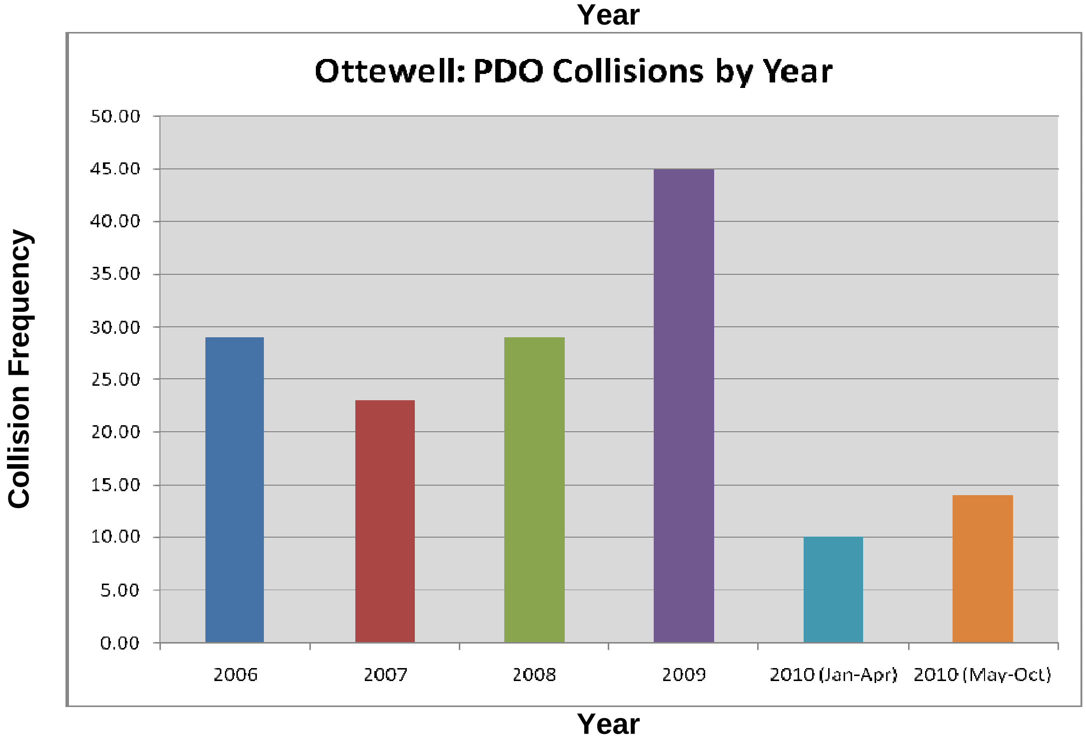
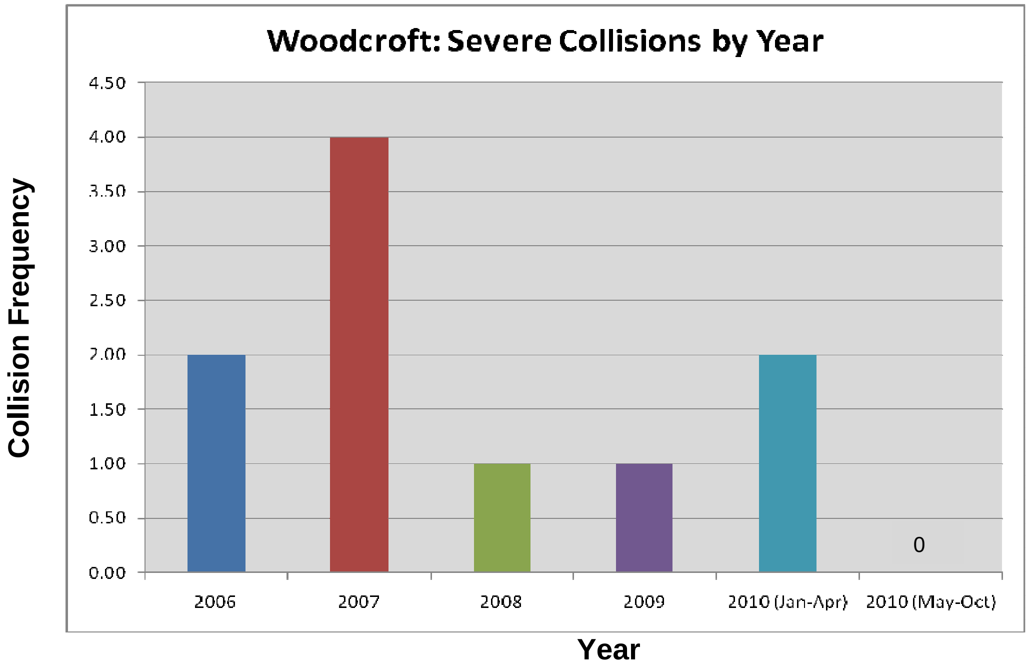


Figure 7.1 Ottewell Historical Collision Statistics 2006-2010
Top: Severe Collisions by Year
Bottom: PDO Collisions by Year



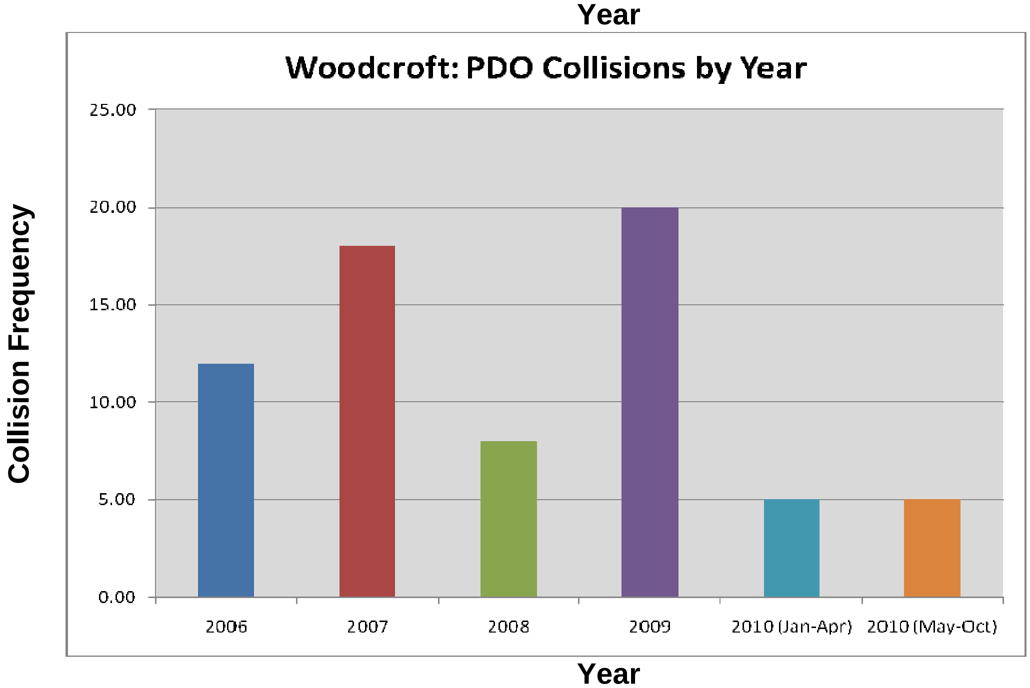


Figure 7.2 Woodcroft Historical Collision Statistics 2006-2010
Top: Severe Collisions by Year
Bottom: PDO Collisions by Year

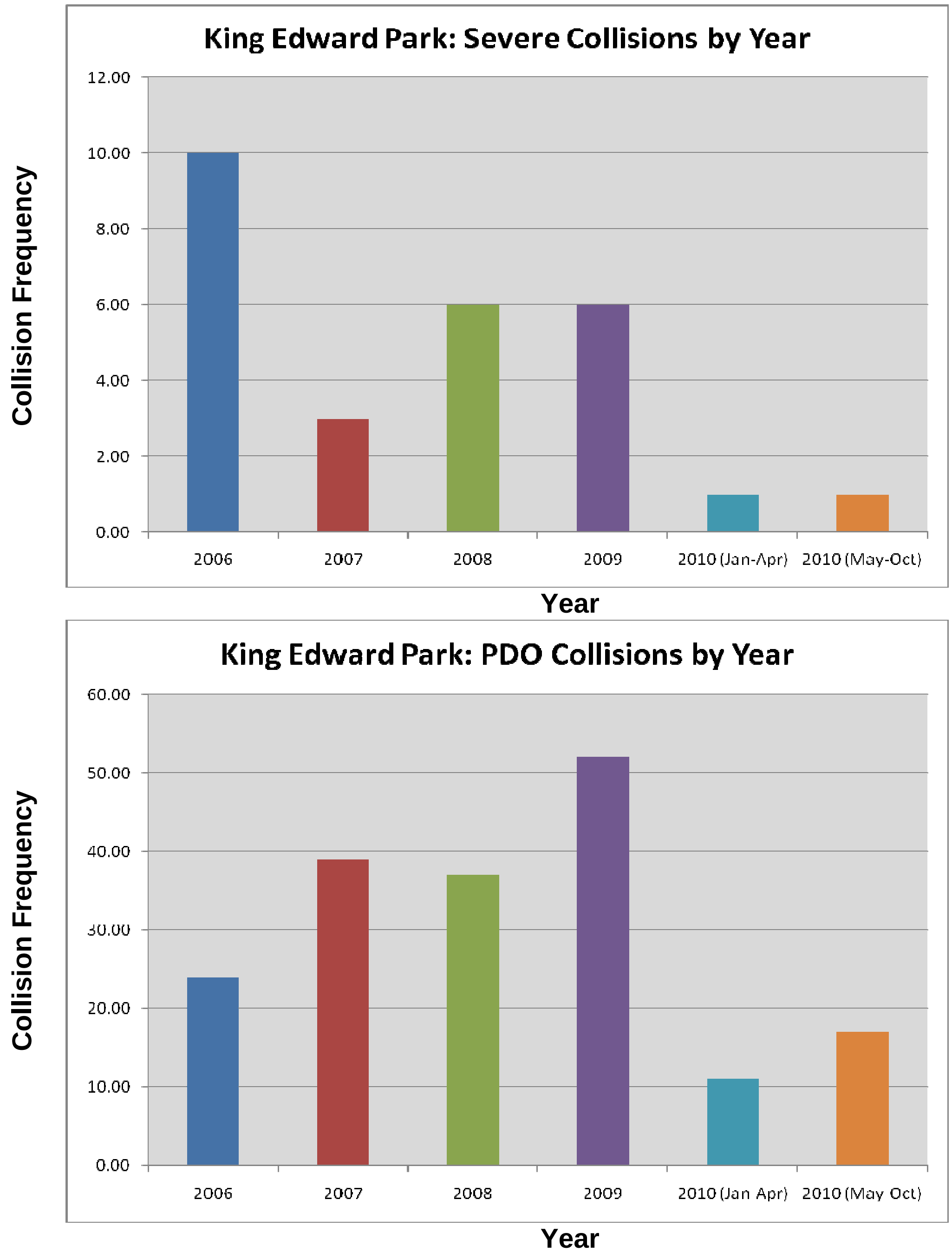
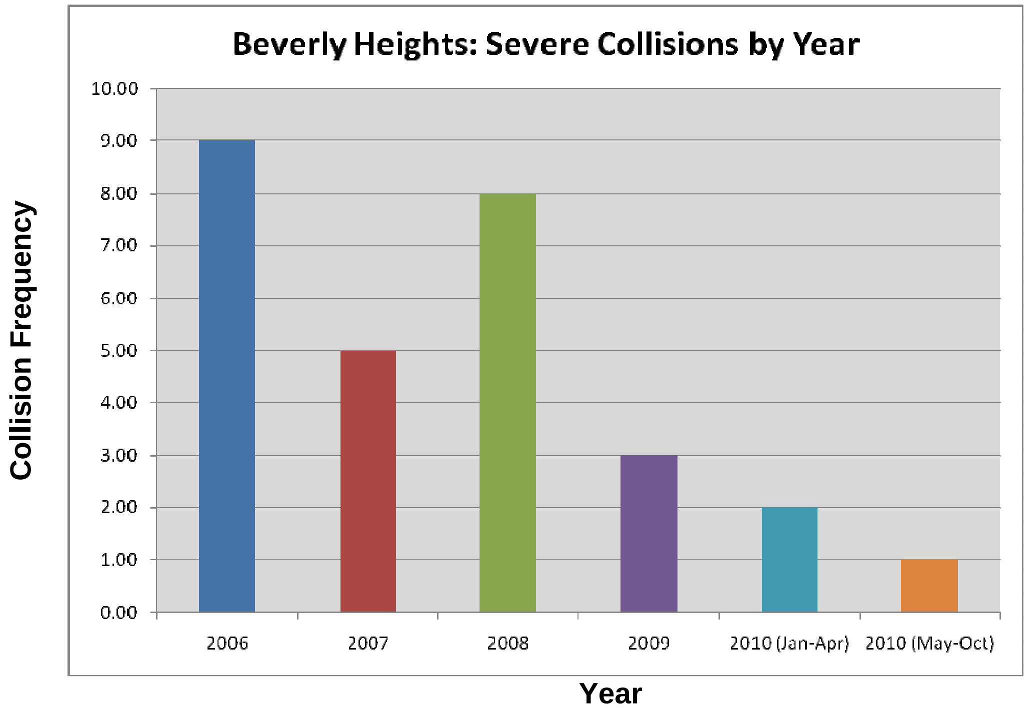


Figure 7.3 King Edward Park Historical Collision Statistics 2006-2010
Top: Severe Collisions by Year
Bottom: PDO Collisions by Year



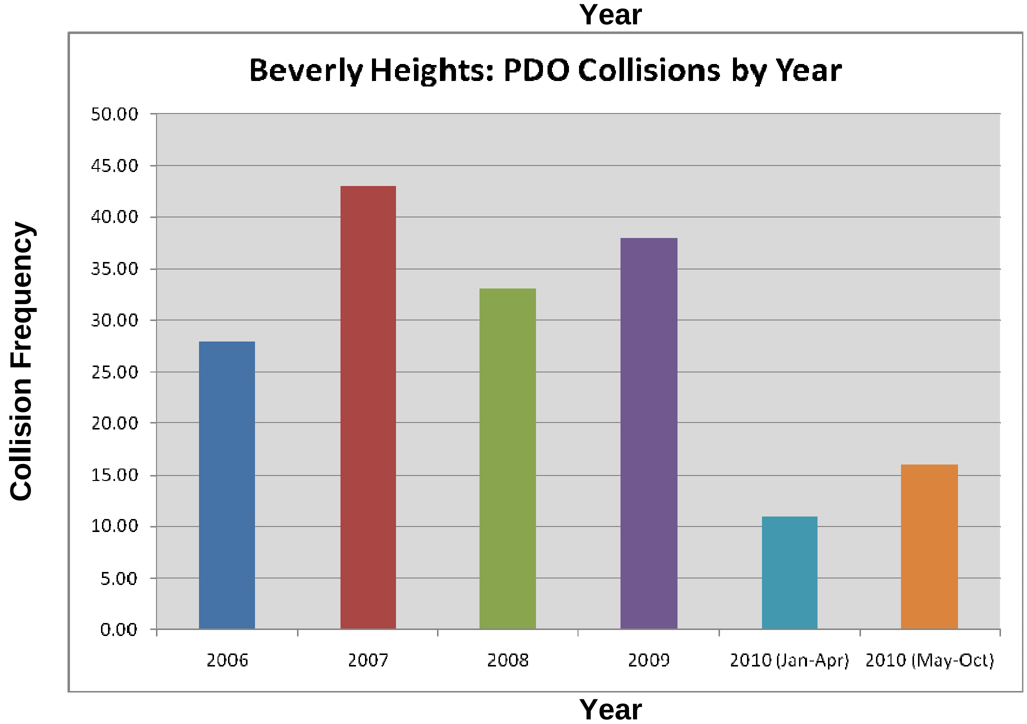


Figure 7.4 Beverly Heights Historical Collision Statistics 2006-2010
Top: Severe Collisions by Year
Bottom: PDO Collisions by Year

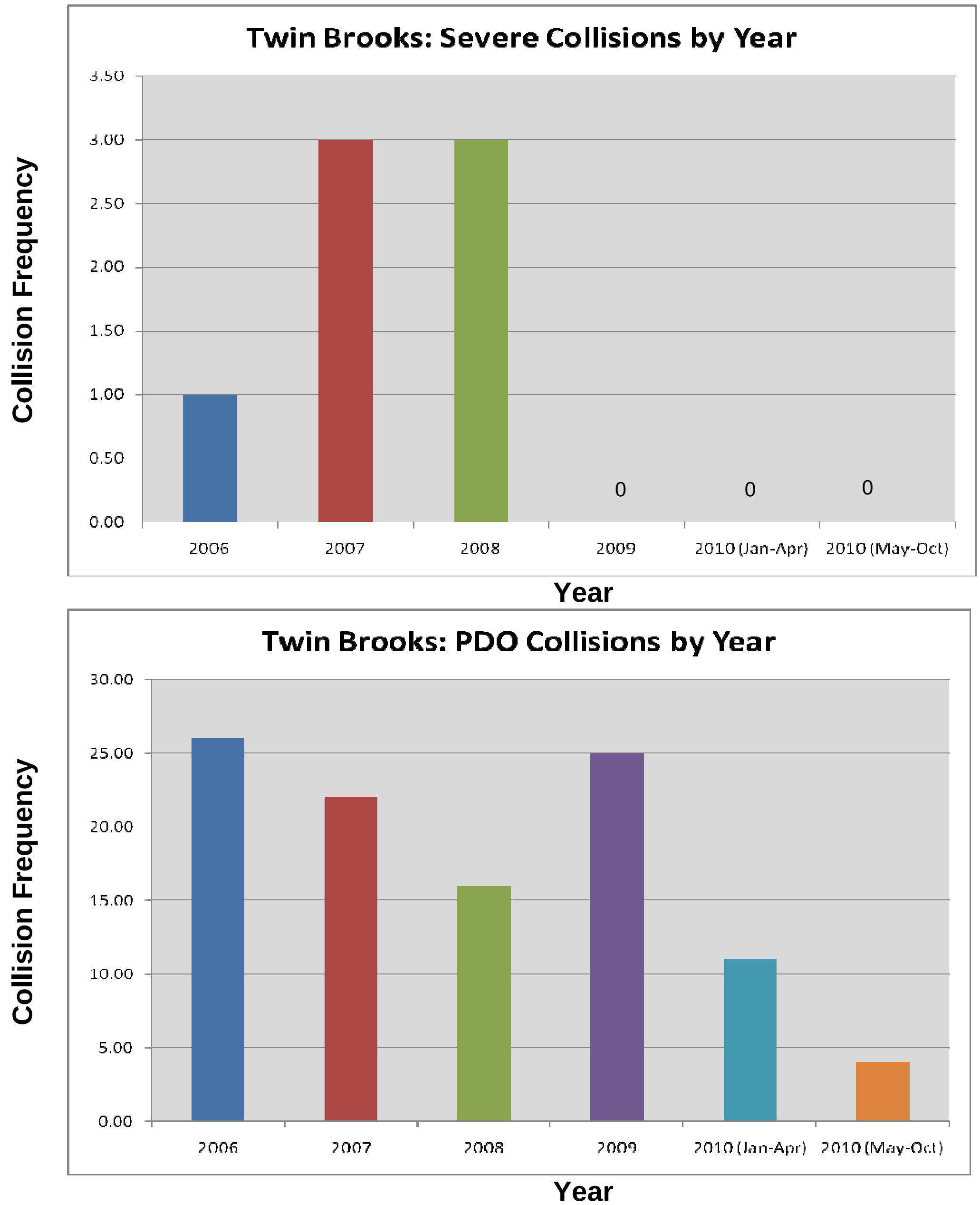
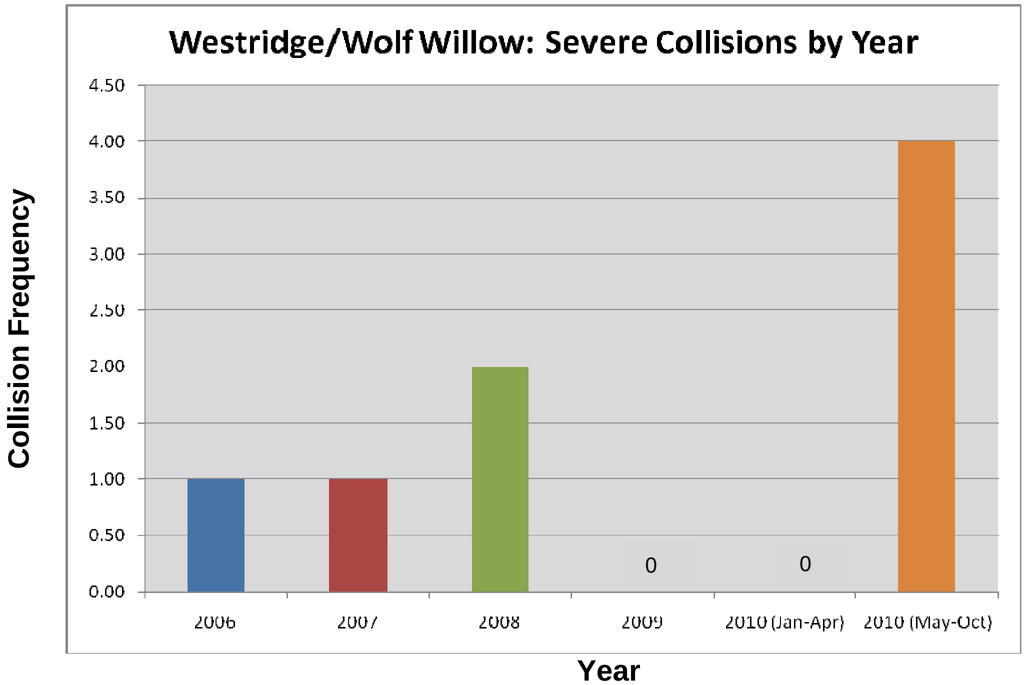


Figure 7.5 Twin Brooks Historical Collision Statistics 2006-2010
Top: Severe Collisions by Year
Bottom: PDO Collisions by Year



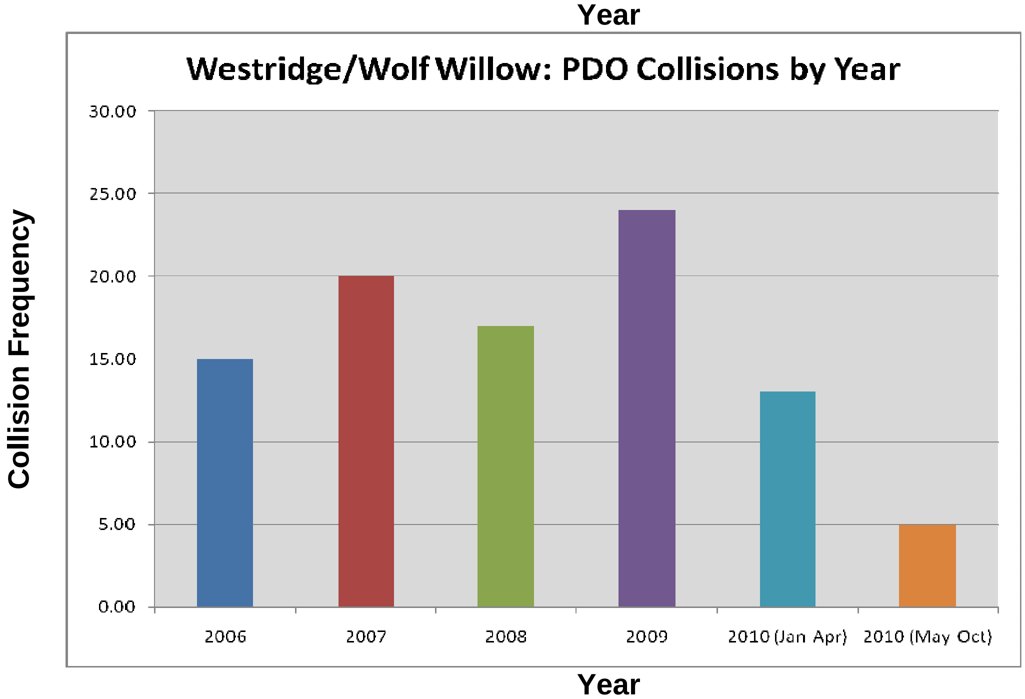


Figure 7.6 Westridge/Wolf Willow Historical Collision Statistics 2006-2010
Top: Severe Collisions by Year
Bottom: PDO Collisions by Year

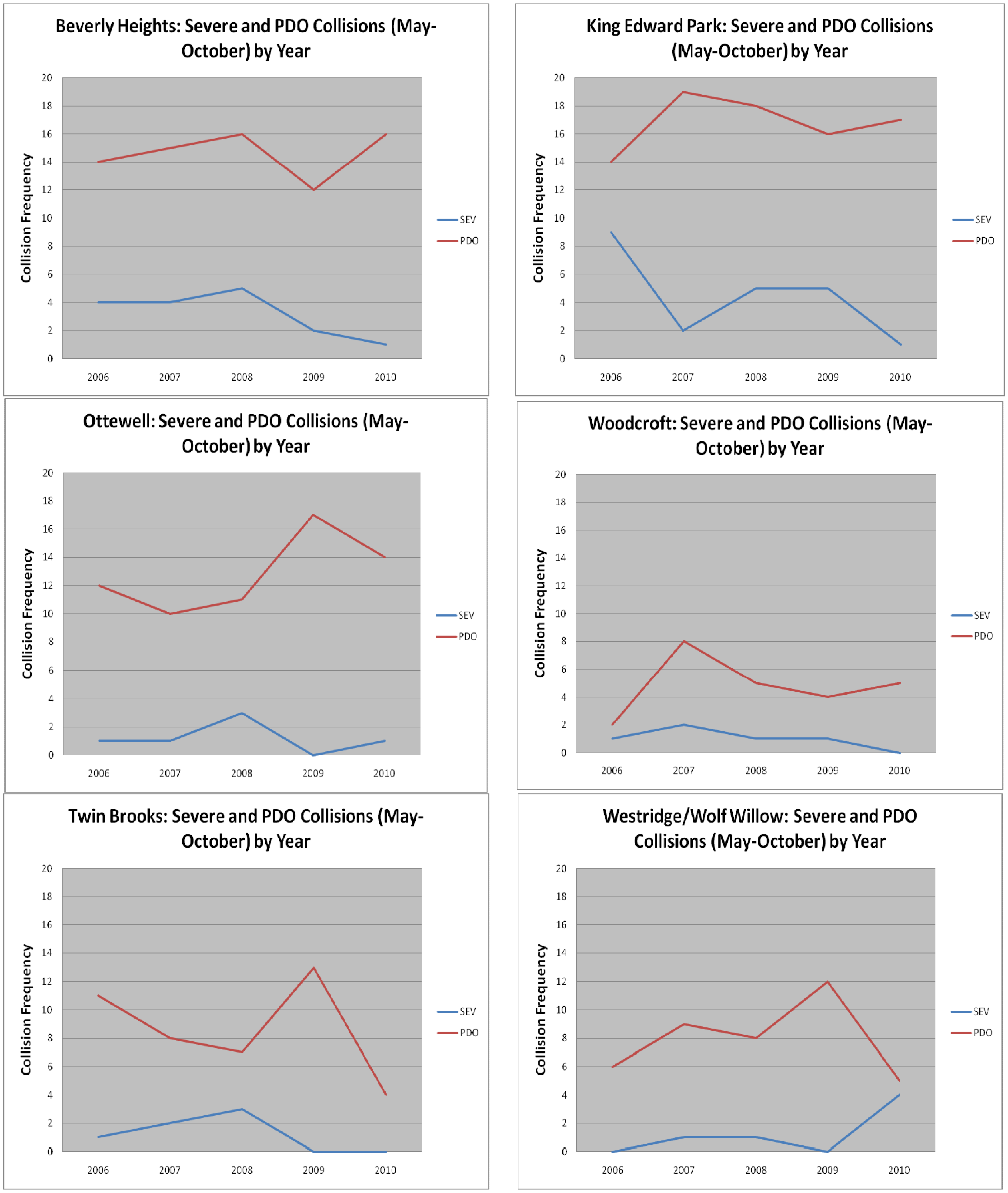


Figure 7.7 Time Series Plot of Severe and PDO Collisions (May-October) by Year in each of the Treated Communities

7.2 Results of the Collision Analysis

7.2.1 Percent Change in Collisions

The above descriptive statistics show the pilot project may have had an impact on the safety of the selected communities. A rigorous "Before" and "After" analysis of reduced speed limit on the severity of collision counts was conducted using a time series intervention model. The intervention model was developed based on the work by El-Basyouny and Sayed (2011) and Li et al. (2008), where a Hierarchical (full) Bayesian approach was proposed to conduct a "Before" and "After" safety evaluation with matched controls.

The intervention model was developed using the Poisson Lognormal distribution which accounts for the randomness and over-dispersion typically available in collision data. The model was extended to account for the bivariate nature of the collision data since for each community collisions were available by two severity levels (i.e., severe collisions and Property Damage Only {PDO} collisions). The model was further extended to account for seasonal variation (winter, spring, summer and fall) as well as to account for the treated-control matching process.

According to the time-series intervention model, the estimates of the overall odds ratio for *severe* collision was 0.75, implying reductions in predicted collision counts of 25% with a 95% confidence interval of -81%, 77%. Alternatively, the estimates of the overall odds ratio for *PDO* collisions was 0.94, implying reductions in predicted collision counts of 6% with a 95% confidence interval of -28%, 21%.

However, these reductions were not significant as the 95% confidence interval included zero, implying *no change or no effect*. Generally, when a confidence interval is very wide like this one, it is an indication of an inadequate sample size (i.e. in this case the short "After" period) and implies poor precision. The non significant reduction is not surprising given the short 6 month "After" period. Collision data used for diagnosing safety improvements should represent at least 3 years of "After" data to address problems such as the regression-to-the-mean[5] and other confounding factors.

Since Westridge/Wolf Willow experienced an increase in the number of severe collisions during the "After" period, a second evaluation was conducted while excluding the community's results. In this case, the estimates of the overall odds ratio was 0.41, implying a significant reduction in predicted collision counts of 59% with a 90% confidence interval of -91%, -12% for *severe* collisions. For *PDO* collisions, the estimates of the overall odds ratio was 1.002, implying a non-significant increase in predicted collision counts of 0.2% with a 90% confidence interval of -22%, 26%.

It is clear that the "After" collision results in Westridge/Wolf Willow have a significant impact on the overall percent reduction. If all six communities were included in the analysis, the pilot project resulted in a non-significant 25% and 6% reduction in *severe*

[5] Regression to the mean is the tendency of high values to be followed by less extreme values and vice versa.

and *PDO* collisions, respectively. However, if the analysis was restricted to only 5 communities (by excluding the collision results of Westridge/Wolf Willow), the pilot project results in a significant reduction of 59% in *severe* collisions and a non-significant increase of 0.2% in *PDO* collisions. However, the exclusion of the Westridge/Wolf Willow results, solely because they are showing an increase in collisions during the “After” period, is unjustifiable given the rarity of severe collisions in residential neighbourhoods and the likely fluctuations in small number statistics and probability of collisions on local roadways. Therefore, the results of the second collision evaluation must be interpreted with caution since it was only used to illustrate the impact of the Westridge/Wolf Willow results on the overall reduction in collisions.

At this point, the results of the collision analysis were inconclusive and additional research will be required to substantiate the impact of the pilot project on the frequency and severity of collisions.

7.2.2 Correlation between Collision Severity Levels

The correlation between the two severity levels (*severe* and *PDO*) of collision counts was highly significant (0.78), indicating higher *PDO* collisions were associated with higher *severe* collisions. This is a reasonable finding as the collision likelihood for both levels is likely to rise due to similar deficiencies in roadway design and/or other unobserved factors. This correlation was identified by other researchers in the literature.

