The Use of ‘Your Speed’ Changeable Message Signs in School Zones

Sarah O’Brien and Carrie Simpson
Introduction – Speed Affects:

• Driver’s ability to react, braking distance
• Crash Severity or potential to avoid a crash
• Driver’s field of vision
Introduction – Why School Zones?

• **Lower Speed Limits Around Schools = GOOD**
  – Increased pedestrian activity
  – More traffic
  – More turning vehicles
  – Potentially longer queues
Introduction – Do They Work?

• **Effectiveness of School Speed Zones = POOR**
  - No change roadway characteristics
  - No change in environmental setting
  - Reduced speed ‘feels’ unnatural
  - Child walkers/bikers are MIA
    - 48% walked or biked in 1969
    - 12% walked or biked in 2009
Safe Routes to School Goals

• Enable and encourage children to walk and bicycle to school
• Make walking and bicycling to school safer
• Implement projects to:
  – Improve safety
  – Reduce traffic
  – Reduce fuel consumption
  – Reduce air pollution
Speed Feedback Sign Types

Images clockwise: Dan Burden, FHWA-HRT-08-067, Dan Burden, and Caltrans via FHWA-SA-07-002
Study Objectives

• Do YOUR SPEED signs reduce speeding and increase compliance?
• School time vs. non-school time comparison
• Lessons learned and future recommendations
SRTS Project Overview

• CM Eppes Middle School Site Description
• SRTS at CM Eppes
• YOUR SPEED Sign Assembly & Operation
CM Eppes Middle School

S. Elm St. School Zone

- 11,000 vpd
- 1,500 ft zone
- 35 mph, non-ST
- 25 mph, ST

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CM Eppes SRTS Project

- Identify unsafe pedestrian scenarios
- Participate in International Walk to School Day
- Start a frequent walker/cyclist program
- Conduct citation study with local police dept.
Sign Assembly

Features and Operations

• Steady Number
  0 < Speed Limit ≤ 5 mph

• Flashing Number
  Speed Limit ≤ 6 – 20 mph

• Flashing Pattern
  Speed Limit ≤ 21 mph+

• Operate during school times
• Breakaway compliant
• Collect speed data
Data Collection

• Pre-installation; 1, 3, 6 and 12 months post
• During school time (morning and afternoon)
• During non-school time (morning and afternoon)
• Both directions of travel

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Data Analyzed

- % exceeding the speed limit
- Average speed
- 85th percentile speed
- Standard deviation
- Pace speed

- Data grouped by school time, non-school time, and direction of travel
Results – School Time

Graph showing the speed changes over time for northbound and southbound 85th percentile speeds and average speeds.
## Results – School Time

<table>
<thead>
<tr>
<th></th>
<th>Northbound</th>
<th></th>
<th>Southbound</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Sample #</td>
<td>% Exceeding SL</td>
<td>% w/in Pace Speed</td>
<td>Sample #</td>
</tr>
<tr>
<td>Pre-Install</td>
<td>292</td>
<td>89</td>
<td>67</td>
<td>255</td>
</tr>
<tr>
<td>1 Mo. After</td>
<td>207</td>
<td>64</td>
<td>74</td>
<td>201</td>
</tr>
<tr>
<td>3 Mo. After</td>
<td>207</td>
<td>67</td>
<td>84</td>
<td>218</td>
</tr>
<tr>
<td>6 Mo. After</td>
<td>240</td>
<td>66</td>
<td>83</td>
<td>227</td>
</tr>
<tr>
<td>12 Mo. After</td>
<td>240</td>
<td>65</td>
<td>77</td>
<td>213</td>
</tr>
</tbody>
</table>

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Results – Average Speed

Average Speed (MPH) Above / Below Speed Limit
(0 = 25 mph in ST; 0 = 35 mph in Non-ST)

- Northbound ST
- Southbound ST
- Northbound Non-ST
- Southbound Non-ST

Pre-Installation  | 1 Mo. After  | 3 Mo. After  | 6 Mo. After  | 12 Mo. After
# Results – Non-School Time

