

Arterial Road Speed Reduction Program  
Springfield Road, Kelowna, BC

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## ABSTRACT

Springfield Road in Kelowna, BC by 2011 had become one of the community's highest collision frequency corridors over the past decade. Analysis of the types of collisions occurring at the corridor intersections indicated an over-representation of collision types associated with excessive speed. Speed studies were conducted that identified an 85 percentile speed of 71 km/h on this corridor that is posted at 50 km/h. These results reflected the growing number of complaints from area residents regarding unsafe speeds.

Springfield Road is a four-lane arterial roadway with bike lanes and sidewalks on both sides. It is a key commuter route into the City Centre, but also serves local access as residential lands have access onto the roadway. The multi-function needs of the corridor increases the importance of compliance to appropriate posted speeds.

It was understood that a concerted effort utilizing a '5E' approach – Engineering, Encouragement, Education, Enforcement and Evaluation – was needed to reduce speeds.

A working group of City staff, RCMP, and the Insurance Corporation of British Columbia (ICBC) was struck to develop an Integrated Speed Reduction Plan. The resulting plan consisted of:

- |               |  |
|---------------|--|
| Engineering:  | <ul style="list-style-type: none"> <li>• A 'Green Wave' of signal timings based on the posted speed limit</li> <li>• Speed reader board installations</li> <li>• Red '50' box markings at the start of the corridor</li> <li>• Speed activated red light signal</li> </ul> |
| Encouragement | <ul style="list-style-type: none"> <li>• Increased SpeedWatch activity</li> <li>• Speed reader board monitoring</li> <li>• Red '50' markings</li> </ul>  |
| Enforcement:  | <ul style="list-style-type: none"> <li>• Enhanced enforcement plan</li> <li>• '3 strikes and you're out' initiative</li> </ul>   |
| Education:    | <ul style="list-style-type: none"> <li>• 'Green Wave' signage and Media launch</li> <li>• Web site development</li> <li>• Earned Media</li> </ul>  |
| Evaluation    | <ul style="list-style-type: none"> <li>• Speed measurements</li> <li>• Collision tracking</li> <li>• Public response</li> </ul>  |

The program results highlight how driving behaviour be influenced by coordinating efforts of partnering agencies and integrating speed reduction strategies. All measures are highly visible and have reduced the frequency of complaints from area residents. Implementation of the 5E measures has resulted in a 7% reduction of the 85<sup>th</sup> percentile speeds and 8% reduction in 50<sup>th</sup> percentile speeds. The speed reductions have been sustained over the past three years.

Future evaluation will include the continuation of corridor speed monitoring. In addition, an evaluation of the impact of the measures on addressing collisions is currently being undertaken by the University of British Columbia – Okanagan and should be available by year end.

INTRODUCTION

It would be desirable for every arterial road in our communities to have the sole function of moving traffic through the neighbourhood, with properly spaced intersections having great sight lines, and with limited driveways with adjacent land use obtaining access from the side streets. In reality, however, many of our arterial roads are similar to that of Springfield Road in Kelowna, BC. Many arterial roads have adjacent incompatible land uses that have been there for decades as the importance of the roadway to serve an arterial function has increased.

The result is a roadway serving multiple functions including both through commuter traffic and the access needs of local traffic. Multiple lanes are provided to ensure capacity for the peak traffic, thereby encouraging higher speeds during the off-peak times. The amount of traffic and the speeds make accessing the adjacent land use difficult.