7.2.3 Collision Seasonality Analysis

Given the pilot project’s duration, collisions occurring during the different seasons were not adequately represented. The “After” period included collisions occurring from May to October only. However, the “Before” data (i.e. January 2006 to April 2010) provided sufficient information to investigate some of the seasonality impacts on collisions. The current analysis could be updated with additional information as it becomes available in the future.

For *severe* collisions at the 95% confidence interval:

- The average *severe* collisions during the Fall months was not significantly different from those during the Spring months.
- The average *severe* collisions during the Spring and Fall months was not significantly different from those during the Winter and Summer months.
- The average *severe* collisions during the Winter months was significantly lower than those during the Summer months.

For *PDO* collisions at the 95% confidence interval:

- The average *PDO* collisions during the Fall months was not significantly different from those during the Spring months.
- The average *PDO* collisions during the Spring and Fall months was significantly lower than those during the Winter and Summer months.
- The average *PDO* collisions during the Winter months was significantly higher than those during the Summer months.

7.2.4 Treated-Control Matching Results

Since the matched control communities were selected to be as close to treated communities as possible, this may induce a correlation in collision count between communities within treated-control pairs. To account for this correlation, a random parameter model was proposed as an extension to the time-series intervention model.

The results revealed the effects of the covariates on collision counts varied significantly across treated-control pairs justifying the use of a random parameters component. These results, as well as the goodness-of-fit measures, suggest the matching process not only leads to improved models but is important to be accounted for to eliminate any ensuing bias.

8. SUMMARY

This section provides a comprehensive summary of the evaluation results as they pertain to the community perception of traffic safety, enforcement results, speed and traffic evaluations, and collision analysis.

8.1 Community Perception

Banister Research & Consulting Inc. was commissioned to conduct a random and representative telephone survey with citizens residing in the Pilot Project Communities in two phases – prior to project initiation in March 2010 (pre-pilot) and following the end of the project in November 2010 (post-pilot). Randomly selected households within the six specified neighbourhoods were obtained from a purchased TELUS directory. The randomized households were separated into two groups for each phase of the survey before the project fieldwork began. Below is a summary of the key findings of the November 2010 results with comparisons to the March 2010 data, where applicable.

- The majority (87%) of respondents indicated they were aware their community had been chosen to participate in a pilot project (versus 46% in the pre-pilot).
    - Respondents residing in Ottewell or Westridge/Wolf Willow were significantly more likely to be aware their community had participated in a pilot project (96% to 98%) than those in Beverly Heights, King Edward Park or Woodcroft (76% to 84%).

- When asked, 80% of respondents stated they were aware of the speed trailer (also known as a speed display board), 51% were aware of the school dolly, and 39% were aware of Speed Watch. All significant increases from the pre-pilot (where 50%, 30%, and 24%, respectively, were aware).
    - Respondents residing in Ottewell, Twin Brooks, or Westridge/Wolf Willow were significantly more likely to be aware of the speed trailer (88% to 92%) than those in King Edward Park and Woodcroft (64% to 70%). Respondents residing in Twin Brooks were significantly more likely to be aware of the school dolly (64%) than those in Westridge/Wolf Willow and Woodcroft (38% to 40%).

- Respondents were asked to anticipate the effectiveness of the three different speed monitors. Respondents were most likely to indicate the speed trailer (also known as a speed display board) would be most effective (59%) followed by the school dolly (45%), and Speed Watch (30%).
    - Respondents in the pre-pilot were significantly more likely to feel the school dolly would be more effective (56%), while they were slightly less likely to feel the speed trailer was effective (55%). A comparable proportion of respondents rated Speed Watch as effective in the pre-pilot (32%).
    - Respondents residing in Ottewell were significantly more likely to rate the effectiveness of the speed trailer as high (76%) than those in Beverly Heights, King Edward Park, or Woodcroft (48% to 52%). Respondents residing in Ottewell and Twin Brooks were significantly more likely to rate the

effectiveness of the speed dolly as high (52% to 60%) than those in Westridge/Wolf Willow (30%).

- When respondents were asked to anticipate the effectiveness of the pilot project, 48% of respondents believed it would be highly effective in lowering residential speeds. This was slightly higher than in the pre-pilot (41%).
  - o Respondents residing in Ottewell were significantly more likely to rate the pilot project as effective (64%) than those in Beverly Heights, Westridge/Wolf Willow, or Woodcroft (38% to 44%).

- New to the post-pilot, respondents were asked how the speed of traffic had changed over the last 6 months, 48% reported it was slower, while 45% stated it was about the same.
  - o Respondents residing in Ottewell, Twin Brooks, or Westridge/Wolf Willow were significantly more likely to state the traffic is slower (56% to 64%) than those in Woodcroft (30%). Respondents residing in Beverly Heights, King Edward Park, and Woodcroft were significantly more likely to feel the traffic remained the same (52% to 60%) than those in Twin Brooks (30%).

- Finally, (70% of respondents indicated the level of community involvement and support for the success of the pilot project in improving traffic safety in their community was important (a slight decrease from 75% in the pre-pilot).
  - o Respondents residing in Woodcroft were significantly more likely to rate community involvement and support as important (78%) than those in Beverly Heights (58%).

8.2 Enforcement

Over the course of the pilot project, there were a total of 6,779 speeding violations within the six treated communities.

The highest violation rates[6] were recorded at Woodcroft (94.2), followed by Ottewell (85.0), and Beverly Heights (82.0). The community with the least number of violation rate (per 1,000 vehicles) was Westridge/Wolf Willow (40.1).

In Woodcroft, a total of 187.3 hours of photo radar camera enforcement occurred in four location (139 St SB between 116 - 115A Ave, 139 St NB between 115A - 116 Ave, 114 Ave EB between 139 - 135 St, and 114 Ave WB between 135 - 139 St). During this period a total of 1,153 speed violations were recorded. The speed violation rate (per 1,000 vehicles) was estimated at 94.2.

In Ottewell, a total of 228.0 hours of photo radar camera enforcement occurred in four locations (Ottewell Rd SB between 96A - 95 Ave, 92 Ave EB between 62 - 58 St, 92 Ave WB between 58 - 62 St, and 57 St SB between 97 - 95 Ave). During this period a total of 842 speed violations were recorded. The speed violation rate was estimated at 85.0.

[6] Violation rate was calculated as violation counts per 1,000 recorded vehicles.

In Beverly Heights, a total of 215.6 hours of photo radar camera enforcement occurred in four locations (114 Ave between 44 - 46 St, 114 Ave EB between 46 - 44 St, 34 St SB between 113 - 111 Ave, and 34 St NB between 111 - 113 Ave). During this period a total of 1,935 speed violations were recorded. The speed violation rate was estimated at 82.0.

In King Edward Park, a total of 137.6 hours of photo radar camera enforcement occurred in three locations (76 Ave WB between 75 - 79 St, 76 Ave between 81 - 78 St, and 85 St NB between 80 - 81 Ave). During this period a total of 749 speed violations were recorded. The speed violation rate was estimated at 78.8.

In Twin Brooks, a total of 200.3 hours of photo radar camera enforcement occurred in four locations (12 Ave WB between 111 - 113 St, 12 Ave EB between 113 - 112 St, 9B Ave WB between 116 - 119 St, and 9B Ave WB between 119 - 116 St). During this period a total of 1,593 speed violations were recorded. The speed violation rate was estimated at 75.2.

In Westridge/Wolf Willow, a total of 215.2 hours of photo radar camera enforcement occurred in four locations (Wanyandi Rd between Wolf Ridge Way - Wanyandi Way, Wanyandi Rd NB between Wanyandi Way - Wolf Ridge Way, Wolf Willow Rd WB at Westridge Rd, and Wolf Willow Rd EB at Westridge Rd). During this period a total of 507 speed violations were recorded. The speed violation rate was estimated at 40.1.

8.3 Speed and traffic

Five types of evaluations were used to capture the outcomes of the reduced speed limit on the six treated communities.

The first evaluation focused on analyzing the global or overall effects of the pilot project. For the purpose of this evaluation, a detailed speed and traffic analysis was conducted for three distinct groups of communities (i.e., treated, control and adjacent.) To conduct this analysis, all of the six treated communities were grouped in a single set. Similarly, all the control and adjacent communities were grouped into two separate clusters. Alternatively, an adjacent group of communities is used to assess the displacement and/or other indirect effects which might be associated with the pilot project.

The second evaluation provides a thorough analysis of treated communities by neighbourhood design. Again recall, the six treated communities could be further clustered into three different types based on community development and roadway networks. The community selection process involved choosing three pairs of communities: old (1950’s/60’s) communities, grid communities and new (1970’s/80’s) communities with each pair sharing similar characteristics. A detailed speed and traffic analysis was conducted for those three different neighbourhood designs.

The third evaluation level focuses on analyzing each of the neighbourhood designs: old (1950’s/60’s) communities, grid communities and new (1970’s/80’s) communities separately. For the purpose of this evaluation, only a speed analysis was conducted.

8.3.1 Global Traffic & Speed Analysis

Operating Speed: after accounting for the unintended influence of other variables (achieved by using the control group), the operating speed was reduced by 7%. This corresponds to a reduction of 3.95 km/h in operating speed. Since the interaction between the community groups and “Before” and “After” periods was statistically significant, it was concluded the pilot project was successful in reducing the operating speed (by approximately 7%) in the treated communities.

Mean Speed: the mean speed was reduced by 7% which corresponds to a reduction of 3.48 km/h in mean speed. Again, since the interaction between the community groups and “Before” and “After” periods was statistically significant, it was concluded the pilot project was successful in reducing the mean speed (by approximately 7%) in the treated communities.

The speed analysis showed the *operating speed* and *mean speed* were consistently decreasing in both the treated and adjacent communities (albeit with varying rates) while increasing gradually in the control communities. This relationship held regardless of time of day or day of the week factors.

Also, the analysis revealed there were monthly fluctuations in the *operating speed* and *mean speed* for all community groups. In the treated group the speed was high in April and was reduced in later months, but in the control group the speed increased in later months compared to April. So while the speed was reduced in the treated group over time, it increased in the control group. Also, the speed was marginally reduced for the adjacent group of communities. Note for the treated communities, the largest reduction in operating speed occurred at the start of the project (from April to June) with the speeds rising slightly in July before dropping and leveling off.

After the implementation of the pilot project, the cumulative distribution for the operating and mean speeds in the treated and adjacent communities shifted, indicating a reduction in the speed. In contrast, the speed distribution for the control communities shifted to the opposite direction which implies the speed increased in the control communities during the “After” period.

Percent Compliance: the analysis showed drivers in treated communities during the “After” period were much less likely to comply to the posted speed limit than the drivers in other communities or during the “Before” period. This implies there was a significant decrease in the compliance percentages to the posted speed limit in the treated communities as a result of the pilot project. Moreover, the percent compliance was found to be highly correlated with the speed allowance or tolerance level. The highest percentage compliance (90%) was achieved at approximately 15 km/h over the posted speed limit.

Traffic Count: the average number of recorded vehicles was reduced by 4% with respect to the changes in the control communities. The interaction between the community groups and “Before” and “After” periods was statistically significant, indicating the number of recorded vehicles was marginally reduced (by approximately 4%) in the

treated communities. The reduction in traffic counts in the “After” period is not surprising since the traffic volumes during April and May and during the second half of September and during October are often used as surrogates for the calculation of the Annual Average Daily Traffic and the period June, July and August are typically below-average. This ‘typical’ pattern might explain the volume reductions.

Proportion of Tailgating Vehicles: the proportion of tailgating vehicles was found to be very small ranging from 0.005 to 0.009, (i.e., representing 5 to 9 tailgating vehicles per 1,000 vehicles.) In addition, the analysis revealed drivers in treated communities during the “After” period were a little less likely to tailgate than the drivers in other communities or during the “Before” period. However, the decrease in the proportion of tailgating vehicles in the treated communities was statistically significant.

8.3.2 Traffic & Speed Analysis by Neighbourhood Design

Operating Speed: the operating speed was found to vary with level of community development and type of roadway network. Higher operating speeds were observed in new (1970s/80s) communities followed by grid-based communities and old (1950s/60s) communities. Also, the results show the operating speed decreased consistently (with varying rates) in all of the treated neighbourhood designs, regardless of time of day or day of week.

It is worth noting old communities have constrained road dimensions and often significant on-street parking, these physical constraints typically feature lower speeds than the communities with a grid or irregular street networks which have little on-street parking and generous, or very generous, roadway dimensions. It also explains the most significant speed reduction impact was experienced in the new communities (operating speed decreasing from about 60 to about 56 km/h), followed by the communities with grid networks (operating speed decreased from about 55 to about 53 km/h) and by the older communities (operating speed decreased from about 53 to about 51 km/h).

There were monthly fluctuations in the operating speed for all treated neighbourhood designs. The speed was consistently high in April and was reduced in later months. The largest reduction in speeds occurred at the start of the project (from April to June) with the speeds rising slightly in July before dropping and leveling off. Again, after the implementation of the pilot project, the cumulative distribution for all neighbourhood designs shifted, indicating a reduction in the speed.

Percent Compliance: the degree of compliance was highest for old communities and lowest for new communities. The analysis indicated drivers in old communities during the “After” period were a little less likely to comply than the drivers in other communities or during the “Before” period. In addition, the drivers in grid communities during the “After” period were a little more likely to comply than the drivers in other communities or during the “Before” period.

Traffic Count: the number of recorded vehicles decreased from the “Before” to the “After” conditions for all neighbourhood designs. The largest decrease occurred for new (1970s/80s) and grid-based communities, while there was a slight decrease for the old

communities. Overall, the analysis showed the number of recorded vehicles was marginally reduced for all neighbourhood designs.

Proportion of Tailgating Vehicles: the proportion of tailgating vehicles was again very small, ranging from 0.003 to 0.009 (i.e., representing 3 to 9 tailgating vehicles per 1,000 vehicles) and was smallest in old communities. The results indicate there were no statistical differences in the proportion of tailgating vehicles across the different community classifications from the "Before" to the "After" conditions.

8.3.3 Traffic & Speed Analysis for Grid-based Communities

Operating Speed: the operating speed at grid-based communities was reduced by 4%. This corresponds to a reduction of 2.39 km/h in operating speed. This reduction was statistically significant, indicating the pilot project was successful in reducing the operating speeds in the treated grid-based communities. Moreover, the operating speed decreased consistently in the treated communities regardless of time of day or day of week.

Percent Compliance: the analysis showed the drivers in treated grid-based communities during the "After" period were much less likely to comply than the drivers in other grid-based community groups (i.e., control or adjacent) or during the "Before" period and there was a significant decrease in the percent compliance to the posted speed limit in the treated grid-based communities.

8.3.4 Traffic & Speed Analysis for Old Communities

Operating Speed: the operating speed at old (1950s/60s) communities was reduced by 6%. This corresponds to a reduction of 2.96 km/h in operating speed. The statistical analysis revealed this reduction was significant, indicating the project was successful in reducing the operating speeds in the treated old communities. When compared to the control or adjacent communities, the operating speed was lowest for the treated old communities regardless of day of week and time of day. In addition, there were monthly fluctuations in the operating speed. However, the operating speeds for the treated old communities were consistently lower than the operating speed in the control and adjacent communities.

Percent Compliance: the analysis showed the drivers in treated old communities during the "After" period were much less likely to comply than the drivers in other old community groups (i.e., control or adjacent) or during the "Before" period and there was a significant decrease in the percent compliance to the posted speed limit in the treated old communities as a result of the pilot project.

8.3.5 Traffic & Speed Analysis for New Communities

Operating Speed: the operating speed at new (1970s/80s) communities was reduced by 11%. This corresponds to a reduction of 6.43 km/h in operating speed. Given the statistically significant interaction between the new community groups and the "Before" and "After" periods, it was concluded the project was successful in reducing the

operating speeds in the treated new communities. More so, the operating speed decreased consistently in the treated new communities regardless of time of day or day of week. There were monthly fluctuations in the operating speed compliance for the treated and control new communities. The operating speed in the treated communities was reduced while the operating speed in the control group was increasing steadily with time. After the implementation of the pilot project, the operating speed for the treated new communities was consistently lower than the operating speeds in the control community.

Percent Compliance: the statistical analysis revealed the drivers in treated new communities during the “After” period were much less likely to comply than the drivers in the control community or during the “Before” period. This indicates there was a significant decrease in the percent compliance to the posted speed limit in the treated new communities.

8.4 Collision

A rigorous “Before” and “After” analysis of the effects of reduced speed limits on the severity of collision counts was conducted using a time series intervention model. The intervention model was developed based on the work by El-Basyouny and Sayed (2011) and Li et al. (2008), where a Hierarchical (full) Bayesian approach was proposed to conduct a “Before” and “After” safety evaluation with matched controls.

The intervention model was developed using the Poisson Lognormal distribution which accounts for the randomness and over-dispersion typically available in collision data. The model was extended to account for the bivariate nature of the collision data since for each community collisions were available by two severity levels (i.e., severe collisions and Property Damage Only {PDO} collisions). The model was further extended to account for seasonal variation (winter, spring, summer and fall), as well as to account for the treated-control matching process.

According to the time-series intervention model, the estimates of the overall odds ratio for *severe* collisions was 0.75, implying reductions in predicted collision counts of 25% with a 95% confidence interval of -81%, 77%. Alternatively, the estimates of the overall odds ratio for *PDO* collisions was 0.94, implying reductions in predicted collision counts of 6% with a 95% confidence interval of -28%, 21%. The results of the analysis are depicted in Figure ES7.

However, these reductions were not significant as the 95% confidence interval included zero, implying *no change or no effect*. Generally, when a confidence interval is very wide like this one, it is an indication of an inadequate sample size (i.e. short “After” period) and implies poor precision. Consequently, the results of the collision analysis were inconclusive and additional research will be required to substantiate the impact of the pilot project on the number and frequency of collisions.

8.5 Concluding Remarks

The result of the community perception survey by Banister Research & Consulting Inc. indicates the majority of respondents were aware of their community's involvement in the pilot project. More so, the awareness rate was highest for residents in Ottewell and Westridge/Wolf Willow. A total of 48% percent of the respondents reported the speeds were lower after the pilot project ended, while 45% felt it was about the same. Moreover, 48% percent of respondents believed the pilot project would be highly effective in lowering residential speeds; in particular, 64% of Ottewell residents felt this. Finally, 70% of respondents indicated the importance of community involvement and support for the success of the pilot project in improving traffic safety in their community.

The results of the speed and traffic analysis indicated both the operating speed and mean speeds were reduced after the implementation of the new residential speed limit of 40 km/h in the pilot project communities. This decrease was further magnified by the observed increase in speeds of the control communities over the duration of the pilot project. This implies, even though there was a general tendency for drivers to exceed the speed limit during the "After" period, the piloted communities were still exhibiting a reduction in speeds. Moreover, the operating speed and mean speed were consistently lower regardless of temporal factors like time of day and day of week.

The operating speed was also found to vary with community development and the type of roadway network. Higher operating speeds were observed in new (1970s/80s) communities, followed by grid-based communities and old (1950s/60s) communities. There were reductions in operating speed in all communities, regardless of network type; the largest reduction in operating speed was observed in new communities, (11% reduction), compared to a 6% reduction in old communities and a 4% reduction in grid-based communities. However, new communities still had the highest recorded speeds in the "After" period when compared to the old and grid-based neighbourhood designs. Again, the results show the operating speed decreased consistently (with varying rates) in all of the treated neighbourhood designs regardless of time of day or day of week.

The analysis of the proportion of drivers complying with the posted speed limit showed drivers in treated communities during the "After" period were much less likely to comply to the lower posted speed limit than drivers in other communities or during the "Before" period. In the treated communities, 65% of drivers exceeded the 40 km/h speed limit compared to 39% exceeding the 50 km/h limit before the study. However, the distribution of driver speeds decreased by approximately 4 km/h compared to the control communities, indicating drivers were slower overall in treated communities. This result is consistent with published studies where the posted speed limit was changed without concurrent changes to roadway geometry such as new markings, land use changes or traffic calming techniques.

Moreover, the percent compliance was found to be highly correlated with the speed allowance or tolerance level. The percent compliance of drivers traveling 15km/h over the 50 km/h speed limit in the control communities was 92.9% (before) and 91.0% (after). The percent compliance of drivers travelling 15 km/h over the posted 40 km/h speed limit in the treated communities was 93.1% (before) and 84.3% (after). The

percent compliance was also found to vary with level of community development and type of roadway network. The degree of compliance was highest for old communities and lowest for new communities.

A 4% reduction in the average number of vehicles was observed after the implementation of the new residential speed limit of 40 km/h in the pilot project communities. Once again, the reductions were found to vary with the level of community development and the type of roadway network. Generally, the number of recorded vehicles decreased from the “Before” to the “After” phase for all neighbourhood designs, with the largest decrease in new (1970s/80s) and grid-based communities and a smaller decrease in the old communities. This reduction could be attributed to traffic counts during June, July and August being typically below-average.

The proportion of tailgating vehicles was found to be very small. The analysis revealed drivers in treated communities during the “After” period were slightly less likely to tailgate than the drivers in other communities or during the “Before” period. The results indicated no statistical differences in the proportion of tailgating vehicles across different neighbourhood designs (i.e., grid, new, old) from the “Before” to the “After” phase.

An analysis of collision data in the treated communities showed an overall reduction in collision frequency and severity. There was a larger reduction in severe collisions (i.e. collisions resulting in injury or fatality) than in Property Damage Only (PDO) collisions. This result is consistent with other research showing a reduction in driving speed leads to a reduction in severe collisions at the same time as there is either no change or a slight increase in PDO collisions (Speed Management Report, 2008). However, these reductions were not significant as the 95% confidence interval was very wide and included zero, implying no change or no effect. Consequently, the results of the collision analysis were inconclusive and additional research will be required to substantiate the impact of the pilot project on the number and frequency of collisions.

9. FUTURE RESEARCH

Although this report provides new insights regarding the impact of reducing the posted speed limit on the level of safety within residential communities, there are still a number of future research issues worth investigating. This section summarizes some of these future research issues.

As previously discussed, the analysis in this report was subject to a number of limitations, mostly time and data related. For example, the “After” period was relatively short—only 6 months of “After” data was available for analysis. This period is typically subject to a number of confounding factors such as novelty issues. To circumvent this bias, additional data is scheduled to be collected in the next few months to investigate the effects on speeding and collisions. A larger data set would help solidify the findings in this report, particularly for the collisions analysis usually conducted using 3 years of “After” data.

Due to time constraints, the speed and traffic analysis was restricted to three levels of analysis, namely: global-level, for each of the treated community classes, and for individual community classes. A fourth and probably a fifth level of analysis could be conducted to investigate the impacts and outcomes of the pilot project for each individual community and potentially on each individual street within the treated communities. One topic of particular interest would be the relationship between the speeds or collision types and the types of roads (collector v. residential, strictly local or penetrating or shortcutting traffic), their design parameters, and the type of neighbourhood design, such as the pavement width, “clear” zones, type of housing, and access types (garages on the residential road or on a back lane).

Another potential future research topic would be to investigate the effectiveness of the different speed management measures (i.e., speed display boards, dynamic messaging signs, school dollies, Speed Watch, Neighbourhood Pace Cars, Safe Speed Community vans and covert photo-radar trucks) with respect to traffic, speed, and collisions occurrence. One more issue to explore would be the influence of various types of enforcement on speeding behavior (in general) and speed limit compliance (in specific). Alternatively, the association between increased enforcement presence and overall level of not only safety but also security (crime and traffic) could be examined.

A more detailed analysis of the influences of the road network type and residents’ responses related to perceptions for different community characteristics would provide valuable insight on the factors which mostly influence community perception of safety.

These analyses would employ data collected for this project and several other databases and would be well suited for Masters of Applied Science (M.Sc.) or Master of Engineering (M.Sc.) or other student research projects at the University of Alberta or any other university.

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APPENDIX I: BYLAWS

OFFICE OF THE CITY CLERK
CONSOLIDATION

BYLAW NO. 6894

(CONSOLIDATED ON APRIL 14, 2010)

A Bylaw to Establish Certain Speed
Zones in the City of Edmonton

WHEREAS *Section 14(2) of The Highway Traffic Act, Revised Statutes of Alberta l980, Chapter H-7, all amendments and successors to, Section 16(1) and Section 16(2) reads as follows:*

(S.2, Bylaw No. 7096, January 26, 1983)

"(2) With respect to highways subject to its direction, control and management, the council of an urban area, by bylaw, may:

(a) prescribe a maximum speed in excess of 50 kilometres per hour for all or any part of a highway,

and

(b) prescribe a maximum speed of less than 50 kilometres per hour for all or any part of a highway."

The Municipal Council of the City of Edmonton finds it desirable to pass a Bylaw pursuant to the said provisions of the said Highway Traffic Act, Revised Statutes of Alberta 1980, Chapter H-7.

(S.5, Bylaw No. 7884, August l3, l985)

NOW THEREFORE*, the Municipal Council of the City of Edmonton, duly assembled, hereby enacts as follows:*

1. This Bylaw may be cited as "The City of Edmonton Speed Bylaw".

2. On the following described portions of highway, a maximum speed in excess of or less than 50 kilometres per hour is hereby provided, namely:

40 km/h Daytime and Night time

Beverly Heights

All the roads and streets within the boundaries of the Beverly Heights and Rundle Heights neighbourhoods, in the City of Edmonton, Province of Alberta, which for greater certainty means the area bounded by but not including:

118 Avenue, 50 Street to Rundle Park
Rundle Park, 118 Avenue to North Saskatchewan River
North Saskatchewan River, Rundle Park to 50 Street
50 Street, 118 Avenue to North Saskatchewan River

King Edward Park

All the roads and streets within the boundaries of the King Edward Park neighbourhood in the City of Edmonton, Province of Alberta which for greater certainty means the area bounded by:

and including 76 Avenue from Mill Creek Ravine to Argyll Road

but not including:

Mill Creek Ravine from Whyte Avenue (82 Avenue) to 76 Avenue
Whyte Avenue (82 Avenue) from 93 Street to Argyll Road
Argyll Road from 76 Avenue to 82 Avenue

excepting throughout 83 Street and 75 Street

Ottewell

All roads and streets within the boundaries of the Ottewell neighbourhood, in the City of Edmonton, Province of Alberta which for greater certainty means the area bounded by:

but not including:

98 Avenue, 75 Street to 50 Street
50 Street, 98 Avenue to 90 Avenue
90 Avenue, 75 Street to Ottewell Road
75 Street, 101 Avenue to 92A Avenue

and including:

Ottewell Road, 90 Avenue to 92A Avenue
92A Avenue, 75 Street to Ottewell Road

Twin Brooks

All roads and streets within the boundaries of the Twin Brooks Neighbourhood, in the City of Edmonton, Province of Alberta, which for greater certainty means the area east of Whitemud Creek, south and west of Blackmud Creek and north of Provincial Highway 216 (Anthony Henday Drive) excepting 111 Street.

All roads and streets within the boundaries of the Ottewell neighbourhood, in the City of Edmonton, Province of Alberta which for greater certainty means the area bounded by:

but not including:

98 Avenue, 75 Street to 50 Street
50 Street, 98 Avenue to 90 Avenue
90 Avenue, 75 Street to Ottewell Road
75 Street, 101 Avenue to 92A Avenue

and including:

Ottewell Road, 90 Avenue to 92A Avenue
92A Avenue, 75 Street to Ottewell Road

Westridge/Wolf Willow

All the roads and streets within the boundaries of the Westridge and Oleskiw neighbourhoods in the City of Edmonton, Province of Alberta, which for greater certainty means the area bounded by but not including:

170 Street, Whitemud Drive to the North Saskatchewan River
Patricia Ravine, Whitemud Drive to North Saskatchewan River
North Saskatchewan River, 170 Street to Patricia Ravine

Woodcroft

All the roads and streets within the boundaries of the Woodcroft neighbourhood, in the City of Edmonton, Province of Alberta which for greater certainty means the area bounded by but not including:

118 Avenue, 142 Street to Groat Road
Groat Road, 118 Avenue to 111 Avenue
111 Avenue, 142 Street to Groat Road
142 Street, 118 Avenue to 111 Avenue.

APPENDIX II: BANISTER RESEARCH & CONSULTING INC. REPORT

CITY OF EDMONTON
OFFICE OF TRAFFIC SAFETY

Speed Management Pilot Research – Phase 2
Final Report

December 17, 2010

Banister
Research & Consulting Inc.

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EXECUTIVE SUMMARY

The City of Edmonton, Office of Traffic Safety, conducted a Residential Speed Reduction Pilot Project in six (6) Edmonton communities to test the impact of a lower residential speed limit on the level of traffic safety. Banister Research & Consulting Inc. was commissioned to conduct a random and representative telephone survey with citizens residing in the Pilot Project Communities in two phases – prior to project initiation (March, 2010) (pre-pilot) and following the end of the project in November, 2010 (post-pilot). This is a summary of the November, 2010 results with comparisons to the March data, where applicable.

Key Findings:

Current Habits and Concerns

- To begin the survey, respondents were asked to identify how often they, or a member of their family, drives, walks and cycles in their community. Respondents most frequently stated they drive in their community daily (83%), walk in the community daily (46%) or a few times a week (28%), and rarely or never cycle in their community (68%).
    - The results for driving and walking were comparable to the pre-pilot, with 85% driving daily (versus 83% in the post-pilot), 40% and 31% walking daily and a few times a week, respectively (versus 46% and 28%, respectively). However, in the post-pilot, fewer respondents cycled (68% stating rarely or never versus 57% in the pre-pilot).
    - Respondents that reside in Ottewell, Twin Brooks, or Westridge / Wolf Willow were significantly more likely (88% to 96%) to drive daily than respondents in Woodcroft (72%). Respondents that reside in Beverly Heights, King Edward Park, Ottewell, Westridge / Wolf Willow, or Woodcroft were significantly more likely (44% to 58%) to walk daily than those in Twin Brooks (24%).
- Respondents were most likely to indicate they felt safe (4 or 5 out of 5) driving in their community (86%), followed by walking in their community (83%) and cycling in their community (47%).
    - Significantly more respondents felt safe (4 or 5 out of 5) walking in their community in the post-pilot (83% versus 75% in the pre-pilot). While the proportions for driving and cycling in the post-pilot (86% and 47%, respectively) remained comparable to the pre-pilot (83% and 45%, respectively).

- Respondents that reside in King Edward Park, Ottewell, Twin Brooks, or Westridge / Wolf Willow were significantly more likely to feel safe walking in their community (84% to 94%) than those in Beverly Heights (60%).
- Respondents that reside in Twin Brooks were significantly more likely to feel safe cycling in their community (64%) than those in Beverly Heights or King Edward Park (38% versus 40%).
- Respondents that reside in Ottewell or Westridge / Wolf Willow were significantly more likely to feel safe driving in their community (94% to 98% versus 80% of respondents that reside in King Edward Park).

◆ Respondents were asked to rate their level of concern with a number of factors. Respondents were most concerned (4 or 5 out of 5) with the safety of children due to auto traffic (38%) and least concerned (16%) with the number of collisions in their community. While in the pre-pilot, safety of children due to auto traffic and number of collisions were the areas of most (52%) and least (23%) concern, respectively, the proportion of respondents concerned (4 or 5 out of 5) decreased in the post-pilot.

- Respondents that reside in King Edward Park or Woodcroft were significantly more likely to be concerned with the safety of children due to auto traffic (44% to 46%) than those that reside in Westridge / Wolf Willow (24%). Respondents that reside in Beverly Heights, King Edward Park, or Woodcroft were significantly more likely to be concerned with the number of collisions (22% to 24%) than those in Twin Brooks or Westridge / Wolf Willow (8%).

◆ The vast majority of respondents in the post-pilot drove (94%), comparable to the proportion in the pre-pilot (95%). Respondents in Ottewell or Westridge / Wolf Willow were significantly more likely to drive (98%) than those in Woodcroft (86%).

◆ Considering their driving in the past 6 months, respondents were most likely to indicate they drive right at (81%) the speed limit daily, and rarely or never under the speed limit (44%), up to 5 km/hr (42%), 6 to 10 km/hr (79%), or more than 10 km/hr (95%) over the speed limit.

