‘Slow Down’ or ‘Not to Slow Down’
A Before-after study on effectiveness of SLOWS trailers in Calgary

Surendra Mishra, M.Sc., P. Eng.
Traffic Engineer, The City of Calgary

Tony Churchill, P. Eng.
Sr. Traffic Engineer, The City of Calgary
Outline

- Introduction
- Before-after speed study
- Methodology
  - Speed data collection
  - Analysis of results
- Conclusions
- Next Steps/Further Research
- Lessons Learned from Calgary
Introduction

- Vehicle Activated Traffic Calming Signs (VATCS)
- Speed Limit Observation and Warning System (SLOWS)
- SLOWS vs iSLOWS
- City of Calgary’s SLOWS trailers rotation program
Before-after speed study

Objectives:
– To evaluate the effectiveness of SLOWS trailers in reducing speed during rotation
– To evaluate if there is any lasting effect

Study locations:
Location 1 – Maple Creek Drive & Maple Ridge Cres. SE, Calgary
(Speed limit: 50 km/h)
Comparison site: 20 Street & 29 Av SW (Speed limit: 50 km/h)
Location 2 – 1 Avenue & Penworth Drive SE, Calgary (Playground Zone)
Methodology

Data Collection:
- 24 hour speed data collected using rubber tubes
- Connected to automated counter
- 1-2 weeks before, during installation and 2 weeks after removal of the SLOWS trailers

Location 1: (Speed Limit 50 km/h)

<table>
<thead>
<tr>
<th>Statistic</th>
<th>Before</th>
<th>During</th>
<th>After</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean Speed (km/h)</td>
<td>46.78</td>
<td>43.57</td>
<td>45.06</td>
</tr>
<tr>
<td>85th Percentile Speed (km/h)</td>
<td>55.87</td>
<td>51.11</td>
<td>52.60</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>9.97</td>
<td>8.42</td>
<td>7.77</td>
</tr>
</tbody>
</table>

Comparison site: (Speed Limit 50 km/h)

<table>
<thead>
<tr>
<th>Statistic</th>
<th>Before</th>
<th>No SLOWS trailer installed</th>
<th>After</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean Speed (km/h)</td>
<td>47.52</td>
<td></td>
<td>47.53</td>
</tr>
<tr>
<td>85th Percentile Speed (km/h)</td>
<td>53.54</td>
<td></td>
<td>54.19</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>6.64</td>
<td></td>
<td>7.06</td>
</tr>
</tbody>
</table>
Results:

Maple Creek Dr & Maple Ridge Cres SE (50 km/h)

Before: Average Speed 46.78, 85th Percentile Speed 55.87
During: Average Speed 42.57, 85th Percentile Speed 51.11
After: Average Speed 45.06, 85th Percentile Speed 52.60
Significance tests:

T-Tests: Before & during, Before & after removal of SLOWS trailers

Null Hypothesis (H0): Mean Speeds before and during SLOWS trailer are equal
Reject H0: We can say with 95% confidence that mean speeds are significantly different
Cannot reject H0: There is not sufficient evidence to reject null hypothesis that the two mean speeds are equal

ANOVA
Results: Before & During SLOWS trailers
Mean speed reduced by 3.21 km/h from 46.78 km/h to 43.57 km/h
(Statistically significant at 95% confidence level:
t Stat 6.70>tCritical 1.96)
Before & After removal:
Mean speed reduced by 1.72 km/h from 46.78 km/h to 45.06 km/h
(Statistically significant at 95% confidence level)

ANOVA: F= 24.90> Fcrit (2.99), (p-value= 2.01E-11<0.05)
i.e. Null hypothesis that mean speeds were not significantly different was rejected.
85th percentile speed: Reduced from 55.87 km/h to 51.11 km/h

Comparison site:
Mean speed: Increased from 47.52 km/h to 47.53 during the same period
85th percentile speed: Increased from 53.54 km/h to 54.19 km/h
Percentage of vehicles exceeding speed limit:

Location 1

<table>
<thead>
<tr>
<th></th>
<th>Before</th>
<th>During</th>
<th>After</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>40.41%</td>
<td>21.08%</td>
<td>26.76%</td>
</tr>
</tbody>
</table>

Comparison site:

<table>
<thead>
<tr>
<th></th>
<th>Before</th>
<th>After</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>32.36%</td>
<td>35.84%</td>
</tr>
</tbody>
</table>
### Location 2: Playground Zone