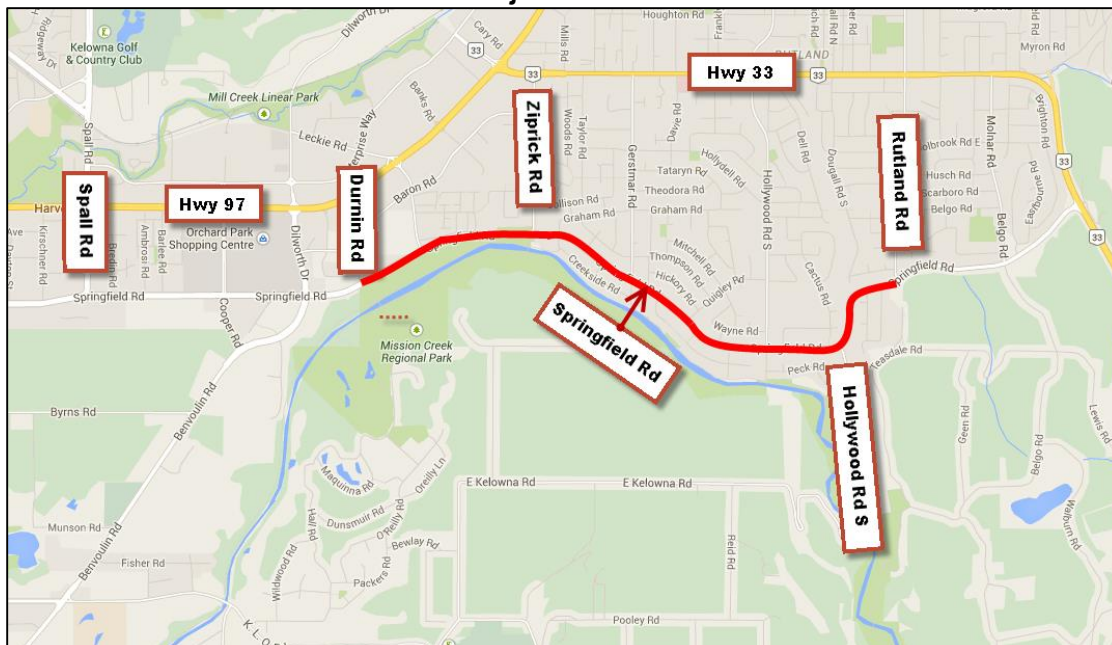
Long-term transportation and land use planning address the incompatibilities over time, but in the meantime conflicts occur and pressure is rightfully put on City staff and police enforcement to address the issue. Addressing speeding on an arterial road is difficult – the toolbox for traffic calming is typically reduced due to the high pedestrian volumes and the types of vehicles on an arterial road. While difficult, it is not impossible. Experience throughout North America have shown that a concerted, integrated effort using the 5 E’s of Engineering, Education, Encouragement, Enforcement, and Evaluation can influence speeds on arterial roads.

This paper describes one such experience in Kelowna, BC.

BACKGROUND

Springfield Road is a key east-west commuter route in Kelowna connecting the Rutland community at Hwy 33 with the City Centre. The subject corridor is a 4 km portion of Springfield Road from Durnin Road to Rutland Road as shown in Figure 1.

Figure 1  
Subject Corridor



The importance of Springfield Road has grown over time as has the roadway itself. In 2003 the roadway was expanded to a 4-lane cross-section with bike lanes and sidewalks on both sides (see Figure 2). Currently, Springfield Road has an Average Annual Daily Traffic of approximately 23,000 vehicles per day at the east end and 40,000 vehicle per day at the west end.

**Figure 2**  
**Roadway Cross-Section**



A total of 14 intersections are included in the study area; 5 of them are signalized, 2 are pedestrian signals, and the other 7 intersections are stop controlled. The posted speed along the corridor is 50 km/h with the exception of a 1-km section of 60 km/h between Ziprick Road and Durnin Road.

The adjacent land use is a mixture of parkland, single and multi-family residential. Driveway density is relatively high (56 driveways/km) between Ziprick Road and Hollywood Road South, as is typical for single family use.

The City of Kelowna directed resources to improve the safety of the Springfield Road corridor in 2007 by undertaking a Traffic Safety and Operational Analysis (CH2MHill Sep 2007). The City has been implementing the recommendations since then as funds permit. However, public concern regarding the safety of the corridor increased in 2009 and 2010 due to a series of severe collisions. Staff and Council responded with an investigation of options which resulted in the 2011 implementation of the Arterial Road Speed Reduction Program.