- Respondents that indicated they drive right at the speed limit daily (81%) increased compared to the pre-pilot (64%). Respondents that rarely or never drove under the speed limit (44%) increased from the pre-pilot (18%), while those that drove up to 5 km/hr (42%) or 6 to 10 km/hr (79%) decreased from the pre-

pilot (56% and 87%, respectively) and respondents that drove more than 10 km/hr (95%) over the speed limit remained the same (95% in the pre-pilot).

- o Respondents in Ottewell or Twin Brooks were significantly more likely to drive right on the speed limit daily (88% to 90%) than those in Beverly Heights or King Edward Park (70% to 72%). Respondents that reside in Twin Brooks or Westridge / Wolf Willow were significantly more likely to indicate they rarely or never drive under the speed limit (50% to 67%) than those in Ottewell (29%).
- o Respondents that reside in Ottewell or Woodcroft were significantly more likely to rarely or never drive up to 5 km/hr over the speed limit (51% to 54%) than those in Twin Brooks or Beverly Heights (28% to 31%). Respondents that reside in King Edward Park or Woodcroft were significantly more likely to never or rarely drive 6 to 10 km/hr over the speed limit (87% to 88%) than those in Westridge / Wolf Willow (67%).

- ◆ When respondents were asked if they were aware of the current speed limit in their community, the vast majority (98%) of respondents were aware that the speed limit was 40 km/hr, representing a significant increase from 80% who knew it was 50 km/hr in the pre-pilot.
  - o Respondents that reside in King Edward Park, Ottewell, or Westridge / Wolf Willow were significantly more likely to be aware of the current speed limit (100%) than those in Beverly Heights (92%).
- ◆ More than half of respondents (57%) felt that the speed limit was just right, while 39% felt it was too low. In the pre-pilot 71% felt it was just right (significantly more than the post-pilot), while 1% felt that it was too low (significantly less that the post-pilot).
  - o Respondents that reside in Beverly Heights, Twin Brooks, or Westridge / Wolf Willow were significantly more likely to feel the speed limit is too low (42% to 58%) than those in Woodcroft (18%). Respondents that reside in King Edward Park, Ottewell, or Woodcroft were significantly more likely to feel the speed limit is just right (62% to 74%) than those in Westridge / Wolf Willow (42%).
- ◆ Forty-four percent (44%) of the respondents felt that reducing the speed limit from 50 km/hr to 40 km/hr was effective in improving traffic safety in their community, while 35% believed the reduction was not effective (1 or 2 out of 5).

- In the pre-pilot significantly fewer respondents felt reducing the speed limit would be effective (31%), while significantly more felt it would not be effective (46%). Respondents that reside in Ottewell were significantly more likely to feel that the speed limit reduction was effective (54%) than those in King Edward Park (34%).

Pilot Project

- The majority (87%) of respondents indicated they were aware that their community had been chosen to participate in a pilot project (versus 46% in the pre-pilot). Respondents that reside in Ottewell or Westridge / Wolf Willow were significantly more likely to be aware that their community had participated in a pilot project (96% to 98% than those in Beverly Heights, King Edward Park, or Woodcroft (76% to 84%).
- When asked, 80% of respondents stated they were aware of the speed trailer, 51% were aware of the school dolly and 39% were aware of speed watch. All significant increases from the pre-pilot (where 50%, 30%, and 24%, respectively, were aware).
    - Respondents that reside in Ottewell, Twin Brooks, or Westridge / Wolf Willow were significantly more likely to be aware of the speed trailer (88% to 92%) than those in King Edward Park and Woodcroft (64% to 70%). Respondents that reside in Twin Brooks were significantly more likely to be aware of the school dolly (64%) than those in Westridge / Wolf Willow and Woodcroft (38% to 40%).
- Respondents were asked to anticipate the effectiveness of the three different speed monitors. Respondents were most likely to indicate the speed trailer would be most effective (4 or 5 out of 5) (59%), followed by the school dolly (45%) and the speed watch (30%).
    - Respondents in the pre-pilot were significantly more likely to feel that the school dolly would be more effective (56%), while they were slightly less likely to feel the speed trailer was effective (55%). A comparable proportion of respondents rated the speed watch as effective in the pre-pilot (32%).
    - Respondents that reside in Ottewell were significantly more likely to rate the effectiveness of the speed trailer as high (76%) than those in Beverly Heights, King Edward Park or Woodcroft (48% to 52%). Respondents that reside in Ottewell and Twin Brooks were significantly more likely to rate the effectiveness of the speed dolly as high (52% to 60%) than those in Westridge / Wolf Willow (30%).

- When respondents were asked to anticipate the effectiveness of the pilot project, 48% of respondents believed it would be highly effective (4 or 5 out of 5) in lowering residential speed limits. This was slightly higher (41%) than in the pre-pilot.
    - Respondents that reside in Ottewell were significantly more likely to rate the pilot project as effective (64%) than those in Beverly Heights, Westridge / Wolf Willow, or Woodcroft (38% to 44%).
- New to the post-pilot, respondents were asked how the speed of traffic had changed over the last six months, 48% reported it was slower (1 or 2 out of 5), while 45% stated it was about the same (3 out of 5).
    - Respondents that reside in Ottewell, Twin Brooks, or Westridge / Wolf Willow were significantly more likely to state that the traffic is slower (56% to 64%) than those in Woodcroft (30%). Respondents that reside in Beverly Heights, King Edward Park, and Woodcroft were significantly more likely to feel the traffic remained the same (52% to 60%) than those in Twin Brooks (30%).
- Finally, seventy percent (70%) of respondents indicated the level of community involvement and support for the success of the pilot project in improving traffic safety in their community was important (4 or 5 out of 5) (a slight decrease from 75% in the pre-pilot).
    - Respondents that reside in Woodcroft were significantly more likely to rate community involvement and support as important (78%) than those in Beverly Heights (58%).

1.0 STUDY BACKGROUND

The City of Edmonton, Office of Traffic Safety, conducted a Residential Speed Reduction Pilot Project in six (6)[7] Edmonton communities to test the impact of a lower residential speed limit on the level of traffic safety. Banister Research & Consulting Inc. was commissioned to conduct a random and representative telephone survey with citizens residing in the Pilot Project Communities in two phases – before project initiation (March, 2010) (pre-pilot) and following the end of the project in November, 2010 (post-pilot).

2.0 METHODOLOGY

All components of the project were designed and executed in close consultation with the City of Edmonton, Office of Traffic Safety (the client). A detailed description of each task of the project is outlined in the remainder of this section.

2.1 Project Initiations and Questionnaire Design

At the outset of the project, all background information relevant to the study was identified and subsequently reviewed by Banister Research. The consulting team familiarized itself with the objectives of the client ensuring a full understanding of the issues and concerns to be addressed in the project. The result of this task was an agreement on the research methodology, a detailed work plan and project initiation.

Following the initial meeting, the survey instruments for both phases were designed by Banister Research. Once the client reviewed the draft survey instruments, revisions were made and the questionnaires were finalized in consultation with the client. Copies of each of the final questionnaires are provided in Appendix A.

[7] Beverly Heights, King Edward Park, Woodcroft, Ottewell, Westridge/Wolf Willow, Twin Brooks

2.2 Survey Populations and Data Collection

Telephone interviews were conducted from March 25th to 31st, 2010 (pre-pilot), and from November 8th to 19th, 2010 (post-pilot) with residents, 18 years of age or older, from the six (6) Pilot Project Communities. Banister Research conducted 50 interviews per community for a total of 300 interviews (in both the pre- and post-pilot surveys). Overall results are accurate to within ±5.6% at the 95% confidence level (or 19 times out of 20) (both pre- and post-pilot surveys).

Community	Number of Households*	Number of Interviews (Pre-Pilot)	Number of Interviews (Post-Pilot)	Margin of Error per Phase
Beverly Heights	1,767	50	50	+/- 13.7%
King Edward Park	2,058	50	50	+/- 13.7%
Woodcroft	1,265	50	50	+/- 13.6%
Ottewell	2,612	50	50	+/- 13.7%
Westridge/Wolf Willow	485	50	50	+/- 13.1%
Twin Brooks	2,242	50	50	+/- 13.7%
Overall	**10,429**	**300**	**300**	**+/- 5.6%**

*Data obtained from the City of Edmonton website from the 2009 Municipal Census

The following table presents the results of the final call attempts for the post-pilot survey. Using the call summary standard established by the Market Research and Intelligence Association, there was a 22% response rate and a 68% refusal rate. It is important to note that the calculation used for both response and refusal rates is a conservative estimate and does not necessarily measure respondent interest in the subject area.

Summary of Final Call Attempts (Post-Pilot)

Call Classification:	Number of Calls:
Completed Interviews by Telephone	300
Busy/No answer/Answering machine/Respondents unavailable	456
Refusals/Disqualified	722
Fax/Modem/Business	34
Not-In-Service	101
Language barrier/Communication problem	29
Untouched Sample	28
Total	**1,670**

2.3 Data Analysis and Project Documentation

After the surveys were completed and verified, the lead consultant reviewed the list of different responses to each open-ended or verbatim question and then a code list was established. To ensure consistency of interpretation, the same team of coders was assigned to the project from start to finish. The coding supervisor verified at least 20% of each coder's work. Once the responses were fully coded and entered onto the data file, computer programs were written to check the data for quality and consistency.

Data analysis included cross-tabulation, whereby the frequency and percentage distribution of the results for each question were broken down based on respondent characteristics and responses (e.g. length of residency, demographics, etc.). Statistical analysis included a Z-test to determine if there were significant differences in responses between respondent subgroups. Results were reported as statistically significant at the 95% confidence level.

This report provides detailed findings for the Speed Management Post-Pilot Research, with comparisons to pre-pilot data where applicable.

3.0 STUDY FINDINGS

Results of the survey are presented as they relate to the specific topic areas addressed by the survey. The reader should note, when reading the report that the term significant refers to "statistical significance". It is important to note that any discrepancies between charts, graphs or tables are due to rounding of the numbers.

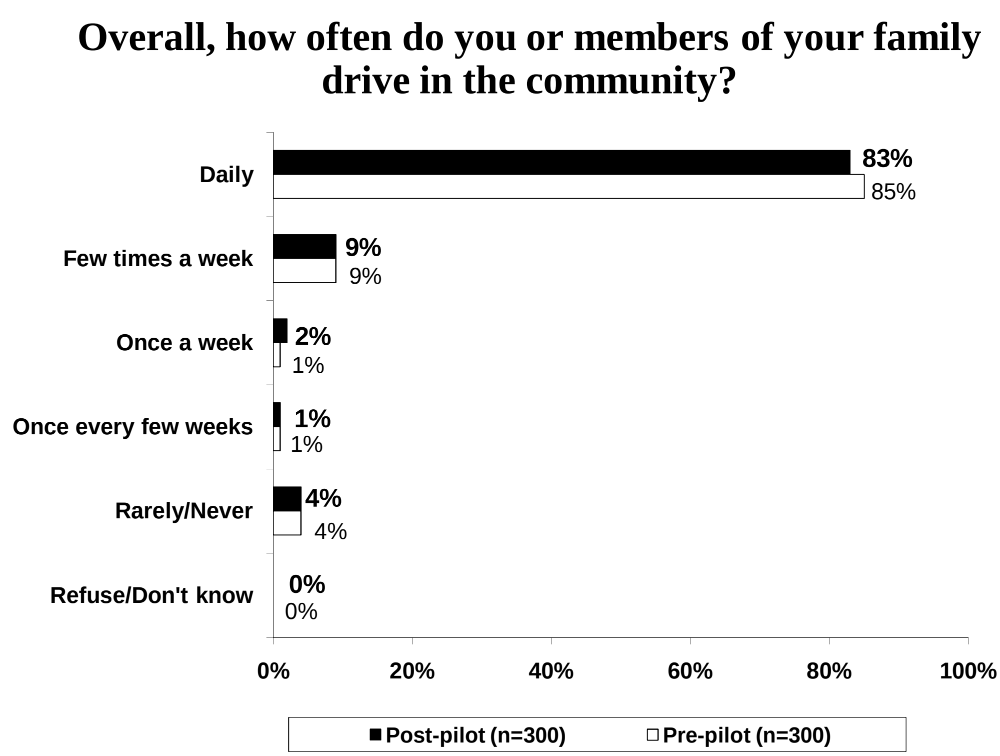
3.1 Overall Analysis

This section provides the overall results of the post-pilot survey, with comparisons to pre-pilot data, where applicable.

3.1.1 Current Habits and Concerns

To begin the survey, respondents were asked to identify how often they, or a member of their family, drive in their community. Overall, respondents most frequently stated they drive in their community daily (83%), 9% stated that someone in the household drove in the community a few times a week, followed by 4% who stated that a member of the household drove rarely or never. See Figure 1, below.

Figure 1



Respondent subgroups significantly more likely to state that **they or someone in their family drove daily** included:

- Male respondents (89% versus 79% of female respondents);
- Respondents that reside in Ottewell, Twin Brooks, or Westridge / Wolf Willow (88% to 96% versus 72% of respondents that reside in Woodcroft);
- Respondents aged 35 to 54 (94% versus 75% of respondents aged 55 or older);
- Respondents that are married (90% versus 68% of respondents that are not married);
- Respondents that are employed (94% versus 70% of respondents that are not employed);
- Respondents that own their home (86% versus 66% of respondents that rent their home); and
- Respondents with a household income of $50,000 or more (86% to 100% versus 63% of respondents with a household income of less than $50,000).

Respondent subgroups significantly more likely to state that **they or someone in their family drove a few times a week** included:

- Respondents that reside in King Edward Park or Woodcroft (14% versus 2% of respondents that reside in Westridge / Wolf Willow);
- Respondents aged 55 or older (14% versus 5% of respondents aged 35 to 54); and
- Respondents that are not employed (17% versus 3% of respondents that are employed).

Respondent subgroups significantly more likely to state that **they or someone in their family drove once a week** included:

- Respondents that are not employed (5% versus 1% of respondents that are employed); and
- Respondents that rent their home (8% versus 2% of respondents that own their home).

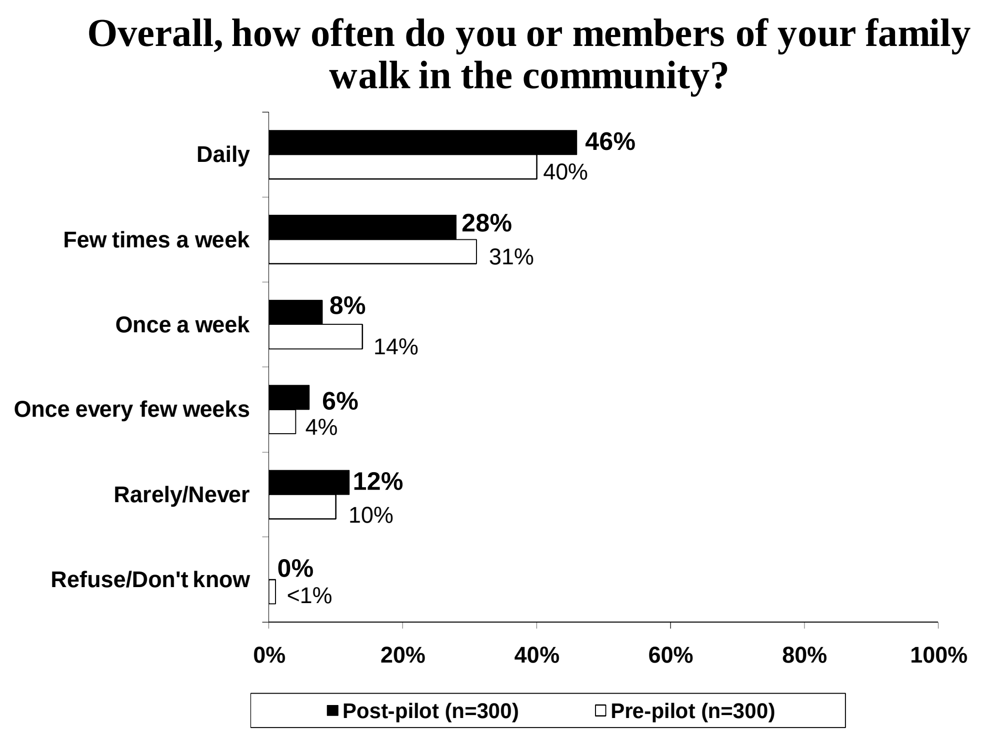
Respondent subgroups significantly more likely to state that **they or someone in their family rarely or never drove** included:

- Respondents that are not married (14% versus 1% of respondents that are married);

- Respondents that are not employed (8% versus 2% of respondents that are employed);
- Respondents that rent their home (13% versus 3% of respondents that own their home); and
- Respondents with a household income of less than $50,000 (11% versus 3% of respondents with a household income of $50,000 to less than $100,000).

Next, respondents were asked to identify how often they, or a member of their family, walk in their community. Close to half (46%) of respondents stated that someone in their family walked daily, followed by 28% that walked a few times a week and 12% that walked rarely or never. See Figure 2, below.

Figure 2



Respondent subgroups significantly <u>more likely</u> to state that **they or someone in their family walked daily** included:

- Respondents that reside in Beverly Heights, King Edward Park, Ottewell, Westridge / Wolf Willow, or Woodcroft (44% to 58% versus 24% of respondents that reside in Twin Brooks); and

- Respondents aged 35 to 54 (54% versus 41% of respondents aged 55 or older).

Respondent subgroups significantly more likely to state that **they or someone in their family walked once a week** included:

- Respondents that have lived in the community for 10 years or less (14% versus 5% of respondents that have lived in the community for more than 10 years); and
- Respondents that are employed (12% versus 4% of respondents that are not employed); and
- Respondents with a household income of $100,000 to less than $150,000 (14% versus 3% of respondents with a household income of less than $50,000).

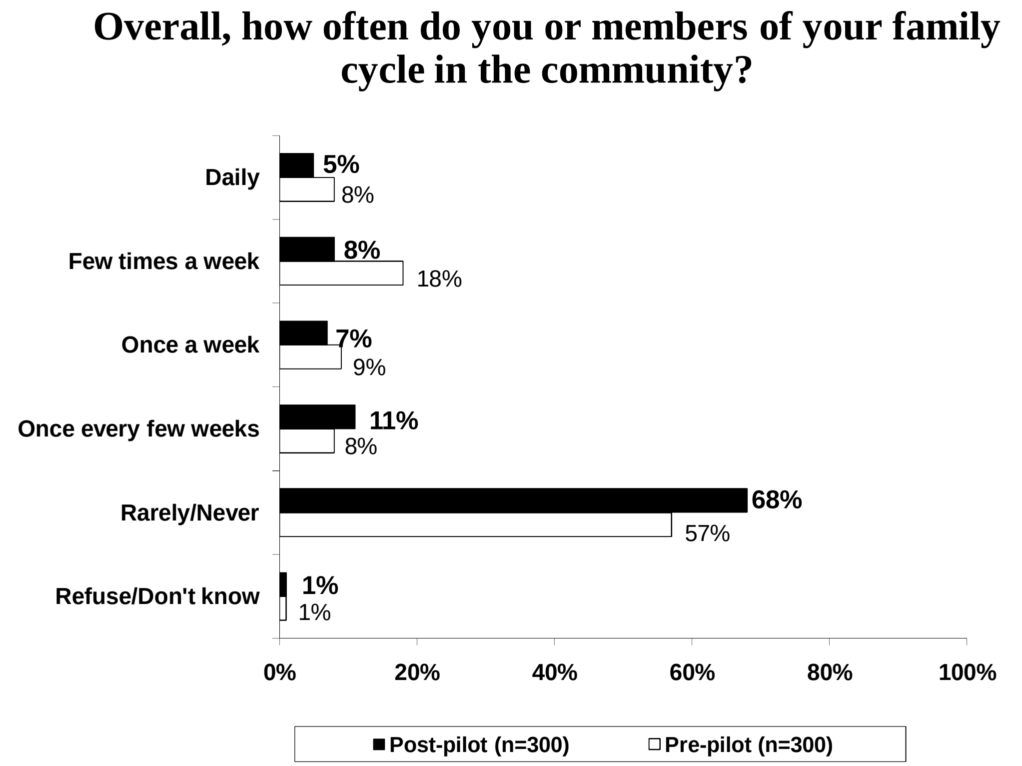
Respondents that reside in Twin Brooks were significantly more likely to state that **they or someone in their family walked once every few weeks** (16% versus 2% to 4% of respondents that reside in Ottewell, Westridge / Wolf Willow, or Woodcroft).

Respondent subgroups significantly more likely to state that **they or someone in their family rarely or never walked** included:

- Respondents aged 55 or older (17% versus 7% of respondents aged 35 to 54);
- Respondents that are not married (20% versus 8% of respondents that are married);
- Respondents that are not employed (18% versus 6% of respondents that are employed); and
- Respondents with a household income of less than $50,000 (21% versus 6% to 8% of respondents with a household income of $50,000 or more).

Approximately two-thirds (68%) of respondents stated that someone in their family cycled rarely or never (a significant increase from 57% in the pre-pilot), followed by 11% that cycled once every few weeks and 8% that cycled a few times a week (a significant decrease from 18% in the pre-pilot). See Figure 3, below.

Figure 3



Respondent subgroups significantly more likely to state that **they or someone in their family cycled a few times a week** included:

- Respondents that reside in Westridge / Wolf Willow (14% versus 2% of respondents that reside in Beverly Heights);
- Respondents aged 35 to 54 (14% versus 4% of respondents aged 55 or older);
- Respondents that are employed (12% versus 5% of respondents that are not employed); and
- Respondents with a household income of $100,000 to less than $150,000 (20% versus 5% to 8% of respondents with a household income of less than $100,000 or $150,000 or more).

Respondent subgroups significantly more likely to state that **they or someone in their family cycled once a week** included:

- Respondents that reside in Ottewell (14% versus 2% of respondents that reside in Twin Brooks);

- Respondents that have lived in the community for 10 years or less (13% versus 4% of respondents that have lived in the community for more than 10 years);
- Respondents aged 35 to 54 (11% versus 4% of respondents aged 55 and older); and
- Respondents that are married (9% versus 2% of respondents that are not married).

Respondent subgroups significantly more likely to state that **they or someone in their family cycled once every few weeks included:**

- Respondents aged 35 to 54 (17% versus 6% of respondents aged 55 or older);
- Respondents that are married (14% versus 3% of respondents that are not married); and
- Respondents that are employed (14% versus 6% of respondents that are not employed).

Respondent subgroups significantly more likely to state that **they or someone in their family rarely or never cycled** included:

- Female respondents (75% versus 58% of male respondents);
- Respondents that felt reducing speed limits would be effective (3 to 5 out of 5) in improving traffic safety (71% versus 60% of respondents that felt reducing speed limits would be ineffective);
- Respondents aged 55 or older (80% versus 51% of respondents aged 35 to 54);
- Respondents that are not married (83% versus 60% of respondents that are married);
- Respondents that are not employed (77% versus 60% of respondents that are employed);
- Respondents that rent their home (84% versus 65% of respondents that own their home); and
- Respondents with a household income of less than $100,000 (67% to 76% versus 48% of respondents with a household income of $100,000 to less than $150,000).

For detailed results see Table 1, below.

Table 1

How often do you or members of your family …. ?												
	Percent of Respondents (n=300)											
	Daily		Few Times a Week		Once a Week		Once Every Few Weeks		Rarely / Never		Refuse/ Don't Know	
	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot
Drive in the community	83	85	9	9	2	1	1	1	4	4	--	--
Walk in the community	46	40	28	31	8	14	6	4	12	10	--	<1
Cycle in the community	5	8	8	18	7	9	11	8	68	57	1	1

Respondents were asked if they used any other methods of transportation. Twenty-nine percent (29%) stated they also used public transit, while 9% used no other forms of transportation. See Table 2, below.

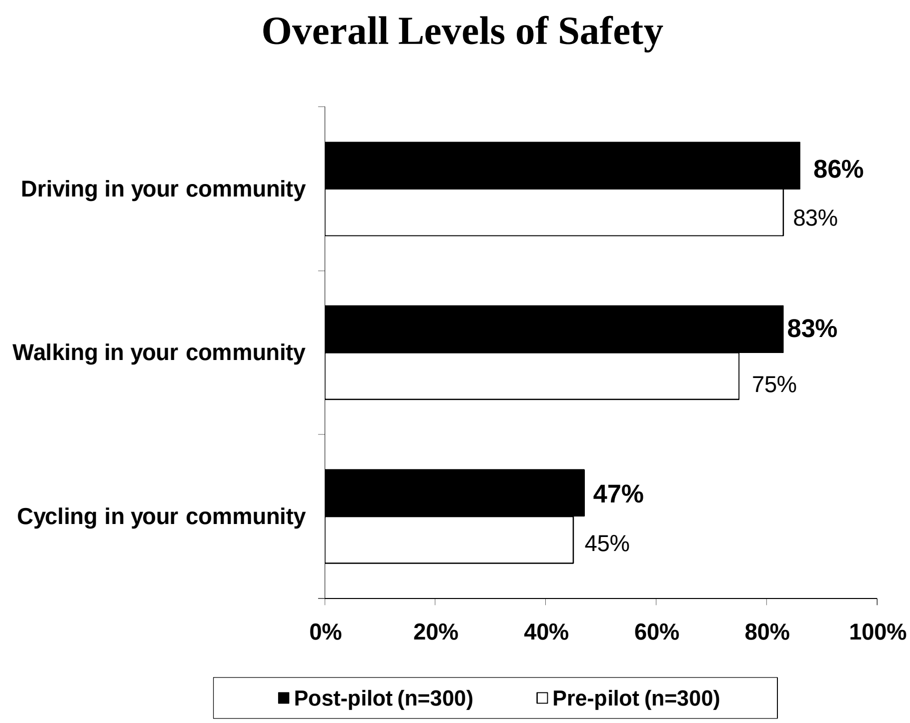
Table 2

Other Methods of Travel		
	Percent of Respondents*	
	Post-Pilot (n=300)	Pre-Pilot (n=300)
Public Transit (ETS)	29	28
DATS	<1	1
Skateboard	<1	<1
Taxi	<1	1
Chauffeur	<1	--
Unicycle	--	1
Scooter	--	1
Inline skating	--	1
None	9	9

*Multiple Responses

Respondents were then asked to rate their level of safety while using the different modes of transportation within their community. As indicated in Figure 4, below, respondents were most likely to indicate they felt safe (4 or 5 out of 5) driving in their community (86%), followed by walking in their community (83%) (a significant increase from 75% in the pre-pilot) and cycling in their community (47%).

Figure 4



Base: Respondents that selected 4 or 5 out of 5

Table 3

How safe do you feel…?														
	Percent of Respondents (n=300)												Mean	
	Very Unsafe (1)		(2)		(3)		(4)		Very Safe (5)		Refuse/ Don't Know			
	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot
Driving in your community	1	<1	2	2	7	11	29	37	57	46	3	4	4.44	4.31
Walking in your community	1	2	4	6	11	16	26	35	57	40	1	1	4.35	4.05
Cycling in your community	2	1	3	5	14	12	17	24	30	21	34	38	4.07	3.96

Respondents that reside in King Edward Park, Ottewell, Twin Brooks, or Westridge / Wolf Willow were significantly more likely to indicate they **feel safe (4 or 5 out of 5) walking in their community** (84% to 94% versus 60% of respondents that reside in Beverly Heights).

Respondent subgroups significantly more likely to indicate they **feel safe (4 or 5 out of 5) cycling in their community** included:

- Respondents that reside in Twin Brooks (64% versus 38% to 40% of respondents that reside in Beverly Heights or King Edward Park);
- Respondents aged 35 to 54 (62% versus 35% of respondents aged 55 or older);
- Respondents that are married (53% versus 33% of respondents that are not married);
- Respondents that are employed (55% versus 37% of respondents that are not employed); and
- Respondents with a household income of $100,000 or more (53% to 60% versus 34% of those with a household income of less than $50,000).

Respondent subgroups significantly more likely to indicate they **feel safe (4 or 5 out of 5) driving in their community** included:

- Respondents that reside in Ottewell or Westridge / Wolf Willow (94% to 98% versus 80% of respondents that reside in King Edward Park);
- Respondents that have lived in the community for more than 10 years (90% versus 79% of respondents that have lived in the community for 10 years or less);
- Respondents that are married (90% versus 79% of respondents that are not married);
- Respondents that own their home (88% versus 71% of respondents that rent their home); and
- Respondents with a household income of $50,000 or more (89% to 92% versus 73% of those with a household income of less than $50,000).

Respondents who felt unsafe (1 or 2 out of 5) walking in their community (n=16) were then asked to state why they felt that way. Four respondents (n=4) each stated that the traffic moves too fast and that there are too many speeders, or they are concerned about the crime and lack of police presence in the community. See Table 4, below.

Table 4

Why do you feel that way?		
Base: Respondents that feel unsafe (1 or 2 out of 5) walking in their community	**Number of Respondents***	
	Post-Pilot (n=16)**	**Pre-Pilot (n=24)****
Traffic is going too fast / too many speeders	4	7
Concerned about crime in the community / lack of police presence	4	5
Traffic is heavy / high volume traffic on the streets	2	3
Feels intersections / 4-way stops in community are unsafe	2	--
Sidewalks are unsafe / fell on sidewalks because of poor maintenance	1	3
Concerned about traffic in alleys (traffic in alleys goes too fast)	--	2
Other (single mentions)	7	12
Don't know / not stated	1	--

*Multiple Responses
** Caution should be exercised when interpreting results due to the small sample sizes

Respondents who felt unsafe (1 or 2 out of 5) cycling in their community (n=15) were asked to state why. Five respondents (n=5) stated that they dislike cycling in traffic and that motorists ignore cyclists. See Table 5, below.

Table 5

Why do you feel that way?		
Base: Respondents that feel unsafe (1 or 2 out of 5) cycling in their community	**Number of Respondents***	
	Post-Pilot (n=15)**	**Pre-Pilot (n=17)****
Dislikes cycling in traffic / motorists don't respect cyclists space / pay attention to cyclists	5	4
Traffic is heavy in community	2	3
Lack of bike paths / trails in communities	2	3
Too many bikes get stolen in the community	2	--
Roads aren't wide enough to cycle on due to parked cars	2	--
Traffic is going too fast / too many speeders	--	7
Is unable to cycle on sidewalk / have to cycle on the road	--	2
Other (single mentions)	4	4

*Multiple Responses
**Caution should be exercised when interpreting results due to the small sample sizes

Respondents who felt unsafe (1 or 2 out of 5) driving in their community (n=10) were asked to state why. Five respondents (n=5) stated that the traffic moves too fast or that there are too many speeders. Three respondents (n=3) each stated that people are distracted while driving and that they do not stop at street lights or signs. See Table 6, below.