<table>
<thead>
<tr>
<th></th>
<th>Northbound</th>
<th>Southbound</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Sample #</td>
<td>% Exceeding SL</td>
</tr>
<tr>
<td>Pre-Install</td>
<td>287</td>
<td>47</td>
</tr>
<tr>
<td>1 Mo. After</td>
<td>228</td>
<td>29</td>
</tr>
<tr>
<td>3 Mo. After</td>
<td>324</td>
<td>39</td>
</tr>
<tr>
<td>6 Mo. After</td>
<td>209</td>
<td>40</td>
</tr>
<tr>
<td>12 Mo. After</td>
<td>214</td>
<td>42</td>
</tr>
</tbody>
</table>

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Results – Non-School Time

![Graph showing speed changes over time for Northbound and Southbound traffic.]
Results – Average Speed

- **School Time**
- **Non-School Time**

Average Speed (mph) Above / Below Speed Limit (0 = 25 mph in ST, 0 = 35 mph in Non-ST)

- Pre-Installation
- 1 Mo. After
- 3 Mo. After
- 6 Mo. After
- 12 Mo. After
Results - % Exceeding Speed Limit

- **School Time**
  - Linear (School Time)

- **Non-School Time**
  - Linear (Non-School Time)

<table>
<thead>
<tr>
<th>Time</th>
<th>Percent of Vehicles Exceeding Speed Limit (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-Installation</td>
<td>90</td>
</tr>
<tr>
<td>1 Mo. After</td>
<td>60</td>
</tr>
<tr>
<td>3 Mo. After</td>
<td>50</td>
</tr>
<tr>
<td>6 Mo. After</td>
<td>40</td>
</tr>
<tr>
<td>12 Mo. After</td>
<td>30</td>
</tr>
</tbody>
</table>
Results – 85th Percentile Speed

85th Percentile Speed (mph) Above Speed Limit (0 = 25 mph ST, 0 = 35 mph Non-ST)

- School Time
- Non-School Time

- Linear (School Time)
- Linear (Non-School Time)

Pre- Installation | 1 Mo. After | 3 Mo. After | 6 Mo. After | 12 Mo. After
--- | --- | --- | --- | ---
4 | 3 | 3 | 3 | 3

21
Results – Standard Deviation

The graph shows the standard deviation of travel speed at different time intervals after installation:
- **Pre-Installation**: High standard deviation (5.2 mph).
- **1 Mo. After**: Decreased standard deviation (4.6 mph).
- **3 Mo. After**: Further decrease to (4.4 mph).
- **6 Mo. After**: Continued decrease to (4.2 mph).
- **12 Mo. After**: Further decrease to (4.0 mph).

The graph also includes linear trends for School Time and Non-School Time, indicating a consistent decrease over time.

- **Red Bars**: School Time
- **Blue Bars**: Non-School Time
- **Black Line**: Linear (School Time)
- **Dashed Line**: Linear (Non-School Time)
Results - % Within Pace Speed

- **School Time**
- **Non-School Time**

Linear Trend (School Time)

Linear (Non-School Time)

<table>
<thead>
<tr>
<th>Time</th>
<th>School Time</th>
<th>Non-School Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-Installation</td>
<td>60</td>
<td>60</td>
</tr>
<tr>
<td>1 Mo. After</td>
<td>70</td>
<td>75</td>
</tr>
<tr>
<td>3 Mo. After</td>
<td>80</td>
<td>85</td>
</tr>
<tr>
<td>6 Mo. After</td>
<td>90</td>
<td>90</td>
</tr>
<tr>
<td>12 Mo. After</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>
Conclusions

• Yes, YOUR SPEED signs worked!
  – Significant, sustained reductions in speed
  – Avg. speed was 12% lower 1 yr after install

• Enhance Effectiveness:
  – Periodic police presence
  – Active SRTS Program
    (encouragement/education)
Conclusions

• Additional Research Needs
  – Context sensitivity: Do they work in all school settings?
  – Optimal speed enforcement strategy (frequency of police presence with use of sign)
  – Comparison to other possible traffic calming techniques
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