## TRAFFIC SAFETY AND OPERATIONAL REVIEW

A joint study by the City of Kelowna and Insurance Corporation of British Columbia (ICBC) was undertaken in 2007 to identify safety and operational concerns of the Springfield Road corridor along with potential safety improvements. CH2MHill's *Springfield Road Between Durnin Road and Rutland Road Safety and Operational Analysis* (September 2007) indicated that the corridor wasn't particularly collision prone, as the collision rate was lower than the critical rate for similar corridors. However, speeds were found to be considerably over the posted speed limit and likely contributing to an over-representation of speed related collision types. Fatal collisions on the corridor also highlighted the safety risks of some of the corridor movements relative to the observed speeds.

A number of options to improve the traffic operation and safety at these intersections were generated and investigated. Selected options were then evaluated from a safety perspective to determine the potential ICBC contribution to safety improvements. The options considered in this study ranged from short to long-term and included: revision to signal timings, reduction to the right-turn radii, red light cameras, signalizing the right-turn movements, pavement markings, and addition of raised medians.

Since the study was completed, the City of Kelowna has been implementing the priority recommendations with financial assistance from ICBC through its Road Improvement Program.

**MULTI-DISCIPLINARY APPROACH**

Although the engineering improvements reduced the targeted collisions at the improvement locations, overall corridor crashes continued to rise from 2007 to 2010. In addition, high profile high speed collisions prompted an increase in public complaints regarding speed through the corridor, resulting in numerous uncoordinated responses by the City and the RCMP. The issue was brought in front of City Council a couple of times with the result that Council approved embarking on an integrated multidisciplinary speed reduction program.

The reasons motorists speed are varied and complex. Addressing the speeding issue therefore benefits from a multifaceted integrated approach using the 5 E's: Engineering, Encouragement, Education, Enforcement, and Evaluation. Such an approach needed to be customized for the Springfield Road corridor. A task force made up of personnel from the City of Kelowna, the RCMP and ICBC was struck to develop and implement the plan.

The following table identifies which component each organization was responsible for:

	City of Kelowna	ICBC	RCMP
Engineering	✓	✓	
Encouragement	✓	✓	✓
Education	✓	✓	✓
Enforcement			✓
Evaluation	✓*	✓	✓

\* With assistance from the University of British Columbia (Okanagan)

A summary of the measures taken along the Springfield Road corridor are described below including both the engineering measures recommended in the 2007 traffic and safety operational review and the 5 E measures that form the integrated speed reduction program.

**ENGINEERING**




A number of engineering projects were undertaken in response to the recommendations of the traffic safety and operational review. These projects were not part of the Arterial Road Speed Reduction Program, but are noted here as they were undertaken on the corridor near the timing of the program and had an impact on collision frequency.

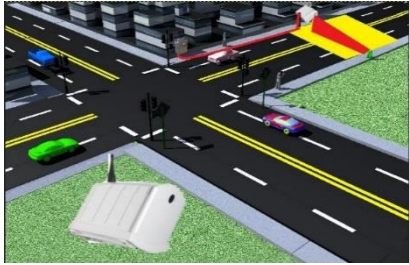
**Figure 3  
Corridor Crashes**



Project	Year
Springfield and Graham – raised median to restrict intersection to right-in / right-out	2008
Springfield and Leckie – eastbound left turn protected phase and southbound right turn lane	2008
Springfield and Rutland – realignment of the north leg to improve intersection angle	2009
Springfield and Gerstmar – painted median island and eastbound left turn guide lines.	2009
Springfield and Durnin – centre median to formalize left turns and restrict left turn outs from Durnin.	2014
Springfield and Hollywood – channelized medians for northbound protected tee and eastbound right turn lane.	2014
Springfield and Ziprick – modified right turn channelization to improve approach angle.	2014


The engineering projects that were part of the coordinated speed reduction program included the following:

Project	Year
<p><u>Traffic Signal Optimization – Green Wave</u> The traffic signals throughout the corridor were optimized with priority given to maintain progression in both directions on Springfield Road. Motorists were informed through signage that the signals were timed for the posted speed limit, and that a “Green Wave” would take them through the corridor without stopping.</p>	 <p>2011</p>
<p><u>Red 50 Pavement Markings</u> A total of four Red 50 pavement markings were installed within the Springfield Road corridor that highlighted the speed limit. These were large red squares covering both travel lanes with the posted speed limit included.</p>	 <p>2011</p>
<p><u>Speed Reader Board Signs</u> Four speed reader board signs were strategically placed throughout the corridor. The placement supplemented the gaps in the traffic signal spacing that were considered too long to hold the platoon of motorists together that were “catching the wave”.</p>	 <p>2011</p>