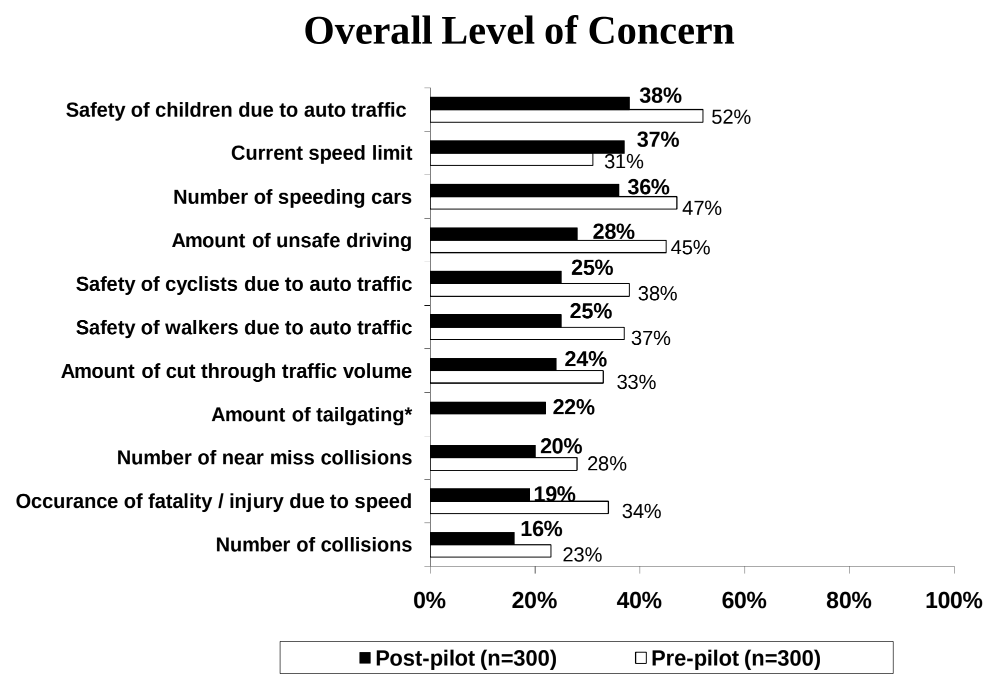
Table 6

Why do you feel that way?		
Base: Respondents that feel unsafe (1 or 2 out of 5) driving in their community	**Number of Respondents***	
	Post-Pilot (n=10)**	**Pre-Pilot (n=7)****
Traffic goes too fast / too many speeders	5	3
People are distracted while driving / do not pay attention	3	--
People do not stop at stop signs / street lights	3	--
Cars parked on both side of the street narrowing the street	1	2
Too many drivers tailgate other drivers	1	--
Poor visibility at street corners	1	--
Few accidents (unspecified)	1	--
Other (single mentions)	--	6

*Multiple Responses
**Caution should be exercised when interpreting results due to the small sample sizes

Respondents were asked to rate their level of concern with a number of factors. As indicated in Figure 5, below, respondents were most frequently concerned (4 or 5 out of 5) with the safety of children due to traffic (38%), the current speed limit (37%), and the number of speeding cars (36%). When comparing the pre-pilot to the post-pilot results, all factors were of less concern in the post-pilot (decreases ranging from 7% to 15%), except the level of concern about the speed limit increased by 6%. For complete results, see Table 7, on the following page.

Figure 5



*Not asked in pre-pilot
**Respondents that rated their concern as 4 or 5 out of 5

Table 7

Level of Concern														
	Percent of Respondents (n=300)													
	Not at all Concerned (1)		(2)		(3)		(4)		Very Concerned (5)		Refuse/ Don't Know		Mean	
Overall	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot
Safety of children due to auto traffic in your community	22	10	16	17	22	19	18	23	20	29	2	2	2.97	3.46
Number of speeding cars in your community	26	11	17	19	20	23	16	20	20	26	1	<1	2.88	3.32
Current speed limit in your community	33	35	12	15	17	16	14	11	23	20	1	2	2.81	2.65
Amount of unsafe driving in your community	23	12	22	18	25	23	14	25	14	20	2	2	2.72	3.22
Safety of cyclists due to auto traffic in your community	29	16	15	16	24	25	16	22	10	16	7	5	2.60	3.07
Safety of walkers due to auto traffic in your community	36	23	20	19	18	20	15	19	10	18	1	1	2.43	2.91
Amount of cut-through traffic volume in your community	41	32	15	19	17	11	12	11	11	22	4	4	2.36	2.70
Amount of tailgating occurring in your community	39	n/a	20	n/a	17	n/a	12	n/a	10	n/a	3	n/a	2.32	n/a
Occurrence of fatality or injury caused by high speed in your community	41	29	17	15	18	17	6	13	13	21	5	5	2.29	2.82
Number of near misses in your community	38	24	20	21	17	19	11	18	9	10	6	8	2.29	2.67
Number of collisions in your community	47	29	20	23	15	19	11	12	6	12	3	6	2.07	2.52

Respondent subgroups significantly more likely to indicate they **are concerned (4 or 5 out of 5) with the number of speeding cars** included:

- Respondents that reside in King Edward Park (46% versus 26% of respondents that reside in Westridge / Wolf Willow);
- Respondents aged 35 to 54 (43% versus 30% of respondents aged 55 or older); and
- Respondents that are married (41% versus 26% of respondents that are not married).

Respondent subgroups significantly more likely to indicate they **are concerned (4 or 5 out of 5) with the current speed limit** included:

- Respondents that reside in Beverly Heights, Ottewell, Twin Brooks, or Westridge / Wolf Willow (36% to 50% versus 16% of respondents that reside in Woodcroft);
- Respondents that have lived in the community for more than 10 years (42% versus 29% of respondents that have lived in the community for less than 10 years);
- Respondents that indicated reducing the speed limit in communities would be ineffective (1 or 2 out of 5) in improving traffic safety (57% versus 26% of respondents that indicated reducing the speed would be effective);
- Respondents that indicated the pilot project would be ineffective (1 or 2 out of 5) in improving traffic safety (59% versus 29% of respondents that indicated the pilot project would be effective); and
- Respondents that are married (40% versus 26% of respondents that are not married).

Respondent subgroups significantly more likely to indicate they **are concerned (4 or 5 out of 5) with the occurrence of fatality or injury caused by high speed** included:

- Respondents that reside in Beverly Heights, King Edward Park, or Woodcroft (26% to 28% versus 6% of respondents that reside in Westridge / Wolf Willow); and
- Respondents that indicated the pilot project would be effective (3 to 5 out of 5) in improving traffic safety (22% versus 10% of respondents that indicated the pilot project would be ineffective).

Respondent subgroups significantly more likely to indicate they **are concerned (4 or 5 out of 5) with the safety of walkers** included:

- Respondents that reside in King Edward Park, Ottewell, or Woodcroft (28% to 36% versus 12% of respondents in Westridge / Wolf Willow);
- Respondents that have lived in their community for 10 years or less (33% versus 20% of respondents that have lived in their community for more than 10 years); and
- Respondents that rent their home (40% versus 23% of respondents that own their home).

Respondent subgroups significantly more likely to indicate they **are concerned (4 or 5 out of 5) with the safety of cyclists due to auto traffic** included:

- Respondents that reside in Beverly Heights, King Edward Park, Ottewell, and Woodcroft (26% to 40% versus 10% of respondents that reside in Westridge / Wolf Willow);
- Respondents that indicated the pilot project would be effective (3 to 5 out of 5) in improving traffic safety (29% versus 16% of respondents that indicated the pilot project would be ineffective); and
- Respondents that rent their home (40% versus 23% of respondents that own their home).

Respondent subgroups significantly more likely to indicate they **are concerned (4 or 5 out of 5) with the safety of children due to auto traffic** included:

- Respondents that reside in King Edward Park or Woodcroft (44% to 46% versus 24% of respondents that reside in Westridge / Wolf Willow);
- Respondents that have lived in the community for 10 years or less (46% versus 34% of respondents that have lived in the community for more than 10 years); and
- Respondents that indicated the pilot project would be effective (3 to 5 out of 5) in improving traffic safety (42% versus 27% of respondents that indicated the pilot project would be ineffective).

Respondent subgroups significantly more likely to indicate they **are concerned (4 or 5 out of 5) with the amount of cut-through traffic volume** included:

- Respondents that reside in King Edward Park, Ottewell, or Woodcroft (30% to 36% versus 8% of respondents that reside in Westridge / Wolf Willow); and
- Respondents aged 35 to 54 (32% versus 20% of respondents aged 55 or older).

Respondent subgroups significantly <u>more likely</u> to indicate they **are concerned (4 or 5 out of 5) with the number of collisions** included:

- Respondents that reside in Beverly Heights, King Edward Park, or Woodcroft (22% to 24% versus 8% of respondents that reside in Twin Brooks or Westridge / Wolf Willow);
- Respondents that indicated reducing the speed limit would be effective (3 to 5 out of 5) in improving traffic safety (21% versus 9% of respondents that indicated reducing the speed would be ineffective); and
- Respondents with a household income of less than $50,000 (26% versus 11% of respondents with a household income of $50,000 to less than $100,000).

Respondent subgroups significantly <u>more likely</u> to indicate they **are concerned (4 or 5 out of 5) with the number of near miss collisions** included:

- Respondents that reside in Beverly Heights, King Edward Park, or Woodcroft (22% to 36% versus 8% of respondents that reside in Westridge or Wolf Willow);
- Respondents that have lived in the community for 10 years or less (27% versus 16% of respondents that have lived in the community for more than 10 years); and
- Respondents that rent their home (37% versus 18% of respondents that own their home).

Respondent subgroups significantly <u>more likely</u> to indicate they **are concerned (4 or 5 out of 5) with the amount of tailgating** included:

- Respondents that reside in Beverly Heights, King Edward Park, Ottewell, Twin Brooks, or Woodcroft (20% to 38% versus 4% of respondents that reside in Westridge / Wolf Willow); and
- Respondents that have lived in the community for 10 years or less (29% versus 18% of respondents that have lived in the community for more than 10 years).

Respondent subgroups significantly <u>more likely</u> to indicate they **are concerned (4 or 5 out of 5) with the amount of unsafe driving** included:

- Respondents that reside in Beverly Heights, King Edward Park, or Woodcroft (34% to 42% versus 10% of respondents that reside in Westridge / Wolf Willow);

- Respondents that rent their home (42% versus 26% of respondents that own their home); and
- Respondents with a household income of less than $50,000 (40% versus 29% of respondents with a household income of $150,000 or more).

Respondents were given the opportunity to detail any additional concerns they had related to traffic in their community. While 57% did not have any other concerns, 10% of respondents indicated they disliked that the speed limit was reduced and would like it changed back to 50 km/hr. See Table 8, below.

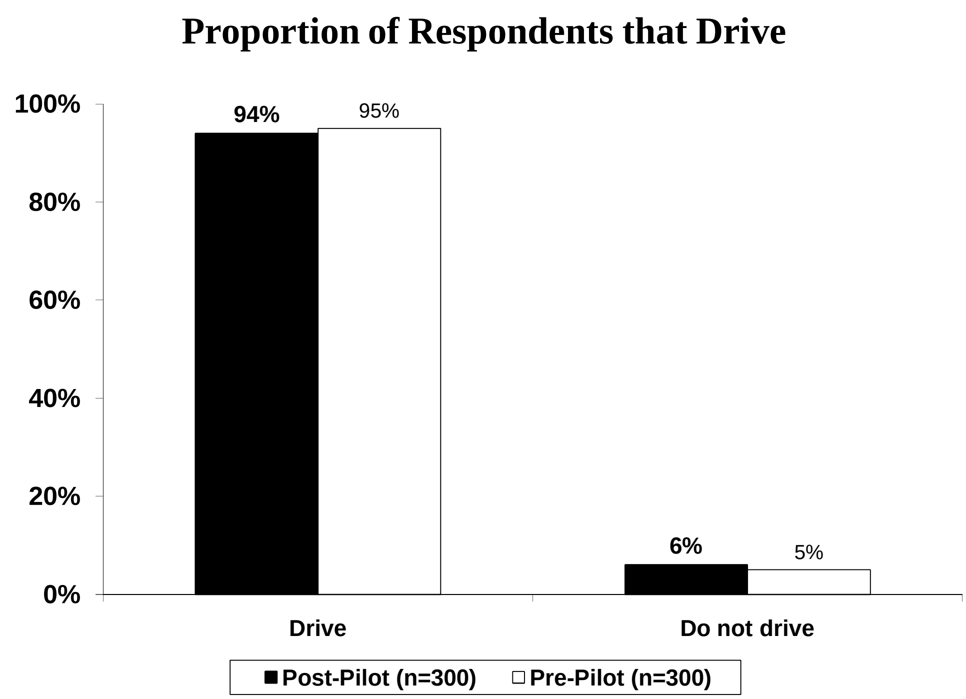
Table 8

Do you have any other concerns relating to traffic in your community?		
Overall	**Percent of Respondents* (n=300)**	
	Post-Pilot	**Pre-Pilot**
Dislikes that speed limit was changed to 40km / new speed limit causes problems / change it back to 50km/hr	10	--
Speeders / people drive too fast/need consequences / lower speed limit	7	9
Traffic is heavy / high volume of traffic on streets	5	1
Dislike that people disobey stop signs	3	2
Illegal parking / parking on both sides of the road obstructs traffic	2	3
Concerned with the amount of buses going through / speeding	2	1
Traffic laws near playgrounds / schools need better enforcement	2	2
Concerned about noisy vehicles / engines are too loud	--	3
Crosswalk safety (better marked / driver's watching at cross walks)	--	2
Poor summer road maintenance (including sidewalks)	--	2
Drivers going too fast through alleys / use it like a road	--	2
Dislikes that speed limit was changed to 40km	--	2
Other (less than 2% of respondents)	24	21
No	57	61

*Multiple Responses

Respondents were asked to indicate whether or not they drove. Ninety-four (94%) percent of respondents indicated they did, while 6% did not. See Figure 6, below.

Figure 6



Respondent subgroups significantly <u>more likely</u> to **state that they drive** included:

- Respondents that reside in Ottewell or Westridge / Wolf Willow (98% versus 86% of respondents that reside in Woodcroft);
- Respondents aged 35 to 54 (98% versus 91% of respondents aged 55 or older);
- Respondents that are married (99% versus 85% of respondents that are not married);
- Respondents that are employed (98% versus 89% of respondents that are unemployed);
- Respondents that own their home (97% versus 79% of respondents that rent their home); and
- Respondents with a household income of $50,000 or more (96% to 100% versus 82% of respondents with a household income of less than $50,000).

Respondents that drove (n=282) were asked, considering their driving in the past 6 months, how often they drive at various speeds. Respondents were most likely to indicate they rarely or never drive under the speed limit (44%), up to 5 km/hr over the speed limit (42%), up to 6 to 10 km/hr over the limit (79%), and more than 10 km/hr over the limit (95%). The majority (81%) stated that they drive right on the speed limit daily (81%). See Table 9, below.

Table 9

How often do you drive at the following speeds in your community?												
Overall: Respondents that drive (n=284 Pre-Pilot; n=282 Post-Pilot)	**Percent of Respondents**											
	Daily		**Few Times a Week**		**Once a Week**		**Once Every Few Weeks**		**Rarely / Never**		**Refuse/ Don't Know**	
	Post-Pilot	**Pre-Pilot**	**Post-Pilot**	**Pre-Pilot**	**Post-Pilot**	**Pre-Pilot**	**Post-Pilot**	**Pre-Pilot**	**Post-Pilot**	**Pre-Pilot**	**Post-Pilot**	**Pre-Pilot**
Under the speed limit	36	57	13	17	5	4	3	3	44	18	--	2
Right on the speed limit	81	64	11	17	3	4	1	3	4	12	<1	1
Up to 5km/hr over the speed limit	18	14	19	17	13	8	7	5	42	56	1	1
6 to 10km/hr over the speed limit	3	3	6	2	7	4	4	4	79	87	1	1
More than 10km/hr over the speed limit	<1	<1	1	2	1	1	1	1	95	95	1	<1

Male respondents were significantly more likely to **indicate they drive under the speed limit daily** (44% versus 29% of female respondents).

Respondents that reside in Ottewell were significantly more likely to **indicate they drive under the speed limit a few times a week** (27% versus 11% of respondents that reside in King Edward Park).

Respondents that rent their home were significantly more likely to **indicate they drive under the speed limit once a week** (17% versus 4% of respondents that own their home).

Respondents that have lived in the community for 10 years or less were significantly more likely to **indicate they drive under the speed limit once every few weeks** (5% versus 1% of respondents that have lived in the community for more than 10 years).

Respondent subgroups significantly <u>more likely</u> to **indicate they rarely or never drive under the speed limit** included:

- Female respondents (49% versus 37% of male respondents);
- Respondents that reside in Twin Brooks or Westridge / Wolf Willow (50% to 67% versus 29% of respondents that reside in Ottewell); and
- Respondents that felt reducing traffic speed to improve safety would be ineffective (1 or 2 out of 5) (53% versus 38% that felt reducing traffic speed would be effective).

Respondents that reside in Ottewell or Twin Brooks were significantly <u>more likely</u> to **indicate they drive right on the speed limit daily** (88% to 90% versus 70% to 72% of respondents that reside in Beverly Heights or King Edward Park).

Respondents that reside in Beverly Heights or King Edward Park were significantly <u>more likely</u> to **indicate they drive right on the speed limit a few times a week** (19% to 20% versus 4% of respondents that reside in Twin Brooks).

Respondent subgroups significantly <u>more likely</u> to **indicate they rarely or never drive right on the speed limit** included:

- Respondents that have lived in the community for 10 years or less (7% versus 2% of respondents that have lived in the community for more than 10 years); and
- Respondents that rent their home (10% versus 3% of respondents that own their home).

Respondent subgroups significantly <u>more likely</u> to **indicate they drive up to 5 km/hr over the speed limit daily** included:

- Respondents that have lived in the community for 10 years or less (26% versus 14% of respondents that have lived in their community for more than 10 years);
- Respondents that are married (22% versus 10% of respondents that are not married); and
- Respondents that are employed (23% versus 13% of respondents that are unemployed).

Respondents that reside in Beverly Heights were significantly more likely to **indicate they drive up to 5 km/hr over the speed limit a few times a week** (26% versus 9% of respondents that reside in Woodcroft).

Respondents that reside in Twin Brooks were significantly more likely to **indicate they drive up to 5 km/hr over the speed limit once a week** (23% versus 7% to 8% of respondents that reside in Beverly Heights or Westridge / Wolf Willow).

Respondents that are unemployed were significantly more likely to **indicate they drive up to 5 km/hr over the speed limit once every few weeks** (11% versus 5% of respondents that are employed).

Respondent subgroups significantly more likely to **indicate they rarely or never drive up to 5 km/hr over the speed limit** included:

- Respondents that reside in Ottewell or Woodcroft (51% to 54% versus 28% to 31% of respondents that reside in Twin Brooks or Beverly Heights);
- Respondents aged 55 or older (49% versus 36% of respondents aged 35 to 54);
- Respondents that are unemployed (51% versus 35% of respondents that are employed); and
- Respondents that rent their home (67% versus 39% of respondents that own their home).

Respondent subgroups significantly more likely to **indicate they drive 6 to 10 km/hr over the speed limit daily** included:

- Male respondents (6% versus 1% of female respondents); and
- Respondents that are employed (5% versus 1% of respondents that are unemployed).

Respondent subgroups significantly more likely to **indicate they drive 6 to 10 km/hr over the speed limit a few times a week** included:

- Respondents that felt reducing speed limits to improve traffic safety was ineffective (1 or 2 out of 5) (10% versus 3% of respondents that felt reducing speed limits was effective);

- Respondents that felt the pilot project would be ineffective (1 or 2 out of 5) at improving traffic safety (14% versus 3% of respondents that felt the pilot project would be effective); and
- Respondents that are employed (9% versus 2% of respondents that are unemployed).

Respondents that are employed were significantly <u>more likely</u> to **indicate they drive 6 to 10 km/hr over the speed limit once a week** (10% versus 3% of respondents that are unemployed).

Respondents aged 35 to 54 were significantly <u>more likely</u> to **indicate they drive 6 to 10 km/hr over the speed limit once every few weeks** (8% versus 1% of respondents aged 55 and older).

Respondent subgroups significantly <u>more likely</u> to **indicate they rarely or never drive 6 to 10 km/hr over the speed limit** included:

- Respondents that reside in King Edward Park or Woodcroft (87% to 88% versus 67% of respondents that reside in Westridge / Wolf Willow);
- Respondents that felt reducing speed limits to improve traffic safety was effective (3 to 5 out of 5) (83% versus 73% of respondents that felt reducing speed limits was ineffective);
- Respondents that felt the pilot project would be effective (3 to 5 out of 5) at improving traffic safety (82% versus 70% of respondents that felt the pilot project would be ineffective);
- Respondents aged 55 or older (88% versus 67% of respondents aged 35 to 54);
- Respondents that are unemployed (92% versus 70% of respondents that are employed); and
- Respondents with a household income of less than $100,000 (84% to 86% versus 69% of respondents with a household income of $150,000 or more).

Respondents aged 55 and older were significantly <u>more likely</u> to **indicate they never or rarely drive more than 10 km/hr over the speed limit** (99% versus 93% of respondents aged 35 to 54).

When respondents were asked if they were aware of the current speed limit in their community, the vast majority (98%) of respondents were aware that the speed limit was 40 km/hr. This represents a significant increase from 80% of respondents that were aware the speed limit was 50 km/hr in the pre-pilot. One percent (1%) of respondents were unaware of the current speed limit. See Table 10, below.

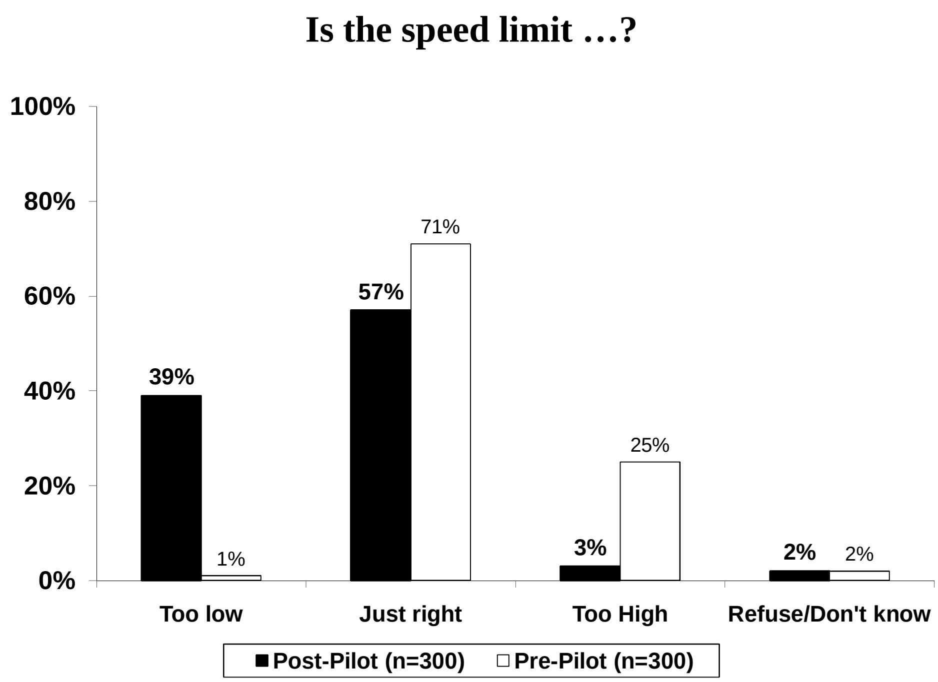
Table 10

Are you aware of the current speed limit in your community?		
	Percent of Respondents (n=300)	
	Post-Pilot	**Pre-Pilot**
40km/hr	98	4
60km/hr	1	4
20km/hr	<1	--
50 km/hr	--	80
35km/hr	--	<1
30km/hr	--	4
No/Not aware	1	6
Refuse, Don't know	--	1

Respondents that reside in King Edward Park, Ottewell, and Westridge / Wolf Willow were significantly more likely to indicate they **are aware the current speed limit is 40 km/hr** (100% versus 92% of respondents that reside in Beverly Heights).

Respondents were also asked, in their opinion, if the speed limit was too high, too low or just right. As indicated in Figure 7, below, more than half of respondents (57%) stated it was just right (a significant decline from 71% in the pre-pilot). Thirty-nine percent (39%) of respondents felt that the speed limit was too low (a significant increase from 1% in the pre-pilot) and 3% indicated it was too high (a significant decrease from 25% in the pre-pilot).

Figure 7



Respondent subgroups significantly more likely to **believe that the current speed limit is too low** included:

- Respondents that reside in Beverly Heights, Twin Brooks, or Westridge / Wolf Willow (42% to 58% versus 18% of respondents that reside in Woodcroft);
- Respondents that felt reducing speed limits would be ineffective (1 or 2 out of 5) in improving traffic safety (69% versus 22% of respondents that felt reducing speed limits would be effective);
- Respondents that felt the pilot project would be ineffective (1 or 2 out of 5) at improving traffic safety (79% versus 26% of respondents that felt the pilot project would be effective);
- Respondents that are married (42% versus 29% of respondents that are not married);
- Respondents that own their home (40% versus 21% of respondents that rent their home); and
- Respondents with a household income of $100,000 to less than $150,000 (50% versus 29% to 31% of respondents with a household income of less than $100,000).

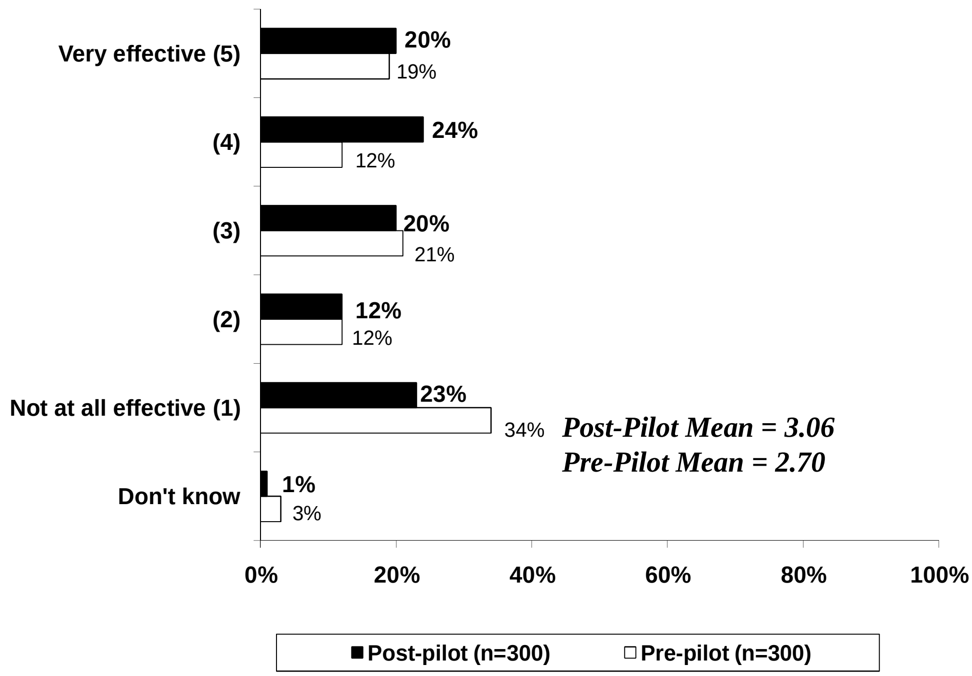
Respondent subgroups significantly <u>more likely</u> to **believe that the current speed limit is just right** included:

- Respondents that reside in King Edward Park, Ottewell, or Woodcroft (62% to 74% versus 42% of respondents that reside in Westridge / Wolf Willow);
- Respondents that felt reducing speed limits would be effective (3 to 5 out of 5) in improving traffic safety (73% versus 26% of respondents that felt reducing speed limits would be ineffective);
- Respondents that felt the pilot project would be effective (3 to 5 out of 5) at improving traffic safety (69% versus 17% of respondents that felt the pilot project would be ineffective); and
- Respondents with a household income of $50,000 to less than $100,000 (67% versus 48% of respondents with a household income of $100,000 to less than $150,000).

Respondents were asked to rate the effectiveness of reducing the speed limit from 50 km/hr to 40 km/hr in improving traffic safety in their community. Forty-four percent (44%) of respondents indicated they thought the reduction in speed limit was effective (4 or 5 out of 5), while 35% believe the reduction would be less effective (1 or 2 out of 5). This represents a significant increase of respondents who rated the reduction as effective (31% in the pre-pilot) and a significant decrease in those who rated it as ineffective (46% in the pre-pilot). See Figure 8, below.

Figure 8

Effectiveness of Reducing the Speed Limit



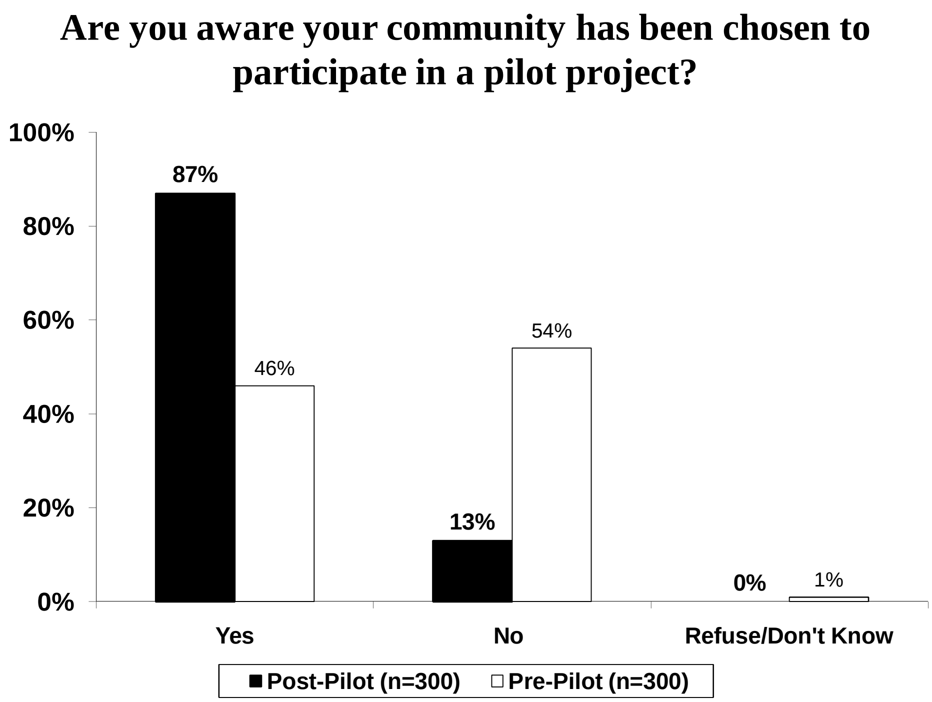
Respondent subgroups significantly <u>more likely</u> to indicate **reducing the speed limit will be effective (4 or 5 out of 5)** included:

- Respondents that reside in Ottewell (54% versus 34% of respondents that reside in King Edward Park);
- Respondents that felt the pilot project would be effective (3 to 5 out of 5) at improving traffic safety (58% versus 4% of respondents that felt the pilot project would be ineffective); and
- Respondents that are unemployed (52% versus 38% of respondents that are employed).

3.1.2 Pilot Project

Respondents were asked if they were aware that their community had been chosen to participate in the pilot project. The majority (87%) were aware, while 13% were unaware. See Figure 9, below.

Figure 9



Respondent subgroups significantly more likely to **be aware that their community had been chosen to participate in a pilot project** included:

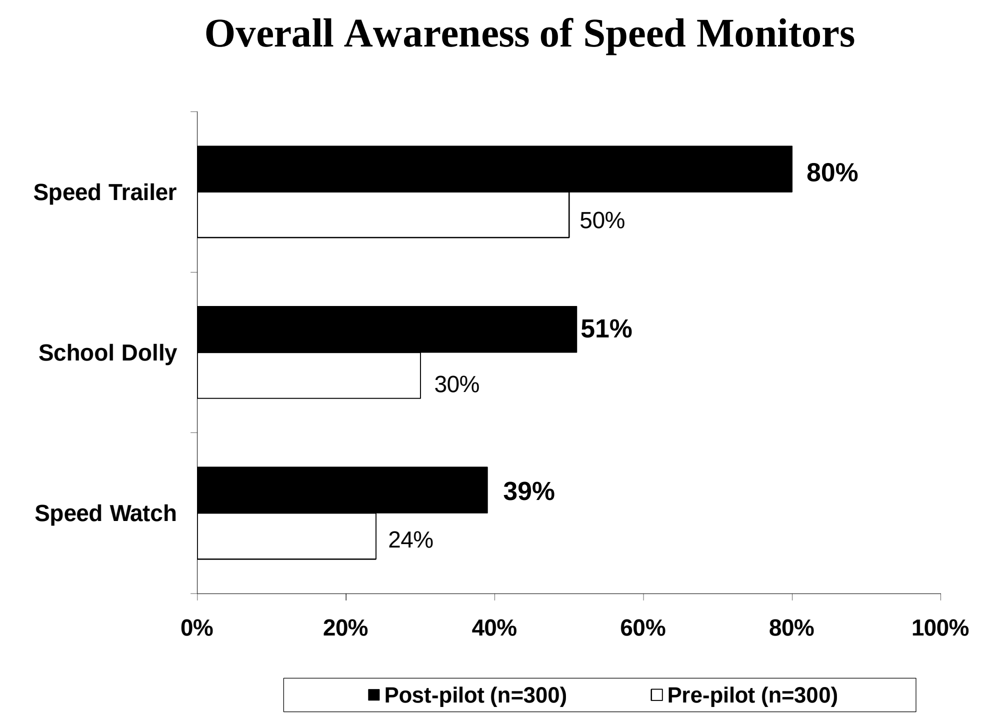
- Respondents that reside in Ottewell or Westridge / Wolf Willow (96% to 98% versus 76% to 84% of respondents that reside in Beverly Heights, King Edward Park, or Woodcroft);
- Respondents that are married (91% versus 81% of respondents that are not married);
- Respondents that are employed (93% versus 80% of respondents that are unemployed);
- Respondents that own their home (90% versus 68% of respondents that rent their home); and
- Respondents with a household income of $50,000 or more (90% to 94% versus 77% of respondents with a household income of less than $50,000).