<table>
<thead>
<tr>
<th>Statistic</th>
<th>Before</th>
<th>During</th>
<th>After</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PGZ Hours</td>
<td>PGZ Hours</td>
<td>PGZ Hours</td>
</tr>
<tr>
<td></td>
<td>Remaining Hours</td>
<td>Remaining Hours</td>
<td>Remaining Hours</td>
</tr>
<tr>
<td>Mean Speed (km/h)</td>
<td>31.62</td>
<td>28.76</td>
<td>31.16</td>
</tr>
<tr>
<td></td>
<td>34.76</td>
<td>29.15</td>
<td>31.60</td>
</tr>
<tr>
<td>85th Percentile Speed (km/h)</td>
<td>38.77</td>
<td>33.82</td>
<td>38.44</td>
</tr>
<tr>
<td></td>
<td>41.66</td>
<td>35.42</td>
<td>37.48</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>7.06</td>
<td>5.45</td>
<td>6.61</td>
</tr>
<tr>
<td></td>
<td>7.43</td>
<td>6.05</td>
<td>6.76</td>
</tr>
</tbody>
</table>
1 Av & Penworth Dr SE (Playground Zone)

<table>
<thead>
<tr>
<th></th>
<th>Before</th>
<th>During</th>
<th>After</th>
</tr>
</thead>
<tbody>
<tr>
<td>PGZ Hours</td>
<td>31.62</td>
<td>28.76</td>
<td>31.16</td>
</tr>
<tr>
<td>Remaining Hours</td>
<td>34.76</td>
<td>33.82</td>
<td>31.60</td>
</tr>
<tr>
<td>PGZ Hours</td>
<td>41.66</td>
<td>35.42</td>
<td>38.44</td>
</tr>
<tr>
<td>Remaining Hours</td>
<td>38.77</td>
<td>35.42</td>
<td>37.48</td>
</tr>
</tbody>
</table>

- Average Speed
- 85th Percentile Speed
Results: Before & During SLOWS trailers
Playground zone hours: Mean speed reduced by 2.86 km/h from 31.62 km/h to 28.76 km/h (Statistically significant at 95% confidence level: t Stat 4.93 > tCritical 1.96)

After hours: Mean speed reduced by 5.61 km/h from 34.76 km/h to 29.15 km/h (Statistically significant at 95% confidence level: t Stat 4.79 > tCritical 1.96)

Results: Before & After removal of SLOWS trailers
Playground zone hours: 31.61 km/h to 31.16 km/h
Not statistically significant
After hours: 34.76 km/h to 31.59 km/h
(Statistically significant at 95% confidence level)
Percentage of vehicles exceeding speed limit:

Location 2: Playground zone hours

<table>
<thead>
<tr>
<th></th>
<th>Before</th>
<th>During</th>
<th>After</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>57.38%</td>
<td>39.24%</td>
<td>52.32%</td>
</tr>
</tbody>
</table>

After hours:
Before and after periods: Negligible
During SLOWS trailers: None
Conclusions

- SLOWS trailers appear to be effective in reducing speeds during installation as well as after removal.
- Positive effects of SLOWS trailers still remained after 2 weeks of removal, evident from the reduced mean, 85th percentile speeds and smaller percentage of vehicles exceeding speed limit.
- 2.86 km/h – 5.61 km/h mean speed reduction was observed during the before-after speed study.
Next steps/Further research

- Optimal rotation period before the effect fades down,
- Multiple rotations at the same location supported with police enforcement,
- Technological upgrades: Display, data collection capability/uses/liability of such data
- Size of fleet. It’s nice to have more of such devices but how much can a Municipality afford given the limited resources to purchase and move them around in a frequent basis,
- Issues with solar powered battery life: alternate power source?
- Direct request from 311 – more of PR tool than actual problem solving in some cases as often people request but there is not really a speeding issue
Lessons learned from Calgary’s SLOWS trailer rotation program

- Currently 8 SLOWS trailers for 14 wards; doesn’t seem enough. Strong desire to have at least one per ward
- Optimal rotation time: 2 weeks? Seems right! Longer periods may result in non compliance
- Current fleet displays speed of an oncoming vehicle. Often, drivers seem to be speeding to test their speed. Desire to have “SLOW DOWN” message displayed instead of actual speed when speed limit is exceeded
- Issues with solar powered batteries. Often, keeps one or two units out of service because of such issues. Desire to have larger solar panels to increase battery life
- Speed data collection capability: Current fleet doesn’t have this capability. Frequent requests from citizens to have the speed data recorded and passed to Calgary Police for enforcement. Desire to have this capability in new fleet.
Thank you!