Project	Year
<p><u>Speed Sensitive Traffic Signals</u> Smartmicro radar detection equipment has been installed at three intersections, covering four approaches on Springfield road. Motorists traveling eastbound towards Ziprick, westbound towards Hollywood, or eastbound or westbound towards Gerstmar will have their speeds measured by radar.</p>  <p>The intent of this new equipment is to detect speeding traffic, input that information to the traffic controller from where it can be processed to change the traffic signals and stop the speeding vehicle with a red signal. From 10 pm to 7 am when the signals are not coordinated, vehicles traveling between 70 and 90 km/h will initiate a call to the signal controller to turn the traffic signal red. Strict protocols are in place that consider the distance of the approaching vehicle from the intersection, pedestrian activity, and side street activity in order that the red light is not called at an improper time.</p>	<p>2015</p>

ENCOURAGEMENT

Measures that were implemented in order to encourage motorists to comply with the posted speed limits are described below.

Project	Year
<p><u>Increased SpeedWatch Activity</u> Speed Watch is an educational program aimed at reducing incidents of speeding. It is designed to raise public awareness of the actual speeds drivers are traveling. The Speed Watch program is conducted in partnership with the police, citizen volunteers and ICBC.</p> 	<p>2011 - 2012</p>
<p><u>Speed Reader Boards</u> Although the installation of the speed reader boards was an engineering initiative, the purpose of the on-going operation is to encourage proper driving speeds. On a wide four-lane roadway with bike lanes it is relatively easy to exceed the speed limit – the speed reader boards reminds these drivers of their excess speeds and encourages compliance.</p>	<p>2011 on-going</p>
<p><u>Red 50 Pavement Markings</u> Similarly, the Red 50 pavement markers provide a reminder to the motorists of the 50 km/h speed limit in order to encourage compliance.</p>	<p>2011 on-going</p>

EDUCATION

Initiatives were undertaken to educate the Kelowna motorists on the speed issue and the many measures taken to address the safety concern.


Project	Year
<p><u>Media Launch</u> A media launch was held at the start of the Springfield Road speed reduction program in order to promote safe speeds within the corridor. The concept of the “Green Wave” was promoted to highlight that there is no benefit in travel time if you speed through the corridor. A further media launch was held with the implementation of the speed sensitive traffic signals – again to highlight the disbenefit of increased delays caused by speeding.</p>	<p>2011 and 2015</p>
<p><u>City Web Page</u> The City of Kelowna created a webpage to explain the concept of the Green Wave and to promote safe speeds within the Springfield Road corridor. The website describes how the signal timings allow the motorists traveling through the corridor arrive at green lights, whereas speeding motorists will likely encounter red lights. Recent web page additions highlight the speed sensitive traffic signals and warn motorists that speeders will activate the red light.</p>	<p>2011 and 2015</p>
<p><u>Earned Media</u> Whenever they get the chance, City staff provide information on the speed reduction initiatives for Springfield Road to the media in order to educate new residents and remind existing residents.</p>	<p>On-going</p>



ENFORCEMENT

The enforcement component of the arterial road speed reduction program was the component that had the potential to be the weakest link. Increased service plans were developed for enforcement on the corridor, but it was realized that the ability to implement the increased enforcement plan was subject to available police members. As with most BC communities, personnel levels within the Traffic Section of the RCMP were not stable and it was unclear whether increased enforcement was possible. In the end, the RCMP were not only able to increase enforcement during the implementation year, but they have also been able to maintain a higher level of enforcement since.