The pilot project utilized a number of methods to monitor speed in the community. Respondents were asked whether they were aware of the following monitors:

- Speed Watch – volunteers book out speed boards from the police stations and monitor speeds on their own.
- Speed Trailer – trailers that are set up to monitor vehicle speeds and display those speeds back to drivers.
- School Dolly – digital speed boards on portable devices that are given to schools to monitor speeds at their school.

As indicated in Figure 10, below, respondents were most likely to be aware of the speed trailer (80%), followed by the school dolly (51%) and speed watch (39%). For detailed results, see Table 11 on the following page.

Figure 10



Base: Respondents that stated they were aware

Table 11

Awareness of Speed Monitors						
Overall	**Percent of Respondents (n=300)**					
	Yes		**No**		**Refuse/Don't Know**	
	Post-Pilot	**Pre-Pilot**	**Post-Pilot**	**Pre-Pilot**	**Post-Pilot**	**Pre-Pilot**
Speed Watch	39	24	59	76	1	1
Speed Trailer	80	50	20	50	<1	<1
School Dolly	51	30	46	69	3	1

Respondents that are married were significantly <u>more likely</u> to **be aware of speed watch as a method of monitoring speed in their community** (44% versus 30% of respondents that are not married).

Respondents with a household income of $100,000 to less than $150,000 were significantly <u>more likely</u> to indicate they **were aware of the school dolly as a method of monitoring speed in their community** (42% versus 22% of respondents with a household income of less than $50,000).

Respondent subgroups significantly <u>more likely</u> to **be aware of speed trailer as a method of monitoring speed in their community** included:

- Respondents that reside in Ottewell, Twin Brooks, or Westridge / Wolf Willow (88% to 92% versus 64% to 70% of respondents that reside in King Edward Park or Woodcroft);
- Respondents that are married (83% versus 72% of respondents that are not married);
- Respondents that are employed (86% versus 71% of respondents that are unemployed);
- Respondents that own their home (83% versus 58% of respondents that rent their home); and
- Respondents with a household income of more than $100,000 (86% to 92% versus 69% of respondents with a household income of less than $50,000).

Respondent subgroups significantly <u>more likely</u> to **be aware of School Dolly as a method of monitoring speed in their community** included:

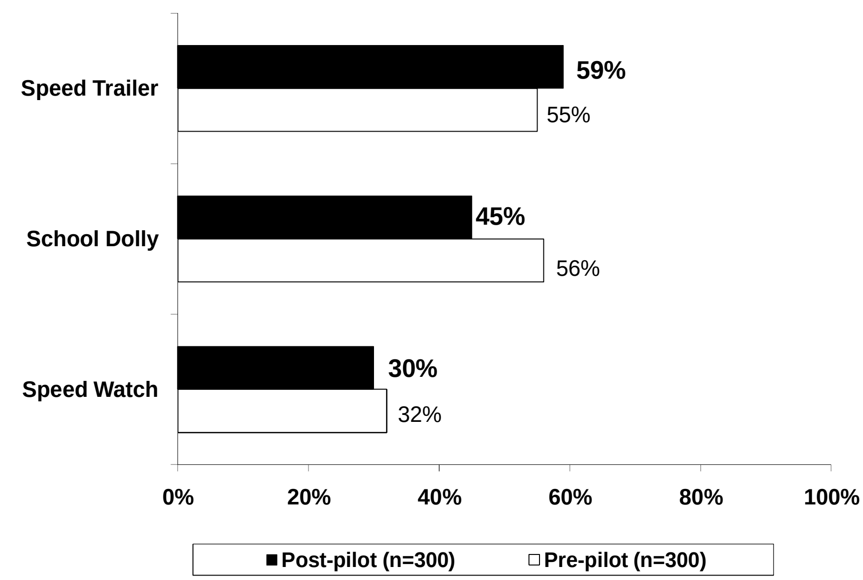
- Respondents that reside in Twin Brooks (64% versus 38% to 40% of respondents that reside in Westridge / Wolf Willow or Woodcroft);

- Respondents aged 35 to 54 (62% versus 43% of respondents aged 55 or older); and
- Respondents that are employed (59% versus 42% of respondents that are employed).

When respondents were asked to anticipate the effectiveness of the speed monitors, 59% of respondents believed the speed trailer would be effective (4 or 5 out of 5), 45% believed the school dolly would be effective (4 or 5 out of 5) (a significant decrease from 56% in the pre-pilot), and 30% stated the speed watch would be effective (4 or 5 out of 5) in lowering residential speed limits. See Figure 11 and Table 12, below.

Figure 11

Overall Effectiveness of Speed Monitors



*Respondents that selected 4 or 5 out of 5

Table 12

Effectiveness of Speed Monitors														
	Percent of Respondents (n=300)													
	Not at all Effective (1)		(2)		(3)		(4)		Very Effective (5)		Refuse/ Don't Know		Mean	
Overall	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot
Speed Trailer	6	7	5	10	18	23	26	31	33	23	11	5	3.85	3.57

Speed Dolly	7	7	5	7	13	19	18	32	27	24	29	11	3.73	3.66
Speed Watch	18	23	8	18	16	19	13	16	17	16	28	8	3.06	2.82

Respondent subgroups significantly more likely to **rate the effectiveness of speed watch as 4 or 5 out of 5** included:

- Respondents that felt reducing speed limits would be effective (3 to 5 out of 5) in improving traffic safety (38% versus 17% of respondents that felt reducing speed limits would be ineffective);
- Respondents that felt the pilot project would be effective (3 to 5 out of 5) at improving traffic safety (37% versus 11% of respondents that felt the pilot project would be ineffective);
- Respondents aged 55 or older (37% versus 18% of respondents aged 35 to 54); and
- Respondents that are unemployed (41% versus 22% of respondents that are employed).

Respondent subgroups significantly more likely to **rate the effectiveness of the speed trailer as 4 or 5 out of 5** included:

- Respondents that reside in Ottewell (76% versus 48% to 52% of respondents that reside in Beverly Heights, King Edward Park or Woodcroft);
- Respondents that have lived in the community for more than 10 years (64% versus 52% of respondents that have lived in the community for 10 years or less);
- Respondents that felt reducing speed limits would be effective (3 to 5 out of 5) in improving traffic safety (67% versus 47% of respondents that felt reducing speed limits would be ineffective); and
- Respondents that felt the pilot project would be effective (3 to 5 out of 5) at improving traffic safety (68% versus 39% of respondents that felt the pilot project would be ineffective).

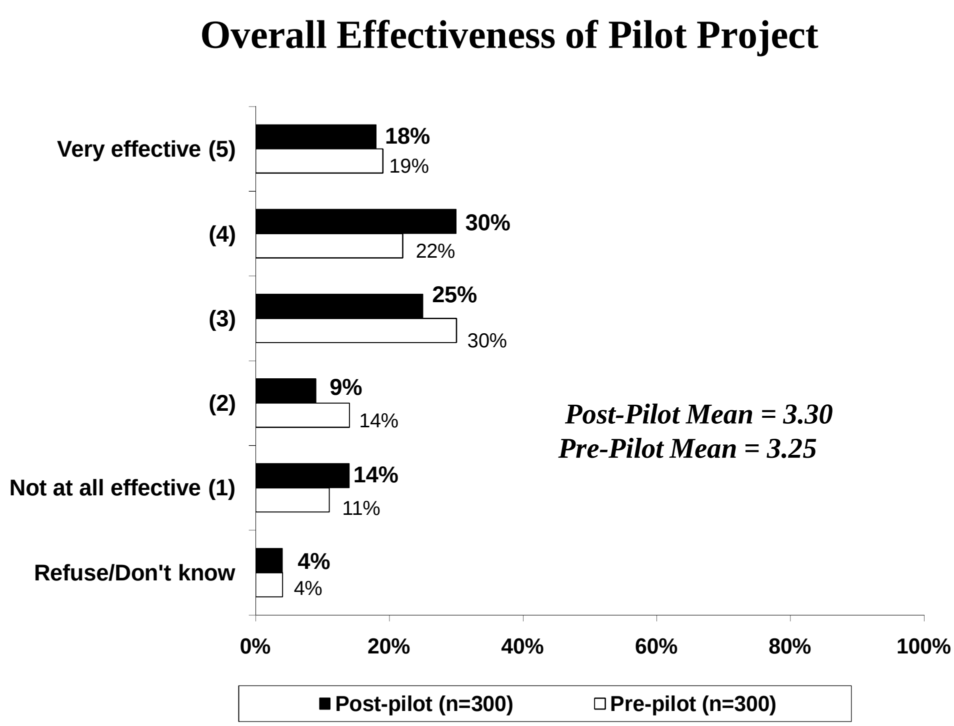
Respondent subgroups significantly more likely to **rate the effectiveness of the school dolly as 4 or 5 out of 5** included:

- Respondents that reside in Ottewell or Twin Brooks (52% to 60% versus 30% of respondents that reside in Westridge / Wolf Willow);

- Respondents that felt reducing speed limits would be effective (3 to 5 out of 5) in improving traffic safety (52% versus 35% of respondents that felt reducing speed limits would be ineffective);
- Respondents that felt the pilot project would be effective (3 to 5 out of 5) at improving traffic safety (53% versus 23% of respondents that felt the pilot project would be ineffective); and
- Respondents with a household income of $50,000 to less than $100,000 (52% versus 33% of respondents with a household income of more than $150,000).

When respondents were asked to anticipate the effectiveness of the pilot project, 48% of respondents believed it would be highly effective (4 or 5 out of 5), 25% believed it would be moderately effective, and 23% stated it would be less effective (1 or 2) in lowering residential speed limits. See Figure 12, below.

Figure 12

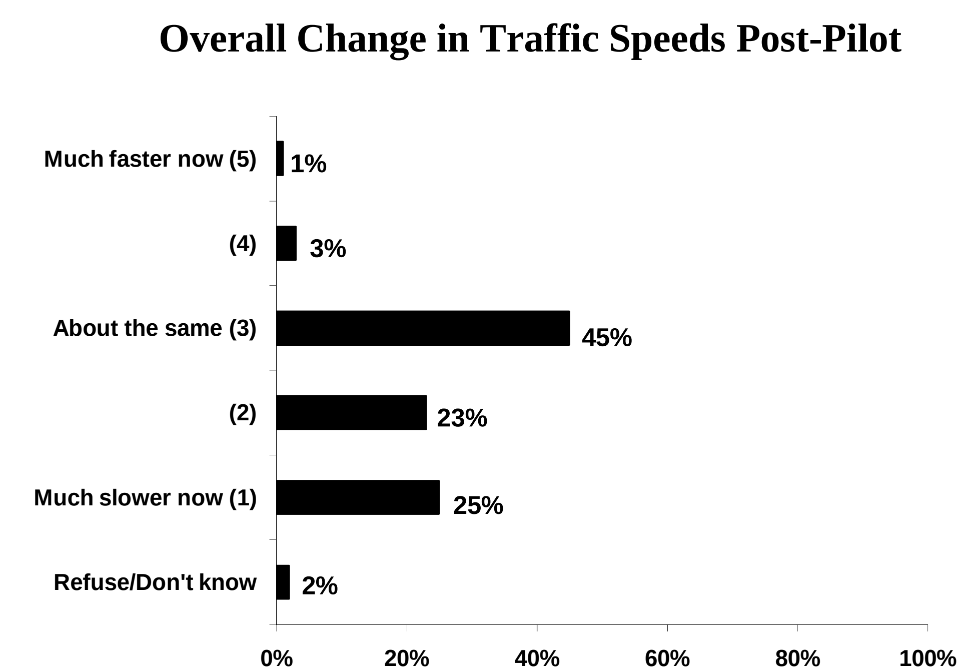


Respondent subgroups significantly <u>more likely</u> to **rate the overall effectiveness of the pilot project as 4 or 5 out of 5** included:

- Respondents that reside in Ottewell (64% versus 38% to 44% of respondents that reside in Beverly Heights, Westridge / Wolf Willow, or Woodcroft);
- Respondents that felt reducing speed limits would be effective in improving traffic safety (67% versus 14% of respondents that felt reducing speed limits would be ineffective); and
- Respondents with a household income of less than $50,000 (60% versus 40% of respondents with a household income of $100,000 to less than $150,000).

Respondents were next asked to rate the change in traffic speed from six months ago to the present. Respondents most frequently (48%) stated that it has slowed down (1 or 2 out of 5), followed by 45% that rated it as about the same, and 4% that stated it was faster. See Figure 13, below.

Figure 13



n=300

Respondent subgroups significantly <u>more likely</u> to **rate traffic speeds in their community as slower now than six months ago** included:

- Respondents that reside in Ottewell, Westridge / Wolf Willow, or Twin Brooks (56% to 64% versus 30% of respondents that reside in Woodcroft);
- Respondents that felt reducing speed limits would be effective (3 to 5 out of 5) in improving traffic safety (57% versus 32% of respondents that felt reducing speed limits would be ineffective);
- Respondents that felt the pilot project would be effective (3 to 5 out of 5) at improving traffic safety (57% versus 26% of respondents that felt the pilot project would be ineffective);
- Respondents that are employed (54% versus 41% of respondents that are unemployed); and
- Respondents with a household income of $50,000 to less than $150,000 (56% to 60% versus 37% of respondents with a household income of less than $50,000).

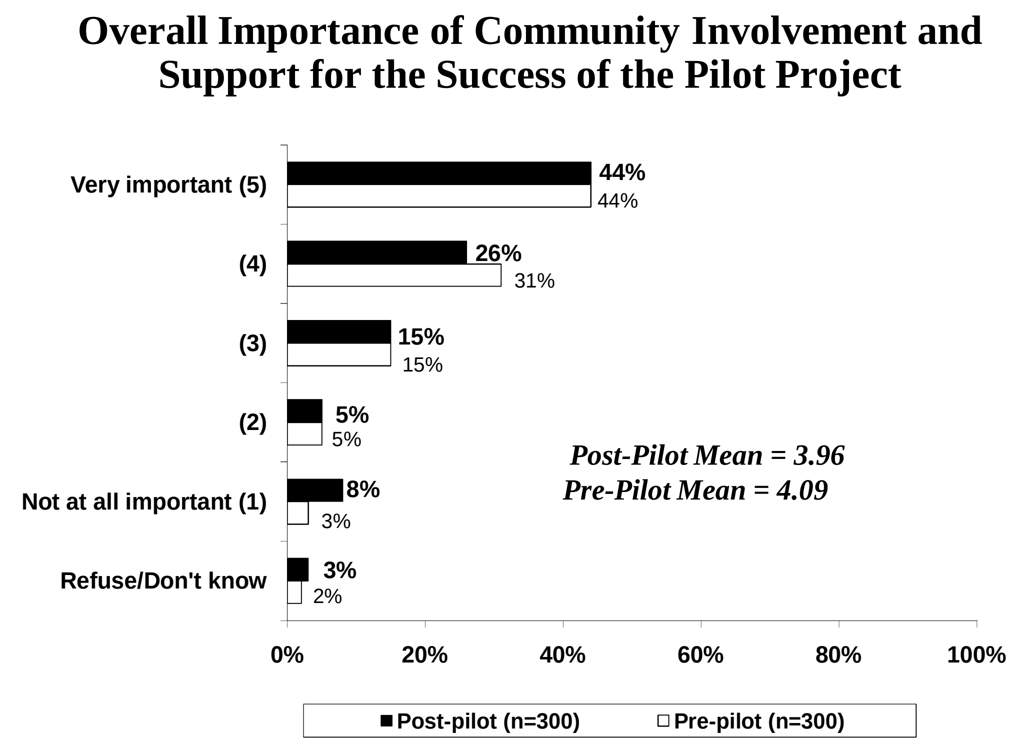
Respondent subgroups significantly <u>more likely</u> to **rate traffic speeds in their community as the same as six months ago** included:

- Respondents that reside in Beverly Heights, King Edward Park, or Woodcroft (52% to 60% versus 30% of respondents that reside in Twin Brooks);
- Respondents that felt reducing speed limits would be ineffective (1 or 2 out of 5) in improving traffic safety (65% versus 35% of respondents that felt reducing speed limits would be effective);
- Respondents that felt the pilot project would be ineffective (1 or 2 out of 5) at improving traffic safety (71% versus 36% of respondents that felt the pilot project would be effective); and
- Respondents with a household income of less than $50,000 (57% versus 37% of respondents with a household income of $50,000 to less than $100,000).

Respondents that rent their home were significantly <u>more likely</u> to **rate traffic speeds in their community as faster now than six months ago** (11% versus 3% of respondents that own their home).

Respondents were next asked to rate how important community involvement and support was for success of the pilot project. The majority of respondents (70%) rated it as important (4 or 5 out of 5), a slight decrease from 75% in the pre-pilot survey. See Figure 14, below.

Figure 14



Respondent subgroups significantly more likely **rate community involvement and support of high importance** included:

- Respondents that reside in Woodcroft (78% versus 58% of respondents that reside in Beverly Heights);
- Respondents that felt reducing speed limits would be effective (3 to 5 out of 5) in improving traffic safety (83% versus 43% of respondents that felt reducing speed limits would be ineffective); and
- Respondents that felt the pilot project would be effective (3 to 5 out of 5) at improving traffic safety (81% versus 34% of respondents that felt the pilot project would be ineffective).

3.2 Community Analysis

This section provides the results for each community of the post-pilot survey.

3.2.1 Current Habits and Concerns

Respondents in Westridge / Wolf Willow were the most likely to drive (92% stating they drive at least once per week), while respondents in Woodcroft were the least likely (88% stating they drive at least once per week). Respondents in King Edward Park were the most likely to walk in their community (90% stating they walk at least once per week), while respondents in Beverly Heights were the least likely to walk (78% stating they walk at least once per week). Respondents in Ottewell were the most likely to cycle in their community (30% stating they cycle at least once a week), while respondents in Twin Brooks were the least likely to cycle (12% stating they cycle at least once per week). See Tables 13 through 15, below and on the following page.

Table 13

How often do you or members of your family drive in the community?												
	Percent of Respondents											
	Daily		Few Times a Week		Once a Week		Once Every Few Weeks		Rarely / Never		Refuse/ Don't Know	
n=300	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot
Beverly Heights (n=50)	80	88	10	8	2	--	2	--	6	4	--	--
King Edward Park (n=50)	76	74	14	20	6	--	--	--	4	6	--	--
Woodcroft (n=50)	72	72	14	12	2	2	--	--	12	14	--	--
Ottewell (n=50)	88	86	8	10	2	4	--	--	2	--	--	--
Westridge / Wolf Willow (n=50)	96	94	2	4	2	--	--	2	--	--	--	--
Twin Brooks (n=50)	88	96	8	2	--	--	2	2	2	--	--	--

Table 14

How often do you or members of your family walk in the community?												
	Percent of Respondents											
	Daily		Few Times a Week		Once a Week		Once Every Few Weeks		Rarely / Never		Refuse/ Don't Know	
n=300	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot
Beverly Heights (n=50)	44	46	26	26	8	10	8	4	14	14	--	--
King Edward Park (n=50)	58	34	22	30	10	16	--	8	10	12	--	--
Woodcroft (n=50)	56	40	22	34	8	12	4	6	10	8	--	--
Ottewell (n=50)	48	44	28	28	8	16	2	2	14	10	--	--
Westridge/Wolf Willow (n=50)	48	38	32	36	6	20	4	2	10	4	--	--
Twin Brooks (n=50)	24	40	38	32	10	10	16	4	12	12	--	2

Table 15

How often do you or members of your family cycle in the community?												
	Percent of Respondents											
	Daily		Few Times a Week		Once a Week		Once Every Few Weeks		Rarely / Never		Refuse/ Don't Know	
n=300	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot
Beverly Heights (n=50)	8	8	2	24	4	8	18	4	68	54	--	2
King Edward Park (n=50)	6	12	6	12	8	10	6	8	74	58	--	--
Woodcroft (n=50)	6	4	12	16	4	12	10	10	68	58	--	--
Ottewell (n=50)	6	6	10	14	14	8	10	10	56	60	4	2
Westridge/Wolf Willow (n=50)	2	8	14	22	10	8	6	4	66	58	2	--
Twin Brooks (n=50)	4	8	6	20	2	6	14	12	74	52	--	2

Respondents were asked if they used any other methods of transportation. Respondents in all communities most frequently used public transit (ETS) ranging from 18% in Westridge / Wolf Willow to 36% in Woodcroft or Ottewell. See Table 16, below.

Table 16

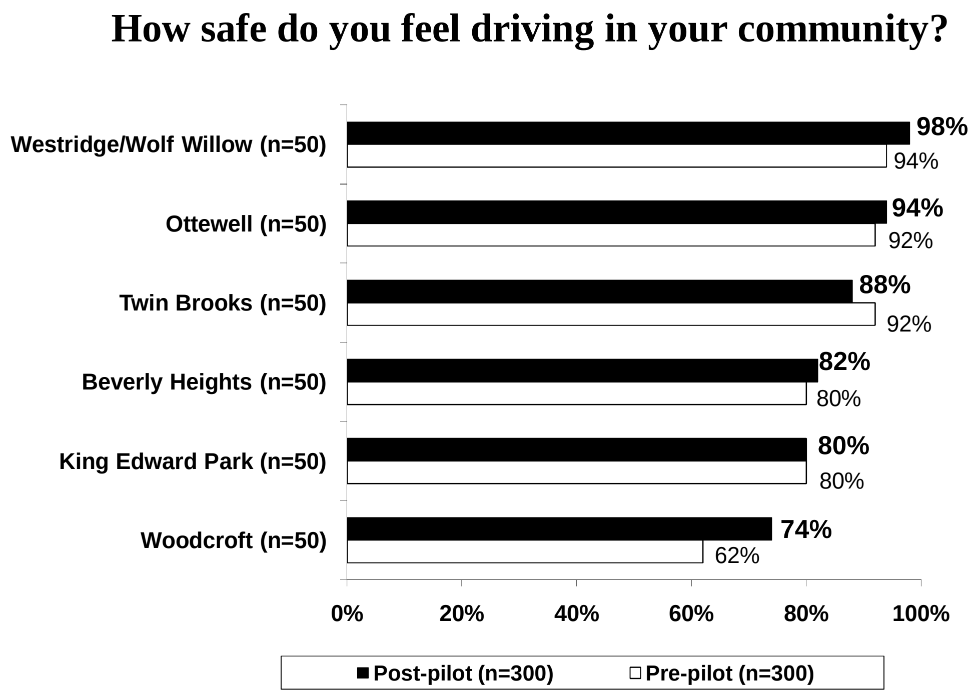
Do you use any other method of travel in the community?						
	Percent of Respondents*					
n=300	Beverly Heights (n=50)	King Edward Park (n=50)	Woodcroft (n=50)	Ottewell (n=50)	Westridge / Wolf Willow (n=50)	Twin Brooks (n=50)
Public Transit (ETS)	20	30	36	36	18	34
DATS	--	--	2	--	--	--
Chauffeur	2	--	--	--	--	--
Skateboard	--	--	--	--	--	2
Taxi	2	--	--	--	--	--

*Multiple responses

Respondents were then asked to rate their perception of safety while using different modes of transportation within their community. Respondents in Westridge / Wolf Willow were most likely to indicate they feel safe (4 or 5 out of 5) driving in their community (98%), while respondents in Woodcroft were least likely to feel safe (4 or 5 out of 5 (74%), see Figure 15, below.

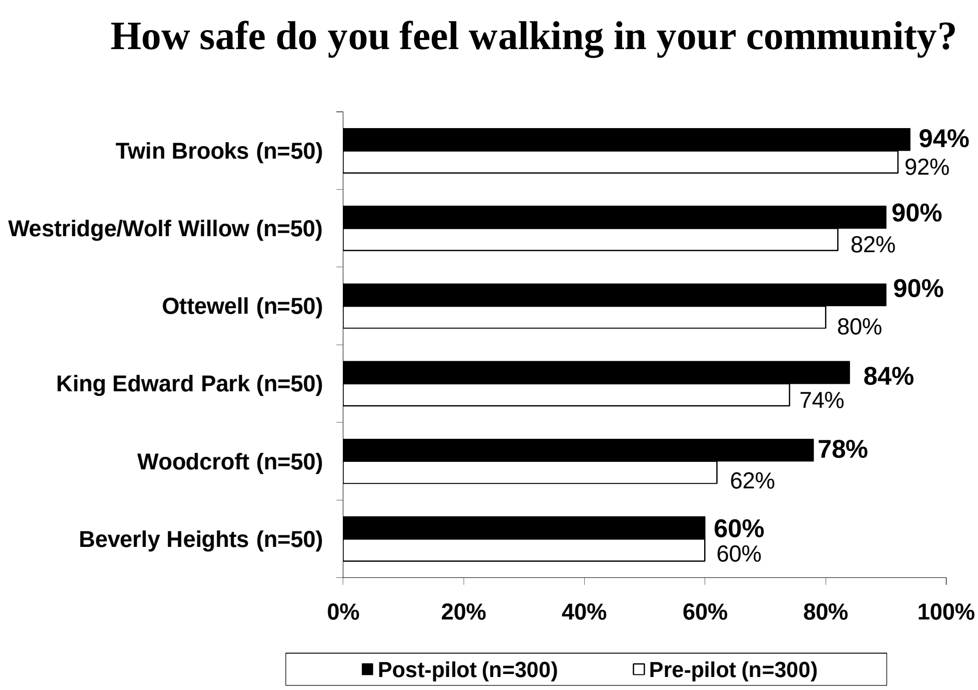
Respondents in Twin Brooks were most likely to feel safe (4 or 5 out of 5) walking in their community (94%), while respondents in Beverly Heights were least likely to feel safe (4 or 5 out of 5) (60%), see Figure 16, on the following page. Respondents in Twin Brooks were most likely to feel safe (4 or 5 out of 5) cycling in their community (64%), while respondents in King Edward Park were least likely to feel safe (4 or 5 out of 5) (38%), see Figure 17, on the following page. For detailed results see Tables 17 through 19 on pages 44 and 45.

Figure 15



*Respondents that selected 4 or 5 out of 5

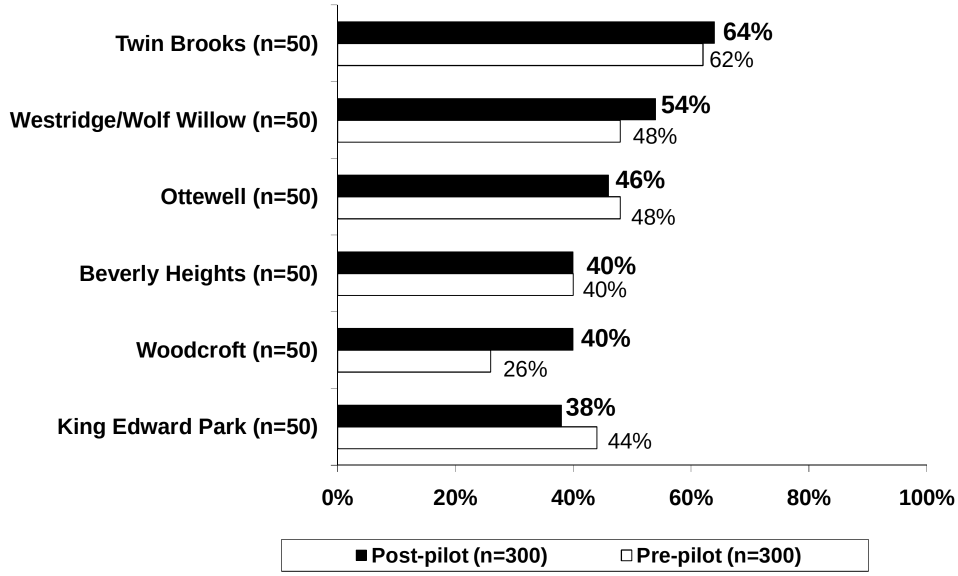
Figure 16



*Respondents that selected 4 or 5 out of 5

Figure 17

How safe do you feel cycling in your community?



*Respondents that selected 4 or 5 out of 5

Table 17

How safe do you feel driving in your community?														
	Percent of Respondents													
	Very Unsafe (1)		(2)		(3)		(4)		Very Safe (5)		Refuse/ Don't Know		Mean	
n=300	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot
Westridge/ Wolf Willow (n=50)	--	--	--	2	2	4	26	34	72	60	--	--	4.70	4.52
Ottewell (n=50)	--	2	--	--	4	6	36	50	58	42	2	--	4.55	4.30
Twin Brooks (n=50)	4	--	--	--	6	8	18	40	70	52	2	--	4.53	4.44
King Edward Park (n=50)	--	--	4	6	10	10	28	34	52	46	6	4	4.36	4.25
Beverly Heights (n=50)	--	--	8	--	6	16	36	32	46	48	4	4	4.25	4.33
Woodcroft (n=50)	2	--	2	4	16	20	28	34	46	28	6	14	4.21	4.00

Table 18

How safe do you feel walking in your community?														
	Percent of Respondents													
	Very Unsafe (1)		(2)		(3)		(4)		Very Safe (5)		Refuse/ Don't Know		Mean	
n=300	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot
Twin Brooks (n=50)	--	--	2	4	2	4	16	32	78	60	2	--	4.73	4.48
Westridge/ Wolf Willow (n=50)	2	2	4	--	4	16	24	32	66	50	--	--	4.48	4.28
Ottewell (n=50)	--	4	6	6	4	8	36	38	54	42	--	2	4.38	4.10
King Edward Park (n=50)	--	4	2	4	14	16	32	42	52	32	--	2	4.34	3.96
Woodcroft (n=50)	2	--	2	16	14	22	24	34	54	28	4	--	4.31	3.74
Beverly Heights (n=50)	2	2	10	6	26	32	24	34	36	26	2	--	3.84	3.76

Table 19

How safe do you feel cycling in your community?														
	Percent of Respondents													
	Very Unsafe (1)		(2)		(3)		(4)		Very Safe (5)		Refuse/ Don't Know		Mean	
n=300	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot
Westridge/ Wolf Willow (n=50)	--	--	--	4	8	10	16	22	38	26	38	38	4.48	4.13
Twin Brooks (n=50)	--	--	2	2	14	8	24	28	40	34	20	28	4.28	4.31
Ottewell (n=50)	--	--	4	10	10	4	18	28	28	20	40	38	4.17	3.94
King Edward Park (n=50)	2	--	4	4	20	14	12	30	26	14	36	38	3.88	3.87
Woodcroft (n=50)	6	2	2	6	14	14	14	14	26	12	38	52	3.84	3.58
Beverly Heights (n=50)	4	2	6	4	16	20	18	20	22	20	34	34	3.73	3.79

Respondents that felt unsafe (1 or 2 out of 5) in their community (n=10, overall) were asked why they felt that way. More respondents in Beverly Heights and Woodcroft stated it was because traffic goes too fast or there are too many speeders (n=2, each). See Table 20, below.

Table 20

Why do you feel that way?						
	Number of Respondents*					
Base: Respondents that feel unsafe (1 or 2 out of 5) driving in their community	**Beverly Heights (n=4)****	**King Edward Park (n=2)****	**Woodcroft (n=2)****	**Ottewell (n=0)**	**Westridge / Wolf Willow (n=0)**	**Twin Brooks (n=2)****
Traffic goes too fast / too many speeders	2	1	2	--	--	--
People are distracted while driving / do not pay attention	1	--	1	--	--	1
People do not stop at stop signs / street lights	1	1	--	--	--	1
Cars parked on both side of the street narrowing the street	--	1	--	--	--	--
Too many drivers tailgate other drivers	1	--	--	--	--	--
Poor visibility at street corners	--	1	--	--	--	--
Few accidents (unspecified)	1	--	--	--	--	--

*Multiple Responses
**Caution should be exercised when interpreting results due to small sample sizes

Respondents that felt unsafe (1 or 2 out of 5) walking in their community (n=16, overall) were asked why they felt that way. Two respondents (n=2) in Beverly Heights stated it was because of crime or a lack of police presence, while one respondent (n=1) each in King Edward Park and Westridge / Wolf Willow provided that response as well. See Table 21, below.

Table 21

Why do you feel that way?						
	Number of Respondents*					
Base: Respondents that feel unsafe (1 or 2 out of 5) walking in their community	**Beverly Heights (n=6)****	**King Edward Park (n=1)****	**Woodcroft (n=2)****	**Ottewell (n=3)****	**Westridge / Wolf Willow (n=3)****	**Twin Brooks (n=1)****
Traffic is going too fast / too many speeders	--	--	1	1	1	1
Concerned about crime in the community / lack of police presence	2	1	--	--	1	--
Traffic is heavy / high volume traffic on the streets	--	--	1	1	--	--
Feels intersections / 4-way stops in community are unsafe	1	--	--	--	1	--
Concerned about prostitution in the community	1	--	--	--	--	--
Concerned about gangs in the community	1	--	--	--	--	--
Concerned about homeless people in their community	--	--	--	--	1	--
Sidewalks are unsafe / fell on side walk because of poor maintenance	--	--	--	1	--	--
Crosswalks are dangerous / unsafe for pedestrians	1	--	--	--	--	--
Feels like there are less street lights in their community compared to others	--	--	1	--	--	--
People don’t think while driving	--	--	1	--	--	--
Safety in community decreased after specific groups moved to community	1	--	--	--	--	--
Refuse, Don’t Know	1	--	--	--	--	--

*Multiple Responses
**Caution should be exercised when interpreting results due to small sample sizes

Respondents that felt unsafe (1 or 2 out of 5) cycling in their community (n=15, overall) were asked why they felt that way. One respondent (n=1) each in Beverly Heights, King Edward Park, Woodcroft, Ottewell, and Twin Brooks stated that they dislike cycling in traffic and that motorists do not respect their space. See Table 22, below.

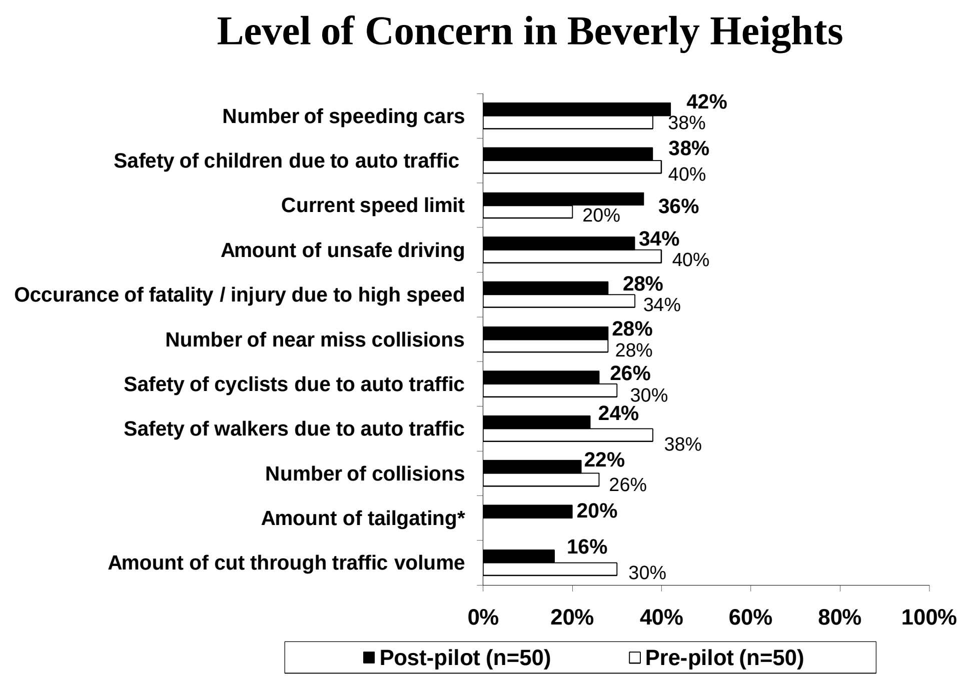
Table 22

Why do you feel that way?						
	Number of Respondents*					
Base: Respondents that feel unsafe (1 or 2 out of 5) cycling in their community	**Beverly Heights (n=5)****	**King Edward Park (n=3)****	**Woodcroft (n=4)****	**Ottewell (n=2)****	**Westridge / Wolf Willow (n=0)****	**Twin Brooks (n=1)****
Dislikes cycling in traffic / motorists do not respect cyclists' space	1	1	1	1	--	1
Traffic is heavy in community	1	--	1	--	--	--
Lack of bike paths / trails in the community	1	--	1	--	--	--
Too many bikes get stolen in the community	1	1	--	--	--	--
Roads are not wide enough to cycle on due to parked cars	--	1	--	1	--	--
Crosswalk light has too long of a delay / Crosswalk does not stay on long enough	1	--	--	--	--	--
Some roads are very rough	--	--	1	--	--	--
Edmonton isn't bicycle friendly (general)	--	--	1	--	--	--
People don't see Woodcroft as a community	--	--	1	--	--	--

*Multiple Responses
**Caution should be exercised when interpreting results due to small sample sizes

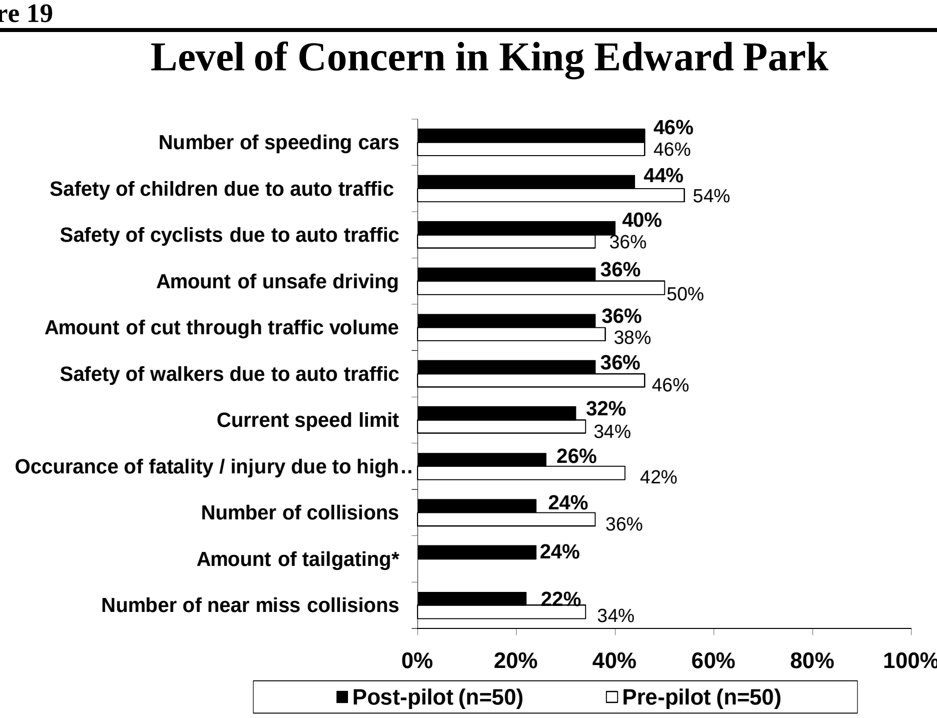
Respondents were asked to rate their level of concern with a number of factors. The current speed limit received the highest proportion of concerned ratings (4 or 5 out of 5) in Westridge / Wolf Willow (50%), Twin Brooks (44%), and Ottewell (42%). The number of speeding cars received the highest proportion of concerned ratings (4 or 5 out of 5) in King Edward Park (46%) and Beverly Heights (42%). Woodcroft residents were most concerned with the safety of children due to auto traffic (46%). See Figures 18 through 23 on pages 49 though 52. For detailed results for each community see Tables 23 to 28 on pages 53 through 58.

Figure 18



*Not asked in the pre-pilot
**Respondents that selected 4 or 5 out of 5

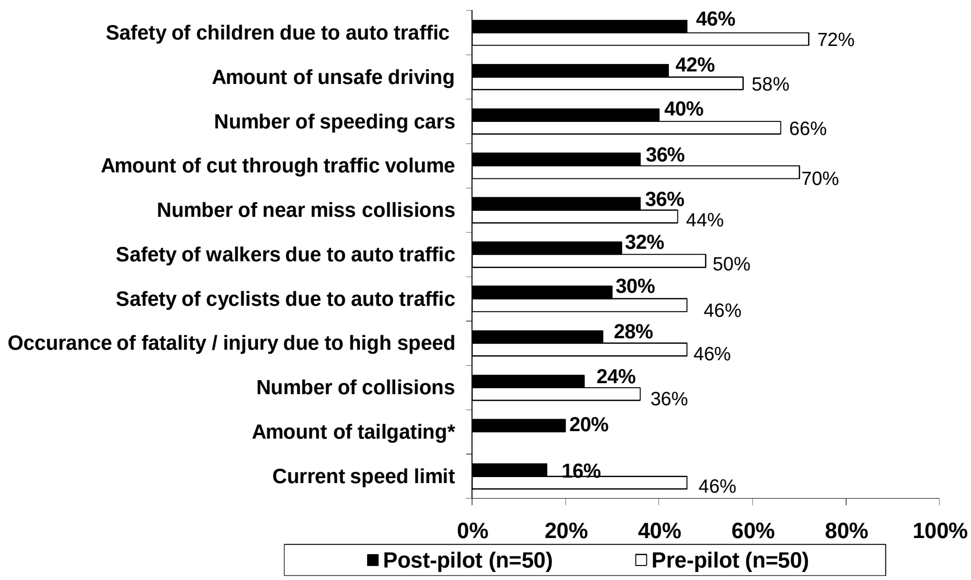
Figure 19



*Not asked in the pre-pilot
**Respondents that selected 4 or 5 out of 5

Figure 20

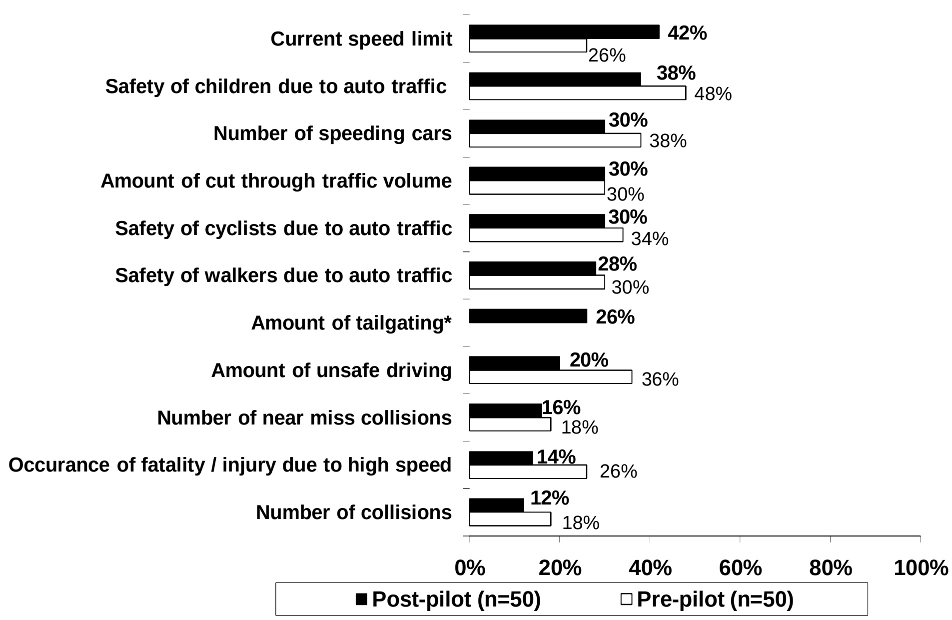
Level of Concern in Woodcroft



*Not asked in pre-pilot
**Respondents that selected 4 or 5 out of 5

Figure 21

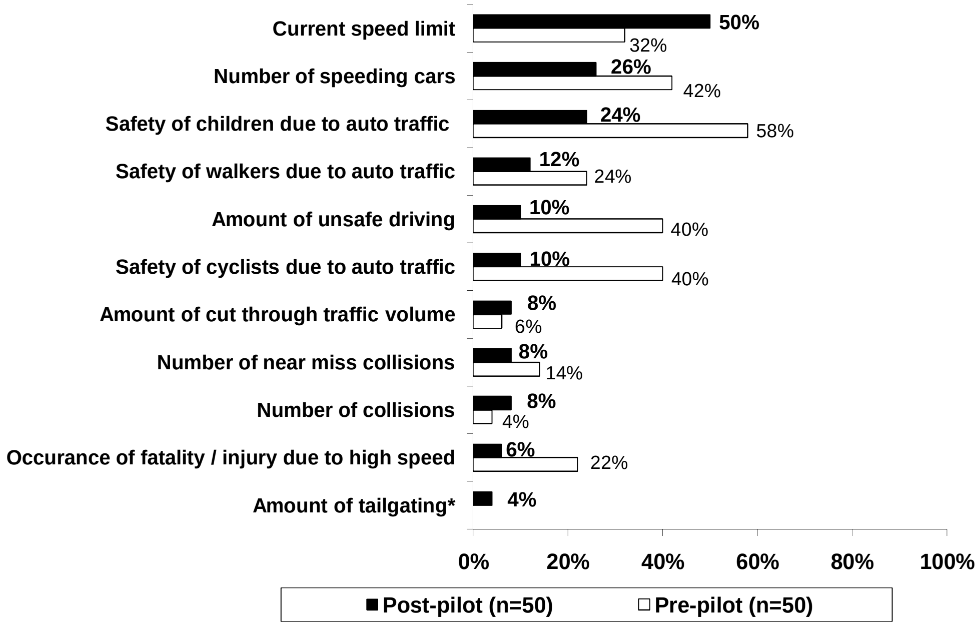
Level of Concern in Ottewell



*Not asked in pre-pilot
**Respondents that selected 4 or 5 out of 5

Figure 22

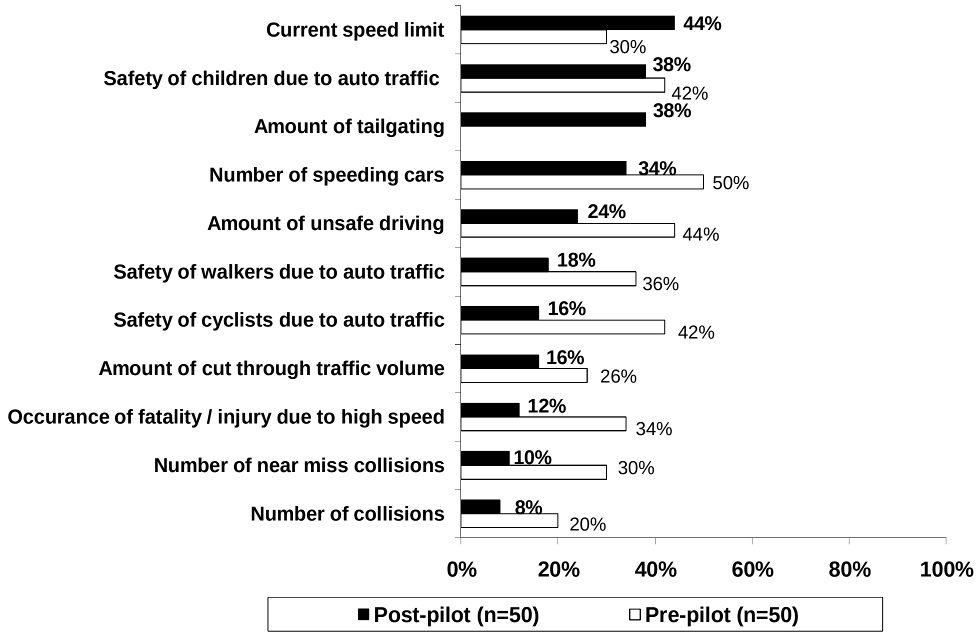
Level of Concern in Westridge / Wolf Willow



*Not asked in pre-pilot
**Respondents that selected 4 or 5 out of 5

Figure 23

Level of Concern in Twin Brooks



*Not asked in pre-pilot
**Respondents that selected 4 or 5 out of 5

Table 23

Level of Concern														
	Percent of Respondents (n=50)													
	Not at all Concerned (1)		(2)		(3)		(4)		Very Concerned (5)		Refuse/ Don't Know		Mean	
Beverly Heights	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot
Safety of children due to auto traffic in your community	16	8	18	22	22	30	16	18	22	22	6	--	3.11	3.24
Number of speeding cars in your community	22	16	18	18	18	28	16	12	26	26	--	--	3.06	3.14
Amount of unsafe driving in your community	22	20	16	14	24	26	12	24	22	16	4	--	2.96	3.02
Current speed limit in your community	32	40	14	14	18	26	12	6	24	14	--	--	2.82	2.40
Occurrence of fatality or injury caused by high speed in your community	34	34	14	8	22	20	6	10	22	24	2	4	2.67	2.81
Safety of cyclists due to auto traffic in your community	26	12	18	20	24	36	18	14	8	16	6	2	2.62	3.02
Number of near miss collisions in your community	28	22	22	18	16	24	16	18	12	10	6	8	2.60	2.74
Safety of walkers due to auto traffic in your community	32	18	20	18	22	24	16	16	8	22	2	2	2.47	3.06
Amount of tailgating occurring in your community	32	n/a	26	n/a	18	n/a	10	n/a	10	n/a	4	n/a	2.38	n/a
Number of collisions in your community	40	26	16	20	20	24	14	10	8	16	2	4	2.33	2.69
Amount of cut-through traffic volume in your community	36	30	14	24	24	10	8	14	8	16	10	6	2.31	2.60

Table 24

Level of Concern														
	Percent of Respondents (n=50)													
	Not at all Concerned (1)		(2)		(3)		(4)		Very Concerned (5)		Refuse/ Don't Know		Mean	
King Edward Park	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot
Safety of children due to auto traffic in your community	10	10	22	16	22	14	12	28	32	26	2	6	3.35	3.47
Safety of cyclists due to auto traffic in your community	12	10	8	18	32	28	20	16	20	20	8	8	3.30	3.20
Number of speeding cars in your community	16	8	16	26	20	20	24	22	22	24	2	--	3.20	3.28
Amount of unsafe driving in your community	8	10	28	20	24	16	18	26	18	24	4	4	3.10	3.35
Amount of cut-through traffic volume in your community	18	24	20	18	26	18	14	10	22	28	--	2	3.02	3.00
Safety of walkers due to auto traffic in your community	24	20	22	18	18	16	14	22	22	24	--	--	2.88	3.12
Current speed limit in your community	32	42	8	20	26	4	10	16	22	18	2	--	2.82	2.48
Occurrence of fatality or injury caused by high speed in your community	26	20	18	22	26	10	10	16	16	26	4	6	2.71	3.06
Number of near miss collisions in your community	24	20	22	26	24	10	10	22	12	12	8	10	2.61	2.78
Number of collisions in your community	28	18	26	24	22	16	16	16	8	20	--	6	2.50	2.96
Amount of tailgating occurring in your community	34	n/a	26	n/a	12	n/a	6	n/a	18	n/a	4	n/a	2.46	n/a

Table 25

Level of Concern														
	Percent of Respondents (n=50)													
	Not at all Concerned (1)		(2)		(3)		(4)		Very Concerned (5)		Refuse/ Don't Know		Mean	
Woodcroft	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot
Safety of children due to auto traffic in your community	22	8	16	4	16	16	24	18	22	54	--	--	3.08	4.06
Amount of unsafe driving in your community	20	8	16	10	20	18	20	26	22	32	2	6	3.08	3.68
Number of speeding cars in your community	32	12	10	10	16	12	12	24	28	42	2	--	2.94	3.74
Number of near miss collisions in your community	32	12	8	12	18	20	18	24	18	20	6	12	2.81	3.32
Safety of cyclists due to auto traffic in your community	28	10	12	10	22	26	12	26	18	20	8	8	2.78	3.39
Amount of cut-through traffic volume in your community	28	8	18	12	14	6	22	20	14	50	4	4	2.75	3.96
Safety of walkers due to auto traffic in your community	32	14	16	14	18	22	18	24	14	26	2	--	2.65	3.34
Occurrence of fatality or injury caused by high speed in your community	38	14	12	12	14	14	8	18	20	28	8	14	2.57	3.40
Amount of tailgating occurring in your community	32	n/a	16	n/a	28	n/a	12	n/a	8	n/a	4	n/a	2.46	n/a
Number of collisions in your community	38	6	16	12	18	26	14	18	10	18	4	20	2.40	3.38
Current speed limit in your community	42	16	18	8	20	26	4	14	12	32	4	4	2.23	3.40

Table 26

Level of Concern														
	Percent of Respondents (n=50)													
	Not at all Concerned (1)		(2)		(3)		(4)		Very Concerned (5)		Refuse/ Don't Know		Mean	
Ottewell	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot
Safety of children due to auto traffic in your community	22	10	16	24	22	14	20	26	18	22	2	4	2.96	3.27
Number of speeding cars in your community	20	12	18	22	32	28	12	16	18	22	--	--	2.90	3.14
Current speed limit in your community	34	38	8	14	16	18	20	6	22	20	--	4	2.88	2.54
Safety of cyclists due to auto traffic in your community	30	20	12	18	24	24	22	20	8	14	4	4	2.65	2.90
Amount of cut-through traffic volume in your community	32	20	18	30	18	14	16	10	14	20	2	6	2.61	2.79
Amount of unsafe driving in your community	24	18	26	18	30	26	12	22	8	14	--	2	2.54	2.96
Safety of walkers due to auto traffic in your community	32	28	22	22	16	18	22	20	6	10	2	2	2.47	2.61
Amount of tailgating occurring in your community	36	n/a	16	n/a	20	n/a	20	n/a	6	n/a	2	n/a	2.43	n/a
Number of near miss collisions in your community	32	26	24	22	22	22	12	12	4	6	6	6	2.28	2.43
Occurrence of fatality or injury caused by high speed in your community	40	34	24	18	18	20	6	10	8	16	4	2	2.15	2.55
Number of collisions in your community	50	34	18	30	18	12	8	14	4	4	2	6	1.96	2.19

Table 27

Level of Concern														
	Percent of Respondents (n=50)													
	Not at all Concerned (1)		(2)		(3)		(4)		Very Concerned (5)		Refuse/ Don't Know		Mean	
Westridge/Wolf Willow	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot
Current speed limit in your community	36	36	8	16	6	14	16	10	34	22	--	2	3.04	2.65
Number of speeding cars in your community	36	8	20	14	18	34	16	22	10	20	--	2	2.44	3.33
Safety of children due to auto traffic in your community	36	6	18	14	20	20	16	36	8	22	2	2	2.41	3.55
Amount of unsafe driving in your community	42	6	30	26	18	28	4	24	6	16	--	--	2.02	3.18
Safety of cyclists due to auto traffic in your community	48	18	20	12	10	20	10	32	--	8	12	10	1.80	3.00
Safety of walkers due to auto traffic in your community	60	26	18	22	10	28	8	14	4	10	--	--	1.78	2.60
Occurrence of fatality or injury caused by high speed in your community	62	36	12	20	12	20	4	10	2	12	8	2	1.61	2.41
Number of near miss collisions in your community	64	30	16	34	8	20	6	10	2	4	4	2	1.60	2.22
Number of collisions in your community	70	46	14	36	4	12	6	4	2	--	4	2	1.50	1.73
Amount of tailgating occurring in your community	70	n/a	16	n/a	10	n/a	4	n/a	--	n/a	--	n/a	1.48	n/a
Amount of cut-through traffic volume in your community	80	74	2	6	6	10	6	2	2	4	4	4	1.42	1.50

Table 28

Level of Concern														
	Percent of Respondents (n=50)													
	Not at all Concerned (1)		(2)		(3)		(4)		Very Concerned (5)		Refuse/ Don't Know		Mean	
Twin Brooks	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot
Current speed limit in your community	24	40	16	20	16	10	20	14	24	16	--	--	3.04	2.46
Safety of children due to auto traffic in your community	26	16	8	20	28	20	22	14	16	28	--	2	2.94	3.18
Amount of tailgating occurring in your community	30	n/a	18	n/a	12	n/a	22	n/a	16	n/a	2	n/a	2.76	n/a
Number of speeding cars in your community	28	10	22	22	16	18	16	26	18	24	--	--	2.74	3.32
Amount of unsafe driving in your community	24	12	18	22	34	22	16	28	8	16	--	--	2.66	3.14
Safety of cyclists due to auto traffic in your community	30	24	18	18	34	16	12	22	4	20	2	--	2.41	2.96
Safety of walkers due to auto traffic in your community	34	32	22	18	26	14	10	18	8	18	--	--	2.36	2.72
Occurrence of fatality or injury caused by high speed in your community	46	34	20	12	18	16	4	12	8	22	4	4	2.04	2.75
Amount of cut-through traffic volume in your community	50	38	16	26	14	8	8	12	8	14	4	2	2.04	2.37
Number of near miss collisions in your community	46	32	28	16	12	20	6	20	4	10	4	2	1.90	2.59
Number of collisions in your community	54	42	28	14	6	24	6	8	2	12	4	--	1.69	2.34

Respondents were given the opportunity to detail any additional concerns they had related to traffic in their community. Respondents in all communities most frequently reported having no other concerns, ranging from 50% in Ottewell to 72% of respondents in Westridge / Wolf Willow. Disliking the speed limit change, the new speed limit causing problems, and a desire to see it raised to 50 km/hr was the most frequent comment made by respondents in Twin Brooks (18%), Westridge / Wolf Willow (16%), Beverly Heights (8%), Woodcroft (8%), and Ottewell (8%). See Table 29, below.

Table 29

Do you have any other concerns relating to traffic in your community?						
	Percent of Respondents*					
n=300	Beverly Heights (n=50)	King Edward Park (n=50)	Woodcroft (n=50)	Ottewell (n=50)	Westridge / Wolf Willow (n=50)	Twin Brooks (n=50)
Dislikes that speed limit was changed to 40km / new speed limit causes problems / change it back to 50km/hr	8	2	8	8	16	18
Speeders / people drive too fast / need consequences / lower speed limit	8	10	4	8	4	6
Traffic is heavy / high volume of traffic on streets	2	8	8	4	--	8
Dislike that people disobey stop signs / traffic laws	2	2	4	8	4	--
Illegal parking / parking on both sides of roads obstructs traffic	--	4	6	2	--	2
Traffic laws near playgrounds / schools need better enforcement	2	4	--	2	--	2
Concerned with the amount of buses going through / speeding	--	--	2	4	4	--
Other (less than 4% of a community's responses)	22	32	32	22	8	28
No	58	58	52	50	72	52

*Multiple Responses

Respondents were asked to indicate whether or not they drove. Respondents in Ottewell and Westridge / Wolf Willow were most likely to drive (98% each), followed by respondents in Twin Brooks (96%), respondents in King Edward Park (94%), and those in Beverly Heights (92%). Respondents in Woodcroft were the least likely to drive with 86% stating that they drove. See Figures 24 through 29 on pages 60 through 63.