Project		Year								
<p><u>Speed Enforcement</u> Enforcement of speeding along the corridor is an effective tool to reduce speeds, but high levels of enforcement needed to sustain compliance are hard to achieve with manpower limitations. The RCMP have been able to prioritize the corridor for enforcement since 2011 as is shown by the number of enforcement contacts over the recent years.</p>	<table border="1"> <thead> <tr> <th>Year</th> <th>Enforcement Contacts (Yearly Average)</th> </tr> </thead> <tbody> <tr> <td>2006 to 2010</td> <td>458 / yr</td> </tr> <tr> <td>2011 to 2012</td> <td>680 / yr</td> </tr> <tr> <td>2013</td> <td>925 / yr</td> </tr> </tbody> </table>	Year	Enforcement Contacts (Yearly Average)	2006 to 2010	458 / yr	2011 to 2012	680 / yr	2013	925 / yr	2011 and on-going
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<p><u>“3 Strikes and You’re Out”</u> As much as possible, the RCMP coordinate with the SpeedWatch volunteers to participate in a “3 Strikes and You’re Out” activity. The reference to 3 strikes is to: Strike 1 – Speeding motorist ignores the speed limit sign Strike 2 – Speeding motorist ignores the SpeedWatch volunteers Strike 3 – Speeding motorist receives a speeding ticket by the RCMP.</p>		2011 and on-going								