Figure 24

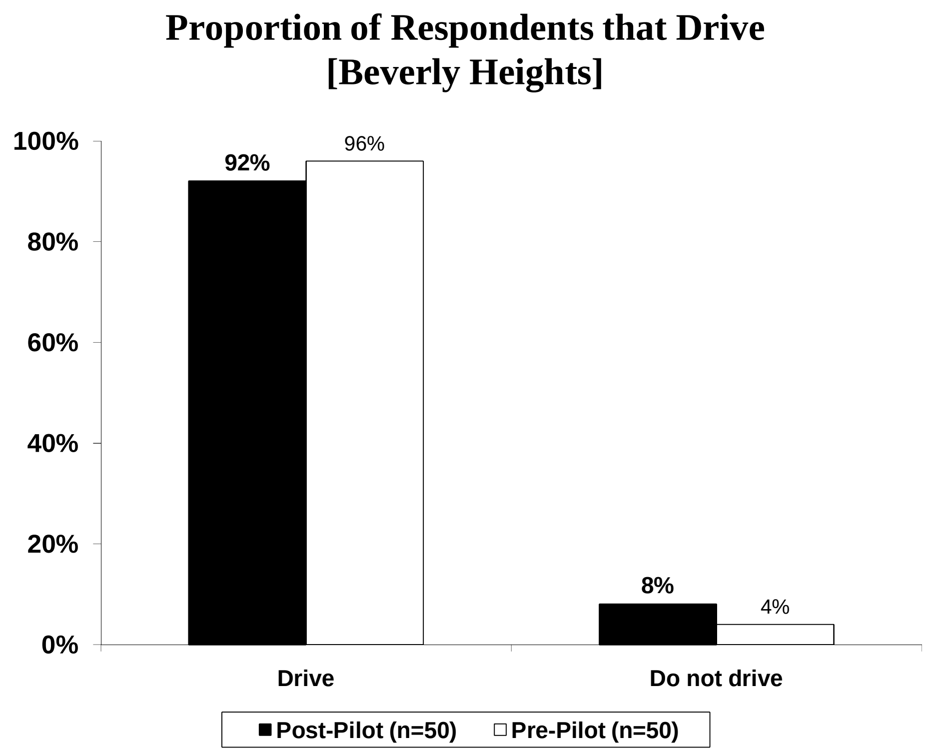


Figure 25

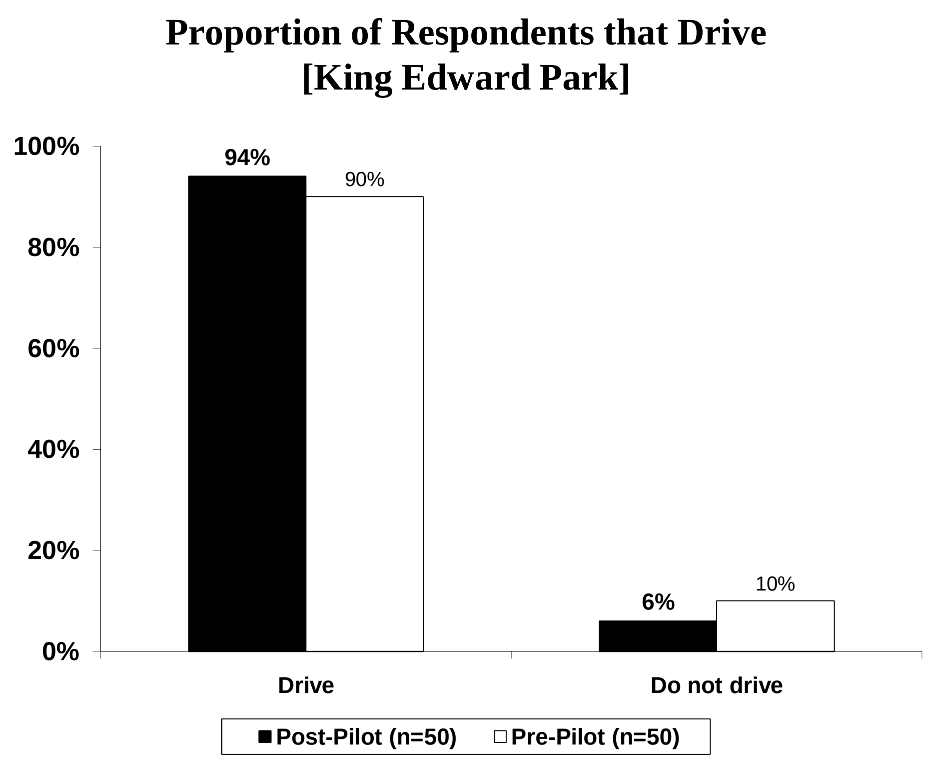


Figure 26

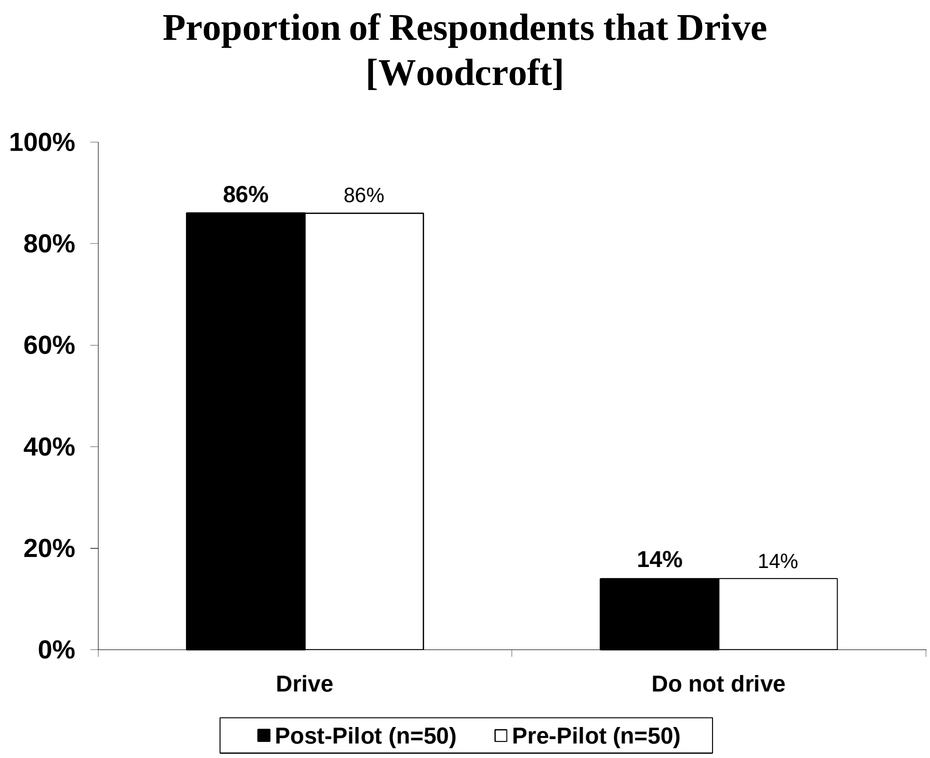


Figure 27

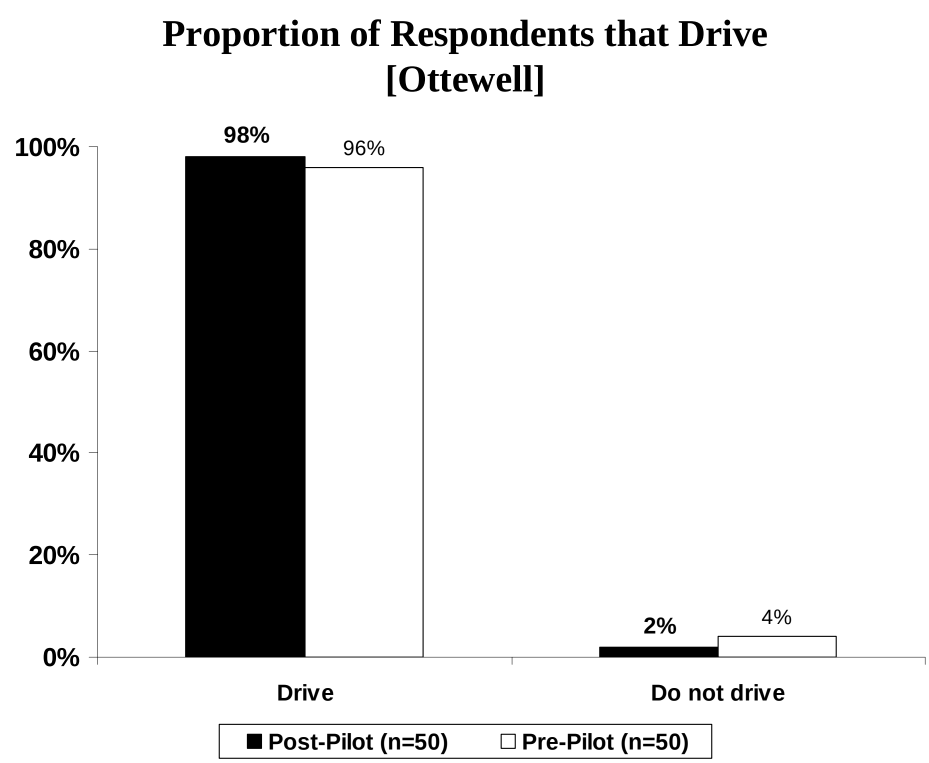


Figure 28

Proportion of Respondents that Drive [Westridge / Wolf Willow]

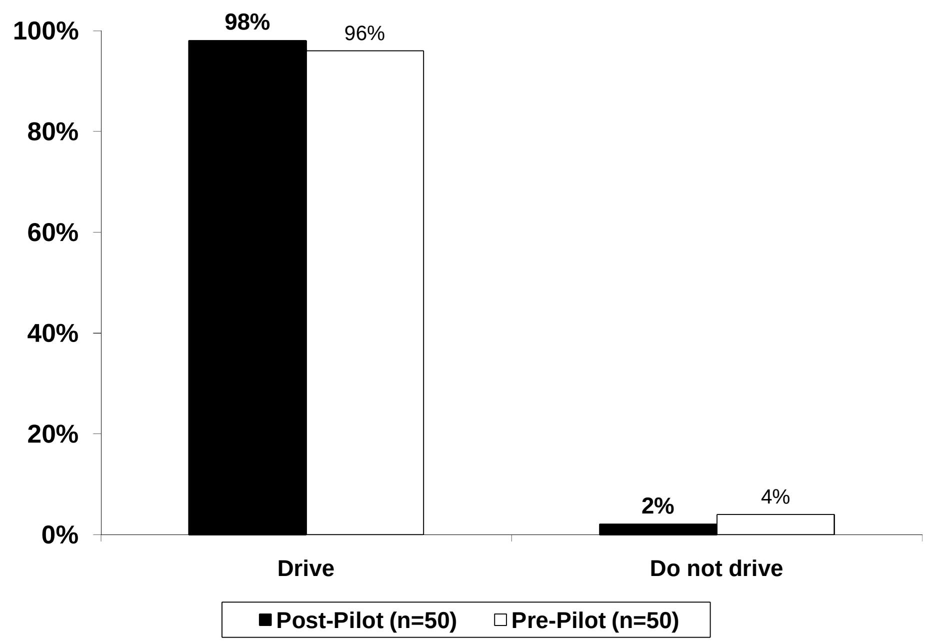
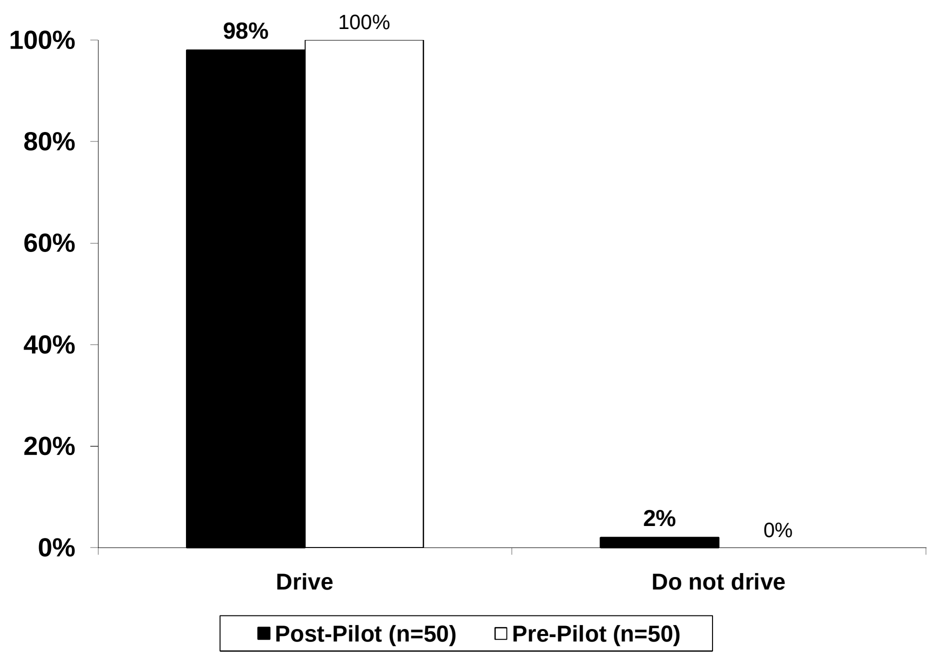


Figure 29

Proportion of Respondents that Drive [Twin Brooks]



Respondents that drove (n=43-49) were asked, considering their driving in the past 6 months, how often they drive at various speeds. Respondents in all communities were most likely to report driving at the speed limit, from 70% in King Edward Park to 90% in Twin Brooks. This was followed, again in all communities, by respondents that stated they drive under the speed limit, from 29% in Twin Brooks to 43% in Ottewell. See Tables 30 through 35, on pages 64 to 66.

Table 30

How often do you drive at the following speeds in your community?

Beverly Heights: Respondents that drive (n=48 Pre-Pilot; n=46 Post-Pilot)	Percent of Respondents											
	Daily		Few Times a Week		Once a Week		Once Every Few Weeks		Rarely / Never		Refuse/ Don't Know	
	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot
Under the speed limit	35	60	13	10	2	2	4	6	46	21	--	--
Right on the speed limit	72	67	20	23	4	4	2	--	2	6	--	--
Up to 5km/hr over the speed limit	26	17	26	17	7	8	11	6	28	52	2	--
6 to 10km/hr over the speed limit	4	4	--	--	7	4	9	6	78	85	2	--
More than 10km/hr over the speed limit	2	--	--	4	--	2	2	--	94	94	2	--

Table 31

How often do you drive at the following speeds in your community?

King Edward Park: Respondents that drive (n=45 Pre-Pilot; n=47 Post-Pilot)	Percent of Respondents											
	Daily		Few Times a Week		Once a Week		Once Every Few Weeks		Rarely / Never		Refuse/ Don't Know	
	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot
Under the speed limit	38	60	11	27	11	2	4	--	36	9	--	2
Right on the speed limit	70	60	19	18	4	4	2	2	4	16	--	--
Up to 5km/hr over the speed limit	17	9	19	18	11	11	6	2	47	60	--	--
6 to 10km/hr over the speed limit	4	--	--	2	4	--	4	4	87	93	--	--
More than 10km/hr over the speed limit	--	--	2	2	--	--	--	--	98	98	--	--

Table 32

How often do you drive at the following speeds in your community?												
Woodcroft: Respondents that drive (n=43 Pre-Pilot; n=43 Post-Pilot)	**Percent of Respondents**											
	Daily		**Few Times a Week**		**Once a Week**		**Once Every Few Weeks**		**Rarely / Never**		**Refuse/ Don't Know**	
	Post-Pilot	**Pre-Pilot**	**Post-Pilot**	**Pre-Pilot**	**Post-Pilot**	**Pre-Pilot**	**Post-Pilot**	**Pre-Pilot**	**Post-Pilot**	**Pre-Pilot**	**Post-Pilot**	**Pre-Pilot**
Under the speed limit	42	72	14	14	12	2	--	--	33	7	--	5
Right on the speed limit	86	47	7	16	--	--	--	5	5	28	2	5
Up to 5km/hr over the speed limit	16	5	9	7	9	5	9	9	54	70	2	5
6 to 10km/hr over the speed limit	--	--	5	--	7	2	--	2	88	93	--	2
More than 10km/hr over the speed limit	--	--	--	--	--	--	--	--	100	98	--	2

Table 33

How often do you drive at the following speeds in your community?												
Ottewell: Respondents that drive (n=48 Pre-Pilot; n=49 Post-Pilot)	**Percent of Respondents**											
	Daily		**Few Times a Week**		**Once a Week**		**Once Every Few Weeks**		**Rarely / Never**		**Refuse/ Don't Know**	
	Post-Pilot	**Pre-Pilot**	**Post-Pilot**	**Pre-Pilot**	**Post-Pilot**	**Pre-Pilot**	**Post-Pilot**	**Pre-Pilot**	**Post-Pilot**	**Pre-Pilot**	**Post-Pilot**	**Pre-Pilot**
Under the speed limit	43	44	27	21	2	4	--	4	29	25	--	2
Right on the speed limit	88	60	8	23	--	6	2	--	2	6	--	4
Up to 5km/hr over the speed limit	12	19	16	17	18	13	2	4	51	48	--	--
6 to 10km/hr over the speed limit	--	4	10	4	4	6	2	8	84	73	--	4
More than 10km/hr over the speed limit	--	--	2	2	4	2	2	--	92	96	--	--

Table 34

How often do you drive at the following speeds in your community?												
	Percent of Respondents											
	Daily		Few Times a Week		Once a Week		Once Every Few Weeks		Rarely / Never		Refuse/ Don't Know	
Westridge/Wolf Willow: Respondents that drive (n=50 Pre-Pilot; n=49 Post-Pilot)	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot
Under the speed limit	29	52	--	14	4	6	--	4	67	22	--	2
Right on the speed limit	80	64	10	14	6	4	--	4	4	14	--	--
Up to 5km/hr over the speed limit	20	6	25	20	8	6	4	6	39	62	4	--
6 to 10km/hr over the speed limit	8	--	12	2	6	4	2	--	67	94	4	--
More than 10km/hr over the speed limit	--	--	2	2	2	--	--	--	92	98	4	--

Table 35

How often do you drive at the following speeds in your community?												
	Percent of Respondents											
	Daily		Few Times a Week		Once a Week		Once Every Few Weeks		Rarely / Never		Refuse/ Don't Know	
Twin Brooks: Respondents that drive (n=50 Pre-Pilot; n=48 Post-Pilot)	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot
Under the speed limit	27	54	15	16	2	4	6	2	50	22	--	2
Right on the speed limit	90	84	4	6	2	4	--	4	4	2	--	--
Up to 5km/hr over the speed limit	17	26	19	22	23	4	10	4	31	44	--	--
6 to 10km/hr over the speed limit	2	8	6	2	15	4	4	4	73	82	--	--
More than 10km/hr over the speed limit	--	2	--	2	2	2	--	4	98	90	--	--

When respondents were asked if they were aware of the current speed limit in their community, the majority of respondents in all communities were aware that the speed limit was 40 km/hr, ranging from 92% in Beverly Heights to 100% in King Edward Park, Ottewell, and Westridge / Wolf Willow. This represents an overall increase from the proportions that correctly stated 50 km/hr in the pre-pilot, with the exception of a small (2%) decrease in Beverly Heights from pre-pilot to post-pilot. See Table 36, below.

Table 36

Are you aware of the current speed limit in your community?												
	Percent of Respondents											
	Beverly Heights (n=50)		King Edward Park (n=50)		Woodcroft (n=50)		Ottewell (n=50)		Westridge / Wolf Willow (n=50)		Twin Brooks (n=50)	
n=300	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot
No/Not aware	4	4	--	8	2	12	--	6	--	4	2	--
40km/hr	92	--	100	--	96	4	100	8	100	4	98	10
50km/hr	--	94	--	74	--	76	--	66	--	84	--	86
60km/hr	2	--	--	10	2	2	--	10	--	4	--	--
35km/hr	--	--	--	--	--	2	--	--	--	--	--	--
30km/hr	--	--	--	8	--	4	--	6	--	2	--	4
20km/hr	2	--	--	--	--	--	--	--	--	--	--	--
Don't know / not stated	--	2	--	--	--	--	--	4	--	2	--	--

Respondents were also asked, in their opinion, if the speed limit was too high, too low or just right. Respondents in Beverly Heights (54%), King Edward Park (62%), Woodcroft (74%), and Ottewell (64%) most frequently rated it as just right. Respondents in Westridge / Wolf Willow (58%) and Twin Brooks (50%) more frequently rated it as too low. See Table 37, below.

Table 37

Is the speed limit … ?								
	Percent of Respondents							
	Too Low		Just Right		Too High		Refuse/ Don't Know	
n=300	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot
Beverly Heights (n=50)	42	--	54	78	4	22	--	--
King Edward Park (n=50)	30	4	62	70	2	24	6	2
Woodcroft (n=50)	18	--	74	46	6	52	2	2
Ottewell (n=50)	34	4	64	72	2	18	--	6
Westridge/Wolf Willow (n=50)	58	--	42	74	--	22	--	4
Twin Brooks (n=50)	50	--	44	86	4	14	2	--

Respondents were asked to rate the effectiveness of reducing the speed limit from 50 km/hr to 40 km/hr in improving traffic safety in their community. Respondents in Ottewell (54%), Beverly Heights (48%), and Woodcroft (48%) were more likely to rate the speed limit reduction as effective (4 or 5 out of 5). Respondents in Westridge / Wolf Willow (40%), Twin Brooks (38%), and King Edward Park (34%) were less likely to rate the speed limit reduction as effective (4 or 5 out of 5). See Table 38, below.

Table 38

Level of Effectiveness of Reducing Speed Limit														
	Percent of Respondents													
	Not at all Effective (1)		(2)		(3)		(4)		Very Effective (5)		Refuse/ Don't Know		Mean	
n=300	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot
Beverly Heights (n=50)	24	28	14	12	14	28	30	8	18	24	--	--	3.04	2.88
Ottewell (n=50)	22	42	8	10	16	18	22	10	32	18	--	2	3.34	2.51
Woodcroft (n=50)	14	20	10	6	26	22	28	20	20	26	2	6	3.31	3.28
King Edward Park (n=50)	14	44	18	6	32	14	22	14	12	18	2	4	3.00	2.54
Twin Brooks (n=50)	26	46	14	18	18	16	22	8	16	10	4	2	2.88	2.16
Westridge/ Wolf Willow (n=50)	36	22	8	20	16	28	20	10	20	18	--	2	2.80	2.82

3.2.2 Pilot Project

Respondents were asked if they were aware that their community had been chosen to participate in the pilot project. The majority of respondents in all communities were aware, with respondents in Westridge / Wolf Willow (98%) and Ottewell (96%) having the highest awareness levels, while respondents in Beverly Heights had lower (76%). See Table 39, below.

Table 39

Are you aware your community has been chosen to participate in a pilot project?						
	Percent of Respondents					
n=300	Yes		No		Refuse/Don't Know	
	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot
Beverly Heights (n=50)	76	46	24	54	--	--
King Edward Park (n=50)	88	30	12	70	--	--
Woodcroft (n=50)	80	50	20	48	--	2
Ottewell (n=50)	96	44	4	56	--	--
Westridge/Wolf Willow (n=50)	98	38	2	62	--	--
Twin Brooks (n=50)	84	68	16	32	--	--

The pilot project utilized a number of methods to monitor speed in the community. Respondents were asked whether they were aware of the following monitors:

- Speed Watch – volunteers book out speed boards from the police stations and monitor speeds on their own.
- Speed Trailer – trailers that are set up to monitor vehicle speeds and display those speeds back to drivers.
- School Dolly – digital speed boards on portable devices that are given to schools to monitor speeds at their school.

Respondents in Ottewell (92%), Westridge / Wolf Willow (90%) were most likely to be aware of the speed trailer, while respondents in King Edward Park (64%) were less likely. Respondents in Twin Brooks were more likely to be aware of the school dolly (64%), while respondents in Woodcroft were least likely (38%). Respondents in Westridge / Wolf Willow were most likely to be aware of speed watch (50%), while respondents in Woodcroft and King Edward Park were least likely to be aware (32% each). See Tables 40 to 42, below and on the following page.

Table 40

Awareness of Speed Watch						
	Percent of Respondents					
	Yes		No		Refuse/Don't Know	
n=300	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot
Beverly Heights (n=50)	38	22	60	78	2	--
King Edward Park (n=50)	32	18	68	82	--	--
Woodcroft (n=50)	32	38	66	60	2	2
Ottewell (n=50)	38	16	62	84	--	--
Westridge / Wolf Willow (n=50)	50	6	50	94	--	--
Twin Brooks (n=50)	46	42	50	56	4	2

Table 41

Awareness of Speed Trailer						
	Percent of Respondents					
	Yes		No		Refuse/Don't Know	
n=300	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot
Beverly Heights (n=50)	74	60	26	40	--	--
King Edward Park (n=50)	64	60	36	40	--	--
Woodcroft (n=50)	70	32	30	66	--	2
Ottewell (n=50)	92	42	8	58	--	--
Westridge / Wolf Willow (n=50)	90	52	10	48	--	--
Twin Brooks (n=50)	88	52	10	48	2	--

Table 42

Awareness of School Dolly						
	Percent of Respondents					
	Yes		No		Refuse/Don't Know	
n=300	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot
Beverly Heights (n=50)	52	38	48	62	--	--
King Edward Park (n=50)	56	28	42	72	2	--
Woodcroft (n=50)	38	18	62	80	--	2
Ottewell (n=50)	56	34	44	64	--	2
Westridge / Wolf Willow (n=50)	40	30	48	70	12	--
Twin Brooks (n=50)	64	32	34	66	2	2

Respondents in Ottewell were most likely to rate all of the speed monitors as effective (4 or 5 out of 5), with 76% rating the speed trailer as effective, 60% rating the school dolly as effective, and 36% rating the speed watch as effective. Respondents in Beverly Heights were less likely to rate the speed trailer (48%) or speed watch (22%), while those in Westridge / Wolf Willow were less likely to rate the school dolly as effective (30%). See Tables 43 to 48, below and on the following pages.

Table 43

Effectiveness of Speed Monitors														
Beverly Heights (n=50)	**Percent of Respondents**													
	Not at all Effective (1)		**(2)**		**(3)**		**(4)**		**Very Effective (5)**		**Refuse/ Don't Know**		**Mean**	
	Post-Pilot	**Pre-Pilot**	**Post-Pilot**	**Pre-Pilot**	**Post-Pilot**	**Pre-Pilot**	**Post-Pilot**	**Pre-Pilot**	**Post-Pilot**	**Pre-Pilot**	**Post-Pilot**	**Pre-Pilot**	**Post-Pilot**	**Pre-Pilot**
Speed Watch	24	18	8	18	20	22	14	20	8	22	26	--	2.65	3.10
School Dolly	8	4	8	6	20	28	20	26	26	30	18	6	3.59	3.77
Speed Trailer	8	6	4	10	26	32	28	22	20	24	14	6	3.56	3.51

Table 44

Effectiveness of Speed Monitors														
King Edward Park (n=50)	**Percent of Respondents**													
	Not at all Effective (1)		**(2)**		**(3)**		**(4)**		**Very Effective (5)**		**Refuse/ Don't Know**		**Mean**	
	Post-Pilot	**Pre-Pilot**	**Post-Pilot**	**Pre-Pilot**	**Post-Pilot**	**Pre-Pilot**	**Post-Pilot**	**Pre-Pilot**	**Post-Pilot**	**Pre-Pilot**	**Post-Pilot**	**Pre-Pilot**	**Post-Pilot**	**Pre-Pilot**
Speed Trailer	8	2	4	12	24	20	10	36	42	28	12	2	3.84	3.78
School Dolly	8	4	6	12	18	14	16	30	28	30	24	10	3.66	3.78
Speed Watch	20	36	6	18	22	12	10	8	22	14	20	12	3.10	2.39

Table 45

Effectiveness of Speed Monitors														
Woodcroft (n=50)	**Percent of Respondents**													
	Not at all Effective (1)		**(2)**		**(3)**		**(4)**		**Very Effective (5)**		**Refuse/ Don't Know**		**Mean**	
	Post-Pilot	**Pre-Pilot**	**Post-Pilot**	**Pre-Pilot**	**Post-Pilot**	**Pre-Pilot**	**Post-Pilot**	**Pre-Pilot**	**Post-Pilot**	**Pre-Pilot**	**Post-Pilot**	**Pre-Pilot**	**Post-Pilot**	**Pre-Pilot**
Speed Trailer	--	12	8	8	18	20	34	26	16	24	24	10	3.76	3.47
School Dolly	8	14	6	6	16	26	18	22	20	20	32	12	3.53	3.32
Speed Watch	12	28	10	16	12	20	24	12	10	18	32	6	3.15	2.74

Table 46

Effectiveness of Speed Monitors														
	Percent of Respondents													
	Not at all Effective (1)		(2)		(3)		(4)		Very Effective (5)		Refuse/ Don't Know		Mean	
Ottewell (n=50)	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot
School Dolly	2	12	2	2	4	12	22	34	38	32	32	8	4.35	3.78
Speed Trailer	4	14	4	6	10	30	30	26	46	20	6	4	4.17	3.33
Speed Watch	14	20	2	14	10	22	12	22	24	10	38	12	3.48	2.86

Table 47

Effectiveness of Speed Monitors														
	Percent of Respondents													
	Not at all Effective (1)		(2)		(3)		(4)		Very Effective (5)		Refuse/ Don't Know		Mean	
Westridge / Wolf Willow (n=50)	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot
Speed Trailer	10	8	6	10	16	16	22	32	42	28	4	6	3.83	3.66
School Dolly	14	4	4	8	6	18	14	30	16	24	46	16	3.26	3.74
Speed Watch	22	18	8	22	16	20	10	12	18	14	26	14	2.92	2.79

Table 48

Effectiveness of Speed Monitors														
	Percent of Respondents													
	Not at all Effective (1)		(2)		(3)		(4)		Very Effective (5)		Refuse/ Don't Know		Mean	
Twin Brooks (n=50)	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot
School Dolly	4	6	6	8	16	14	20	50	32	10	22	12	3.90	3.57
Speed Trailer	8	--	2	14	16	20	32	46	34	16	8	4	3.89	3.67
Speed Watch	14	16	14	22	16	18	10	22	20	16	26	6	3.11	3.00

When respondents were asked to rate the effectiveness of the pilot project, respondents in Ottewell (64%) and Twin Brooks (50%) were most likely to rate it as effective (4 or 5 out of 5). This was followed by King Edward Park (48%), Westridge / Wolf Willow (44%), Beverly Heights (44%), and Woodcroft (38%). See Figures 30 to 35, on pages 75 to 78.