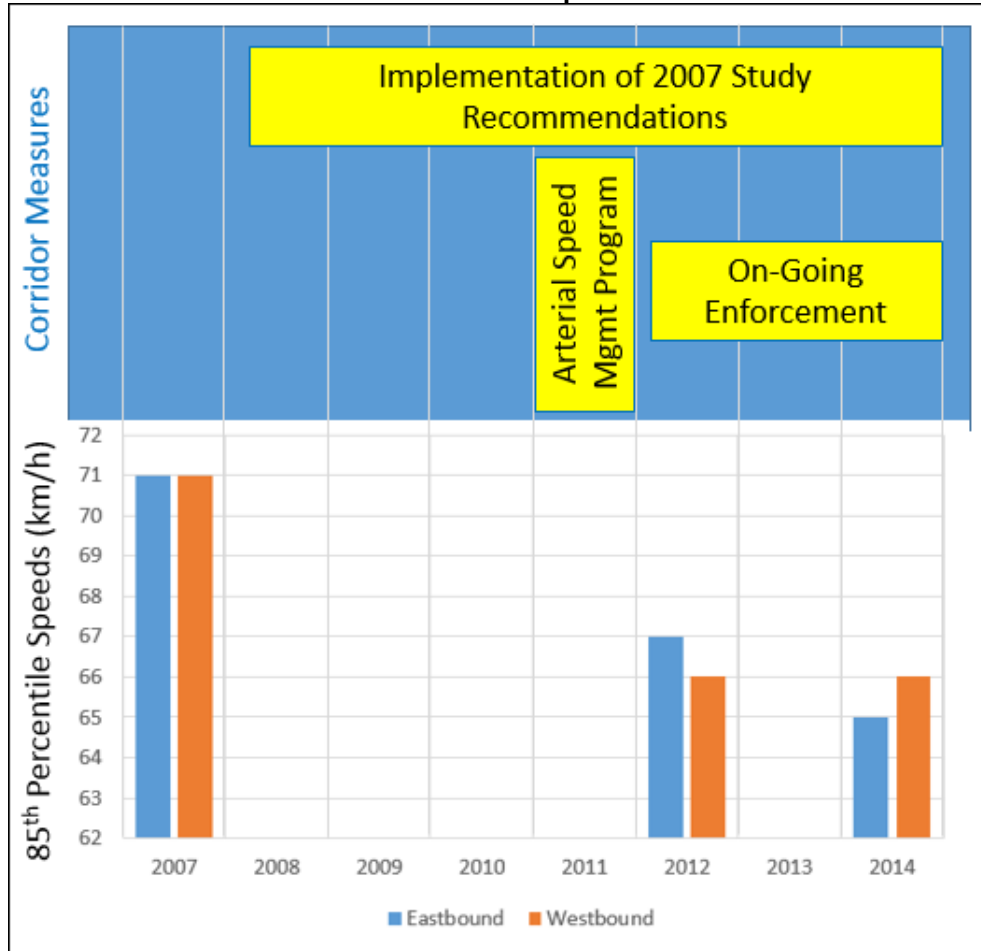
EVALUATION

Speed measurements taken at the start of the Springfield traffic safety and operational review identified the degree of non-compliance with the 50 km/h posted speed limit. The 85<sup>th</sup> percentile speeds for both the east and westbound directions were 71 km/h (50<sup>th</sup> percentile speeds were 63 km/h). After the measures of the Arterial Speed Reduction Program were implemented the 85<sup>th</sup> percentile speeds dropped to 67 km/h (eastbound) and 66 km/h (westbound) which is an approximate 6% reduction in speed. The Green Wave, speed reader boards, the Red 50 markings, and an increased level of enforcement have been in place since. This has resulted in the measured speeds to remain at their lower value (65 km/h eastbound and 66 km/h westbound). The 50<sup>th</sup> percentile speeds have reduced approximately 8% since before the program started. The speed reduction relative to the timing of the measures is graphically shown in Figure 4.

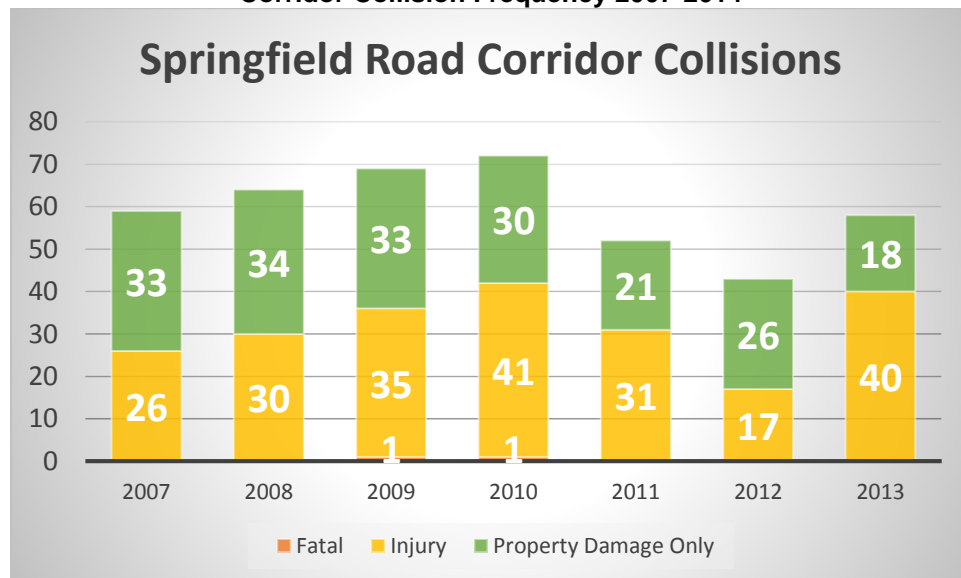
A detailed analysis of the Arterial Speed Reduction Program and its impact on corridor collisions has just been started by the University of British Columbia (Okanagan). This study will utilize control sites and identify any significant change in collision rates relative to the program measures. In the interim, Figure 5 shows the collision frequency throughout the study corridor from 2007 to 2014. The numbers show a noticeable reduction in crashes the year the program was implemented with collision frequency increasing again in 2014 (but still less than before the program started).

A key outcome of the Arterial Speed Reduction Program has been the elimination of complaints from the neighbourhood regarding the Springfield Road corridor. This may be attributable to reduction in speeds within the corridor, but likely also has to do with recognition that a concerted effort has gone into addressing the issue.

**Figure 4**  
**85<sup>th</sup> Percentile Speeds**



**Figure 5**  
**Corridor Collision Frequency 2007-2014**



## CONCLUSIONS

The Springfield Road Speed Reduction Program illustrates how a multi-disciplinary program of integrating engineering, encouragement, education, enforcement and evaluation measures can influence speeds on an arterial corridor. In this case motivated partners worked together to implement proven countermeasures and innovational measures and have been rewarded to date with lower speeds, reduced collisions, and the elimination of public complaints.

## REFERENCES

CH2M Hill Canada Limited. 2007. *Springfield Road Between Durnin Road and Rutland Road, Kelowna, BC, Safety and Operational Analysis.*