Figure 30

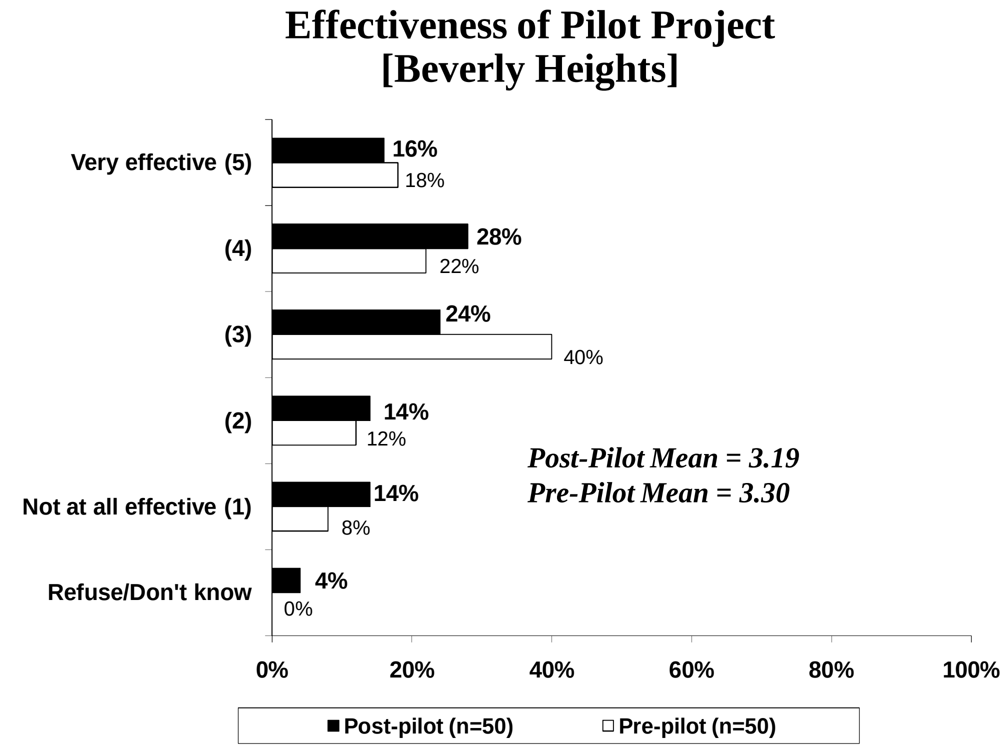


Figure 31

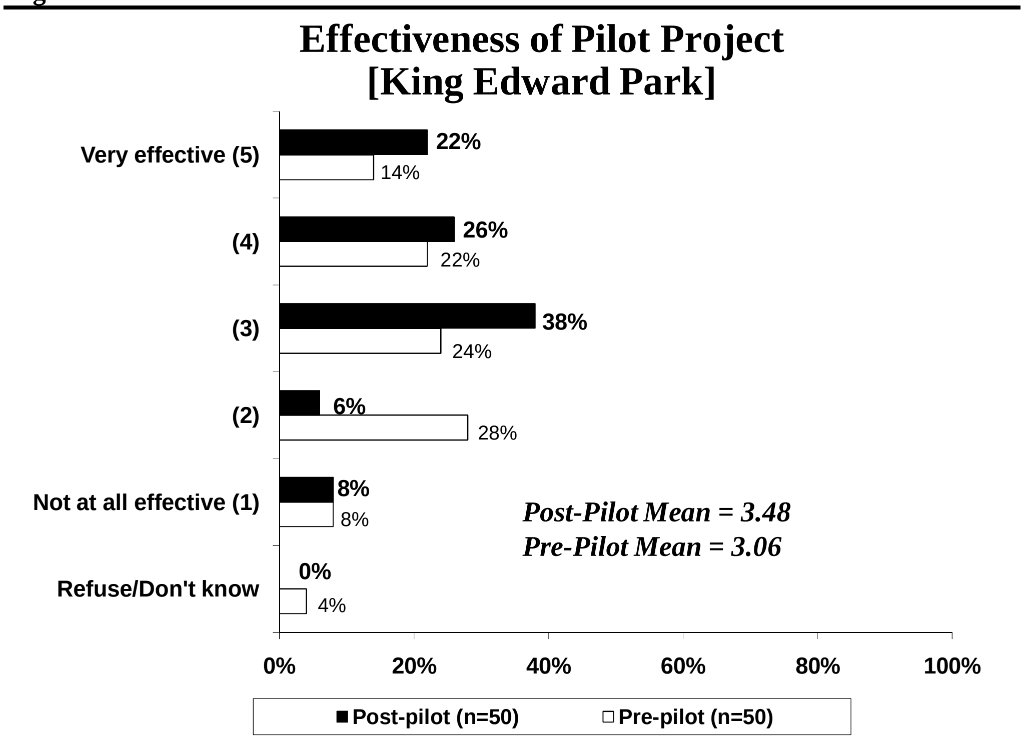


Figure 32

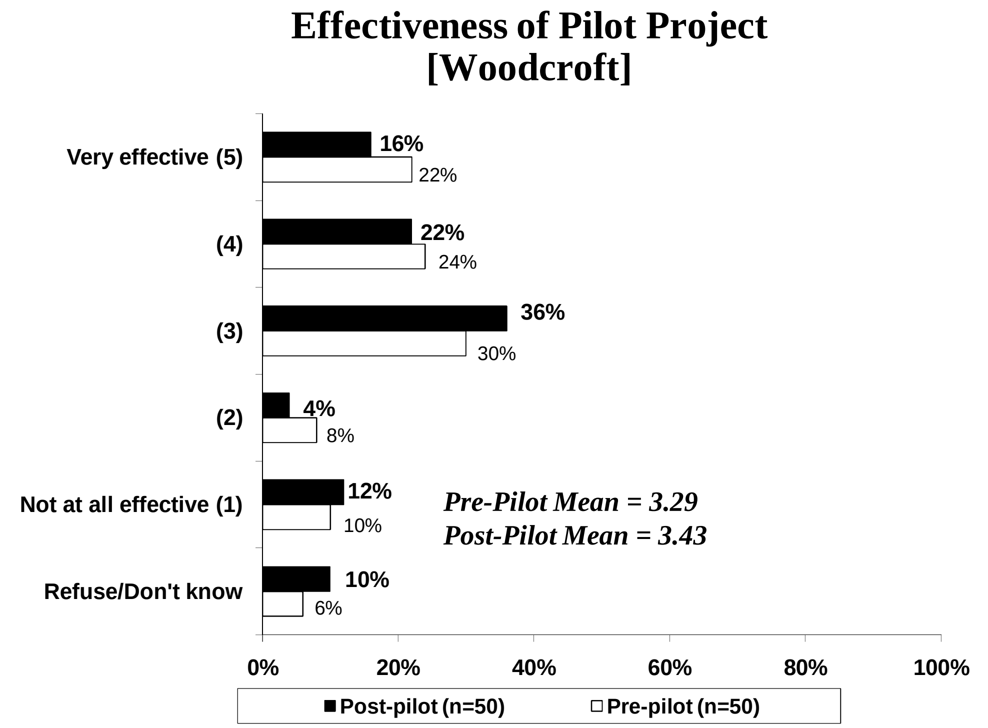


Figure 33

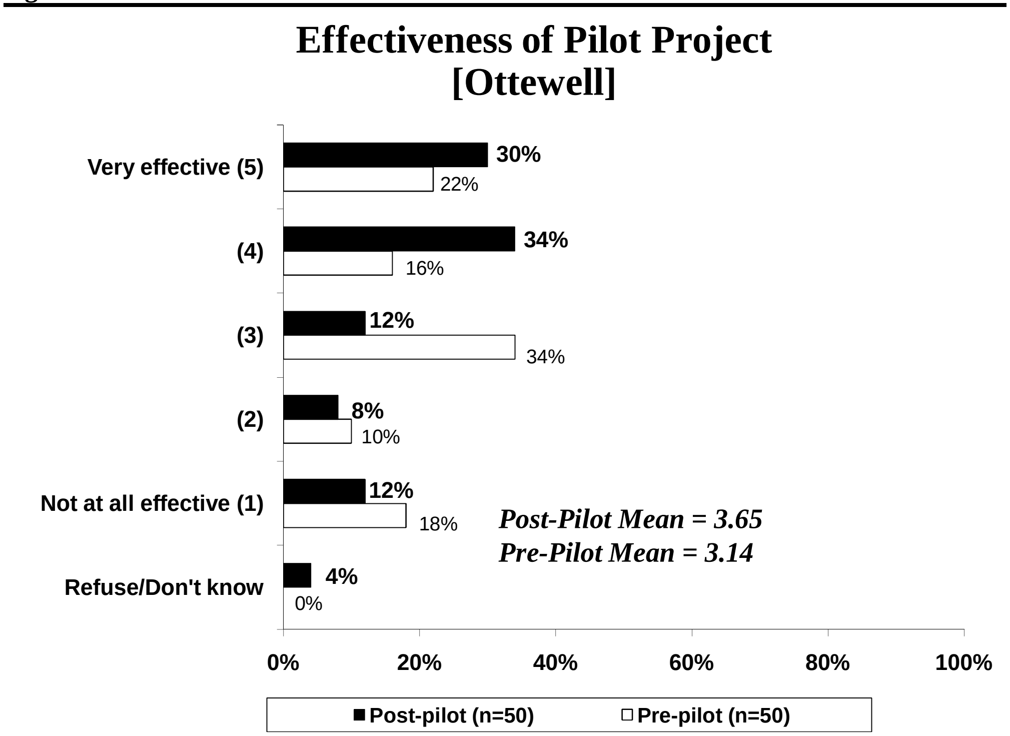


Figure 34

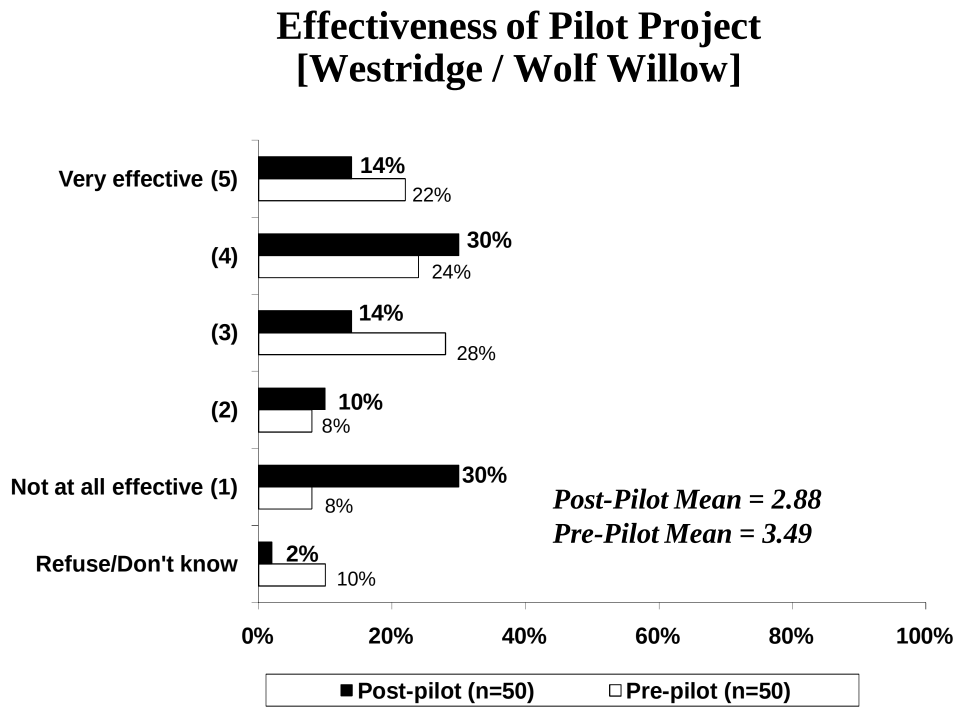
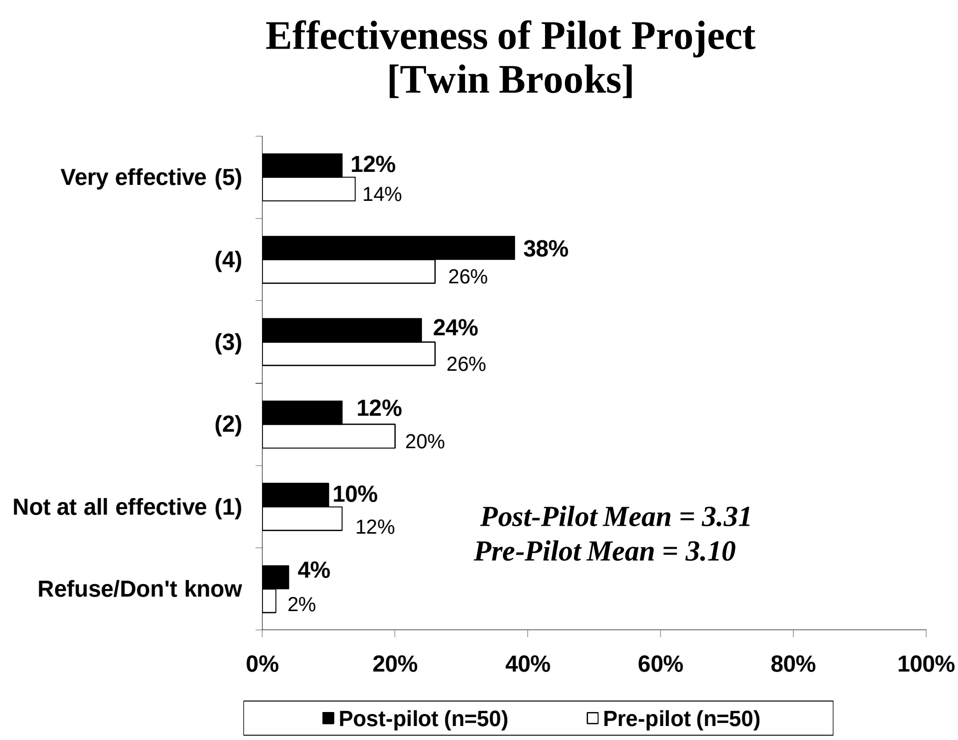


Figure 35



Respondents were next asked to rate the change in traffic speed from six months ago to the present. Respondents in Twin Brooks (64%), Ottewell (60%), and Westridge / Wolf Willow (56%) were most likely to indicate that traffic was slower now (1 or 2 out of 5). Respondents in King Edward Park (40%), Beverly Heights (38%), and Woodcroft (30%) were less likely to state that traffic was slower. See Table 49, below.

Table 49

Change in Traffic Speeds Post-Pilot

	Percent of Respondents						
n=300	**Much Slower Now (1)**	**(2)**	**About the Same (3)**	**(4)**	**Much Faster Now (5)**	**Refuse/ Don't Know**	**Mean**
Beverly Heights (n=50)	16	22	54	2	2	4	2.50
King Edward Park (n=50)	18	22	52	6	--	2	2.47
Woodcroft (n=50)	10	20	60	6	--	4	2.65
Ottewell (n=50)	34	26	38	--	2	--	2.10
Westridge / Wolf Willow (n=50)	44	12	38	4	--	2	2.02
Twin Brooks (n=50)	28	36	30	2	2	2	2.12

Respondents were next asked to rate how important community involvement and support was for success of the pilot project. More than three-quarters of respondents in Woodcroft (78%), Twin Brooks (76%), and King Edward Park (76%) stated that community involvement and support was important (4 or 5 out of 5) for success of the pilot project. Many respondents in Ottewell (66%) and Westridge / Wolf Willow (62%) also stated that community involvement and support was important, while more than half of those in Beverly Heights (58%) stated community involvement was important. See Table 50, below.

Table 50

Importance of Community Involvement and Support for the Success of the Pilot Project														
	Percent of Respondents													
	Not at all Important (1)		(2)		(3)		(4)		Very Important (5)		Refuse/ Don't Know		Mean	
n=300	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot	Post-Pilot	Pre-Pilot
Twin Brooks (n=50)	4	4	8	10	12	14	24	32	52	38	--	2	4.12	3.92
King Edward Park (n=50)	4	--	2	6	16	14	34	34	42	40	2	6	4.10	4.15
Woodcroft (n=50)	12	--	--	4	8	20	32	34	46	42	2	--	4.02	4.14
Ottewell (n=50)	6	4	6	8	16	14	22	28	44	42	6	4	3.98	4.00
Westridge / Wolf Willow (n=50)	12	4	6	2	14	10	20	36	42	46	6	2	3.79	4.20
Beverly Heights (n=50)	8	8	8	--	22	18	22	20	36	54	4	--	3.73	4.12

3.3 Demographics

Table 51, below, contains the demographic profile of pre-pilot respondents, while Table 52, on page 83 contains the demographic profile of post-pilot respondents.

Table 51

Demographic Profile of Pre-Pilot Respondents							
	Percent of Respondents						
	Overall (n=300)	Beverly Heights (n=50)	King Edward Park (n=50)	Woodcroft (n=50)	Ottewell (n=50)	Westridge / Wolf Willow (n=50)	Twin Brooks (n=50)
Community							
Beverly Heights	17	100	--	--	--	--	--
King Edward Park	17	--	100	--	--	--	--
Woodcroft	17	--	--	100	--	--	--
Ottewell	17	--	--	--	100	--	--
Westridge/Wolf Willow	17	--	--	--	--	100	--
Twin Brooks	17	--	--	--	--	--	100
Gender							
Male	49	54	46	46	44	50	56
Female	51	46	54	54	56	50	44
Length of time in Community							
Less than 5 years	15	14	28	16	16	8	6
5 to 10 years	24	18	32	22	12	28	34
More than 10 years	61	68	40	62	72	64	60
Mean years	18.5	22.4	13.1	22.8	23.6	17.2	12.1
Age							
18 to 24 years	1	2	2	2	--	--	--
25 to 34 years	5	4	14	2	4	2	2
35 to 44 years	12	10	16	14	14	8	8
45 to 54 years	24	22	32	12	16	28	34
55 to 64 years	24	34	14	22	14	30	32
65 years and older	31	26	20	42	50	26	20
Refuse, Don't know	4	2	2	6	2	6	4
Mean age in years	57.3	57.0	51.0	61.1	60.8	57.6	56.5
Household Compositions							
Under 13 years old	17	20	18	14	16	18	14
Between 13 and 18 years old	14	6	10	12	12	22	20
Between 19 and 44 years old	41	32	52	36	36	42	50
Between 45 and 64 years old	56	60	48	50	44	60	76
65 years of age or older	33	30	20	42	54	28	24
Refuse, Don't know	2	--	2	2	2	4	--
Mean Household Size	2.55	2.46	2.37	2.24	2.45	2.90	2.90
Demographic Profile of Pre-Pilot Respondents							

	Percent of Respondents						
	Overall (n=300)	**Beverly Heights (n=50)**	**King Edward Park (n=50)**	**Woodcroft (n=50)**	**Ottewell (n=50)**	**Westridge / Wolf Willow (n=50)**	**Twin Brooks (n=50)**
Marital Status							
Single	10	8	22	14	10	2	2
Married or living together as a couple	69	80	54	50	64	78	86
Widowed	9	--	10	22	8	10	4
Separated	2	--	6	--	2	2	--
Divorced	9	8	6	12	16	4	8
Refuse, Don't know	2	4	2	2	--	4	--
Employment Status							
Working full time	47	52	48	38	34	48	62
Working part time	11	4	18	4	16	14	10
Homemaker	5	6	4	6	2	10	2
Student	2	--	6	2	--	--	2
Not employed	3	6	2	4	4	2	--
Retired	30	30	20	44	42	22	24
Refuse, Don't know	2	2	2	2	2	4	--
Current Residence							
Own	85	88	66	72	90	96	100
Rent	14	12	34	28	8	--	--
Refuse, Don't know	1	--	--	--	2	4	--
Household Income							
Less than $50,000	19	20	32	24	30	2	8
$50,000 to less than $100,000	27	38	28	28	24	18	24
$100,000 to less than $150,000	18	16	20	16	14	20	24
$150,000 to less than $200,000	7	4	2	4	--	18	14
$200,000 or more	5	2	2	2	--	20	6
Refuse, Don't know	23	20	16	26	32	22	24

Table 52

Demographic Profile of Post-Pilot Respondents							
	Percent of Respondents						
	Overall (n=300)	Beverly Heights (n=50)	King Edward Park (n=50)	Woodcroft (n=50)	Ottewell (n=50)	Westridge / Wolf Willow (n=50)	Twin Brooks (n=50)
Community							
Beverly Heights	17	100	--	--	--	--	--
King Edward Park	17	--	100	--	--	--	--
Woodcroft	17	--	--	100	--	--	--
Ottewell	17	--	--	--	100	--	--
Westridge/Wolf Willow	17	--	--	--	--	100	--
Twin Brooks	17	--	--	--	--	--	100
Gender							
Male	42	46	40	34	52	38	42
Female	58	54	60	66	48	62	58
Length of time in Community							
Less than 5 years	12	12	10	24	10	12	8
5 to 10 years	25	22	28	18	14	18	50
More than 10 years	63	66	62	58	78	70	42
Mean years	19.0	25.0	20.0	16.1	24.6	17.3	10.7
Age							
18 to 24 years	<1	--	--	-	2	--	--
25 to 34 years	7	4	12	10	6	6	6
35 to 44 years	9	14	4	10	8	6	10
45 to 54 years	28	20	40	28	26	20	32
55 to 64 years	21	22	22	12	16	28	24
65 years and older	32	38	22	38	38	32	24
Refuse, Don't know	3	2	--	2	4	8	4
Mean age in years	57.8	60.3	54.8	58.7	58.2	59.4	55.4
Household Compositions							
Under 13 years old	19	14	16	28	22	14	20
Between 13 and 18 years old	14	10	10	12	14	20	18
Between 19 and 44 years old	38	32	34	44	40	38	42
Between 45 and 64 years old	54	48	66	42	66	62	66
65 years of age or older	39	40	26	46	54	38	24
Refuse, Don't know	1	--	--	--	2	2	--
Mean number of people	2.49	2.26	2.18	2.48	2.84	2.59	2.62
Marital Status							
Single	9	4	18	10	12	4	6
Married or living together as a couple	68	72	54	52	64	84	80
Widowed	11	14	8	22	10	6	8
Separated	1	4	2	--	--	--	--
Divorced	8	4	16	10	8	4	4
Refuse, Don't know	3	2	2	6	6	2	2

Demographic Profile of Post-Pilot Respondents							
	Percent of Respondents						
	Overall (n=300)	Beverly Heights (n=50)	King Edward Park (n=50)	Woodcroft (n=50)	Ottewell (n=50)	Westridge / Wolf Willow (n=50)	Twin Brooks (n=50)
Employment Status							
Working full time	43	34	58	46	36	46	40
Working part time	10	10	6	--	10	16	16
Homemaker	6	4	2	10	6	6	6
Student	1	2	--	--	2	--	--
Not employed	3	8	8	2	--	--	2
Retired	34	40	24	36	42	28	36
Refuse, Don't know	3	2	2	6	4	4	--
Current Residence							
Own	85	90	82	62	84	96	98
Rent	13	10	18	34	12	--	2
Refuse, Don't know	2	--	--	4	4	4	--
Household Income							
Less than $50,000	21	24	22	34	18	8	18
$50,000 to less than $100,000	26	30	40	22	34	14	18
$100,000 to less than $150,000	17	12	14	18	16	16	24
$150,000 to less than $200,000	10	6	6	6	12	14	14
$200,000 or more	7	--	--	--	2	24	14
Refuse, Don't know	20	28	18	20	18	24	12

Appendix A – SURVEY INSTRUMENT: Post and Pre Pilot Survey Questionnaire

Speed Management Pilot Research

City of Edmonton

FINAL: October 12, 2010

INTRODUCTION

Hello, my name is ________ with Banister Research, a professional research firm. We have been contracted to conduct a survey on behalf of the City of Edmonton Office of Traffic Safety and your household has been randomly dialed to participate in this study. I would like to assure you that we are not selling or promoting anything and that all your responses will be kept completely anonymous.

A. For this study, I need to speak to the male or female head of the household. Is that person available?

1. Yes, speaking	**Continue**
2. Yes, I'll get him/her	**Repeat introduction and continue**
3. Not now	**Arrange callback and record first name of selected respondent**

B. **RECORD GENDER: [do not ask]**

1. Male
2. Female

C. This interview will take about 10 minutes. Is this a convenient time for us to talk, or should we call you back?

1. Convenient time	**Continue**
2. Not convenient time	**Arrange callback**

D. Can you please confirm that you currently reside in [community]?

[King Edward Park, Beverly Heights, Ottewell, Twin Brooks, Westridge Wolfwillow, Woodcroft]

1. Yes **Continue**
2. No. **Thank and Terminate.**

E. About how long have you lived in [community]?

________ **RECORD NUMBER OF YEARS**

IF LESS THAN SIX MONTHS THANK AND END INTERVIEW

1. Please indicate how often you or the members of your family travel in the community in the following ways. **[READ LIST]**

    1 – Daily
    2 – Few times a week
    3 – Once a week
    4 – Once every few weeks
    5 – Rarely/Never
    F5 – Don't Know

    a) Drive in the community
    b) Walk in the community
    c) Cycle in the community
    d) Other. Specify: _______________

2. Please indicate on a scale of 1 to 5 with 1 being very unsafe and 5 being very safe, how safe you feel…?

    1 – Very unsafe
    2 –
    3 –
    4 –
    5 – Very safe
    F5 – Don't Know

    a) Walking in your community
    b) Cycling in your community
    c) Driving in your community

2a. [For each 1 or 2] Why do you feel that way? __________________

3. On a scale of 1 to 5, where 1 is not at all concerned and 5 is very concerned, please indicate your level of concern with the…

   1 – Not at all concerned
   2 –
   3 –
   4 –
   5 – Very concerned
   F5 – Don't Know

   a) Number of speeding cars in your community
   b) Current speed limit in your community
   c) Occurrence of fatality or injury caused by high speed in your community
   d) Safety of walkers due to auto traffic in your community
   e) Safety of cyclists due to auto traffic in your community
   f) Safety of children due to auto traffic in your community
   g) Amount of cut-through traffic volume in your community
   h) Amount of tailgating occurring in your community
   i) Number of collisions in your community
   j) Number of near miss collisions in your community
   k) Amount of unsafe driving in your community

4. Do you have any other concerns relating to traffic in your community?

   1 – Yes. Specify: ____________
   2 – No
   F5 – Don't Know

5. Thinking about your driving in the last 6 months, how often do you drive at the following speeds in your community? **[READ LIST]**

   1 – Daily
   2 – Few times a week
   3 – Once a week
   4 – Once every few weeks
   5 – Rarely/Never
   6 – Do not drive
   F5 – Don't Know

   a) Under the speed limit
   b) Right on the speed limit
   c) Up to 5km/hr over the speed limit
   d) 6 to 10km/hr over the speed limit
   e) More than 10km/hr over the speed limit

6. Are you aware of the current speed limit in your community? **[DO NOT READ]**

   1 – Yes. 40km/hr
   2 – Yes. Other: __________
   3 – No
   F5 – Don't Know

7. Are you aware that your community has been chosen to participate in a pilot project to test the impact of lower residential speed limits on the level of traffic safety within Edmonton communities?

   1 – Yes
   2 – No
   F5 – Don't Know

8. The current speed limit in your community is 40km/hr. In your opinion, is this speed limit…? **[READ LIST]**

   1 – Too low

2 – Just right
3 – Too high
F5 – Don't Know

9. On a scale of 1 to 5, where 1 is not at all effective and 5 is very effective, please rate the effectiveness of the reduced speed limit of 40 km/hr in improving traffic safety in your community.

    1 – Not at all effective
    2 –
    3 –
    4 –
    5 – Very effective
    F5 – Don't Know

10. The pilot project utilized a number of methods to monitor speed in your community. Please indicate whether you were aware of the following.

    1 – Yes
    2 – No
    F5 – Don't Know

    a) Speed Watch - where volunteers book out speed boards from the police stations and monitor speeds on their own
    b) Speed Trailer - which are trailers set up to monitor vehicle speeds and display those speeds back to the drivers
    c) School Dolly – which are digital speed boards on portable dollies that are given to schools to monitor speeds at their schools

11. On a scale of 1 to 5, where 1 is not at all effective and 5 is very effective, please rate the effectiveness of the following methods in reducing the speed limit.

    1 – Not at all effective
    2 –
    3 –
    4 –
    5 – Very effective

F5 – Don’t Know

a) Speed Watch
b) Speed Trailer
c) School Dolly

12. On the same scale, please indicate how effective you believe the pilot project overall, including additional speed management controls such as speed watch, the speed trailers and school dollies, were in improving traffic safety in your community.

1 – Not at all effective
2 –
3 –
4 –
5 – Very effective
F5 – Don’t Know

13. On a scale of one to five where 1 means much slower now, 3 means about the same and 5 means much faster now, how would you rate traffic speeds in your community compared to six months ago before the new speed limit was implemented?

1 – Much slower now
2 –
3 – About the same
4 –
5 – Much faster now

13. On a scale of 1 to 5, where 1 is not at all important and 5 is very important, please rate the level of importance of community involvement and support for the success of this pilot project in improving traffic safety in your community.

1 – Not at all important
2 –
3 –
4 –
5 – Very important

F5 – Don’t Know

DEMOGRAPHICS

In order for us to better understand the different views and needs of residents, the next few questions allow us to analyze the data into sub-groups. I would like to assure you that nothing will be recorded to link your answers with you or your household.

D1. First, in what year were you born?

_______ **RECORD YEAR**

F5. (Refused)

D2. Including yourself, how many people in each of the following age groups live in your household? How many are **[READ LIST. RECORD ACTUAL NUMBER.]**

1. Under 13 years old
2. Between 13 and 18 years old
3. Between 19 and 44 years old
4. Between 45 and 64 years old
5. 65 years of age or older

F5. (Not stated)

D3. Which of the following best describes your marital status? Are you **[READ LIST]**?

1. Single, that is, never married
2. Married or living together as a couple
3. Widowed
4. Separated
5. or Divorced

F5. (Not stated)

D4. What is your current employment status? **[READ LIST]**

1. Working full time, including self-employment
2. Working part time, including self-employment
3. Homemaker
4. Student
5. Not employed
6. Retired

F5 (Not stated)

D5. Do you rent or own you current residence?

1. Own
2. Rent

F5 Don't know

D6. Into which of the following categories would you place your total household income before taxes for last year that is for 2009? **[READ LIST]**

1. Less than $50,000
2. $50,000 to less than $100,000
3. $100,000 to less than $150,000
4. $150,000 to less than $200,000
5. $200,000 or more

F5 (Not stated)

That's all of the questions I have. If you have any other comments or suggestions that would improve traffic safety in Edmonton, please direct them to speeding@edmonton.ca. Thank you very much for your help.

Speed Management Pilot Research

City of Edmonton

Final: April 6, 2010

<u>INTRODUCTION</u>

Hello, my name is ________ with Banister Research, a professional research firm. We have been contracted to conduct a survey on behalf of the City of Edmonton Office of Traffic Safety and your household has been randomly dialed to participate in this study. I would like to assure you that we are not selling or promoting anything and that all your responses will be kept completely anonymous.

A. For this study, I need to speak to the male or female head of the household. Is that person available?

1. Yes, speaking	**Continue**
2. Yes, I'll get him/her	**Repeat introduction and continue**
3. Not now	**Arrange callback and record first name of selected respondent**

B. **RECORD GENDER: [do not ask]**

1. Male
2. Female

C. This interview will take about 10 minutes. Is this a convenient time for us to talk, or should we call you back?

1. Convenient time	**Continue**
2. Not convenient time	**Arrange callback**

D. Can you please confirm that you currently reside in [community]?

[King Edward Park, Beverley Heights, Ottewell, Twin Brooks, Westridge Wolfwillow, Woodcroft]

1. Yes **Continue**
2. No. **Thank and Terminate.**

E. About how long have you lived in [community]?

________ **RECORD NUMBER OF YEARS**

IF LESS THAN SIX MONTHS THANK AND END INTERVIEW

14. Please indicate how often you or the members of your family travel in the community in the following ways. **[READ LIST]**

   1 – Daily
   2 – Few times a week
   3 – Once a week
   4 – Once every few weeks
   5 – Rarely/Never
   F5 – Don't Know

   e) Drive in the community
   f) Walk in the community
   g) Cycle in the community
   h) Other. Specify: _______________

15. Please indicate on a scale of 1 to 5 with 1 being very unsafe and 5 being very safe, how safe you feel…?

   1 – Very unsafe
   2 –
   3 –
   4 –
   5 – Very safe
   F5 – Don't Know

   d) Walking in your community
   e) Cycling in your community
   f) Driving in your community

2a. [For each 1 or 2] Why do you feel that way? __________________

16. On a scale of 1 to 5, where 1 is not at all concerned and 5 is very concerned, please indicate your level of concern with the…

    1 – Not at all concerned
    2 –
    3 –
    4 –
    5 – Very concerned
    F5 – Don't Know

    l) Number of speeding cars in your community
    m) Current speed limit in your community
    n) Occurrence of fatality or injury caused by high speed in your community
    o) Safety of walkers due to auto traffic in your community
    p) Safety of cyclists due to auto traffic in your community
    q) Safety of children due to auto traffic in your community
    r) Amount of cut-through traffic volume in your community
    s) Number of collisions in your community
    t) Number of near miss collisions in your community
    u) Amount of unsafe driving in your community

17. Do you have any other concerns relating to traffic in your community?

    1 – Yes. Specify: ____________
    2 – No
    F5 – Don't Know

18. Thinking about your driving in the last 3 months, how often do you drive at the following speeds in your community? **[READ LIST]**

    1 – Daily
    2 – Few times a week
    3 – Once a week
    4 – Once every few weeks
    5 – Rarely/Never
    6 – Do not drive
    F5 – Don't Know

    f) Under the speed limit
    g) Right on the speed limit
    h) Up to 5km/hr over the speed limit
    i) 6 to 10km/hr over the speed limit
    j) More than 10km/hr over the speed limit

19. Are you aware of the current speed limit in your community? **[DO NOT READ]**

    1 – Yes. 50km/hr
    2 – Yes. Other: __________
    3 – No
    F5 – Don't Know

20. The current speed limit in your community is 50km/hr. In your opinion, is this speed limit…? **[READ LIST]**

    1 – Too low
    2 – Just right
    3 – Too high
    F5 – Don't Know

21. On a scale of 1 to 5, where 1 is not at all effective and 5 is very effective, please anticipate the effectiveness of reducing the speed limit from 50km/hr to 40 km/hr in improving traffic safety in your community.

    1 – Not at all effective
    2 –
    3 –
    4 –
    5 – Very effective
    F5 – Don’t Know

22. Are you aware that your community has been chosen to participate in a pilot project to test the impact of lower residential speed limits on the level of traffic safety within Edmonton communities?

    1 – Yes
    2 – No
    F5 – Don’t Know

23. The pilot project will make use of a number of methods to monitor speed in your community. Please indicate whether you were aware of the following.

    1 – Yes
    2 – No
    F5 – Don’t Know

    d) Speed Watch - where volunteers book out speed boards from the police stations and monitor speeds on their own
    e) Speed Trailer - which are trailers set up to monitor vehicle speeds and display those speeds back to the drivers
    f) School Dolly – which are digital speed boards on portable dollies that are given to schools to monitor speeds at their schools

24. On a scale of 1 to 5, where 1 is not at all effective and 5 is very effective, please rate the anticipated effectiveness of the following methods in reducing the speed limit.

    1 – Not at all effective
    2 –
    3 –
    4 –
    5 – Very effective
    F5 – Don't Know

    d) Speed Watch
    e) Speed Trailer
    f) School Dolly

25. On the same scale, please indicate how effective you believe the pilot project overall, including additional speed management controls such as speed watch, the speed trailers and school dollies, will be in lowering residential speed limits.

    1 – Not at all effective
    2 –
    3 –
    4 –
    5 – Very effective
    F5 – Don't Know

26. On a scale of 1 to 5, where 1 is not at all important and 5 is very important, please rate the level of importance of community involvement and support for the success of this pilot project in improving traffic safety in your community.

1 – Not at all important
2 –
3 –
4 –
5 – Very important
F5 – Don't Know

DEMOGRAPHICS

In order for us to better understand the different views and needs of residents, the next few questions allow us to analyze the data into sub-groups. I would like to assure you that nothing will be recorded to link your answers with you or your household.

D1. First, in what year were you born?

_______ **RECORD YEAR**
F5. (Refused)

D2. Including yourself, how many people in each of the following age groups live in your household? How many are **[READ LIST. RECORD ACTUAL NUMBER.]**

1. Under 13 years old
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5. 65 years of age or older

F5. (Not stated)

D3. Which of the following best describes your marital status? Are you **[READ LIST]**?

1. Single, that is, never married
2. Married or living together as a couple
3. Widowed
4. Separated
5. or Divorced

F5. (Not stated)

D4. What is your current employment status? **[READ LIST]**

7. Working full time, including self-employment
8. Working part time, including self-employment
9. Homemaker
10. Student
11. Not employed
12. Retired

F5 (Not stated)

D5. Do you rent or own you current residence?

3. Own
4. Rent

F5 Don't know

D6. Into which of the following categories would you place your total household income before taxes for last year that is for 2009? **[READ LIST]**

6. Less than $50,000
7. $50,000 to less than $100,000
8. $100,000 to less than $150,000
9. $150,000 to less than $200,000
10. $200,000 or more

F5 (Not stated)

That's all of the questions I have. Thank you very much for your help.