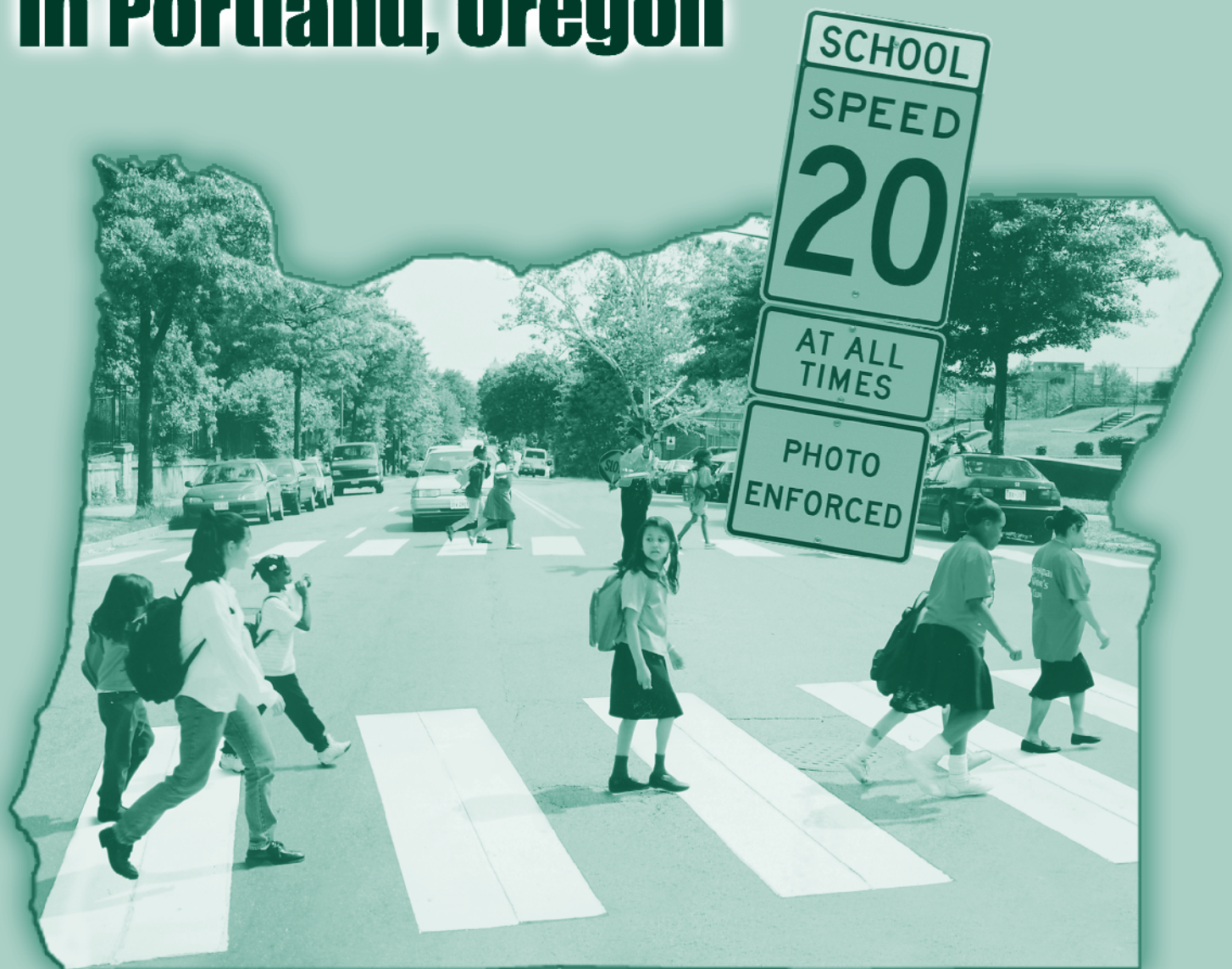


Demonstration of Automated Speed Enforcement in School Zones In Portland, Oregon



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16. Abstract <p>The use of Automated Speed Enforcement (ASE) to reduce traffic speeds in school zones was demonstrated at five neighborhood schools in Portland, OR, during a two-month period. ASE was deployed at each demonstration school zone an average of two to three times per week during this period. The program was well publicized through a public information and education campaign that was conducted prior to and during the demonstration. Speeds were measured at the five demonstration school zones and at five comparison school zones before, during, and after the demonstration. Public awareness was measured before and during the ASE demonstration. Major findings follow:</p> <ul style="list-style-type: none"> • Mean and 85th percentile speeds at demonstration school zones were reduced by approximately 5 mph when ASE was present, and ASE still had an effect (although reduced to 1 to 2 mph) when ASE was not present. The proportion of traffic that exceeded the speed limit by more than 10 mph was reduced by about two-thirds when ASE was present, and by about one-quarter when ASE was not present. • Maximum speed reduction was obtained with the combination of ASE and a flashing beacon, which is used during certain hours at many Portland school zones. • The speed reduction effects observed at the demonstration school zones were still present one month after ASE operations ceased in May 2005. • Speeds at most of the comparison locations were unchanged during this test, indicating that the speed reductions at demonstration schools were attributable to the ASE program. 					
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Executive Summary

Background

Automated Speed Enforcement (ASE), combines speed measurement and digital imaging or film photographs to measure and record vehicle speeds. Automatically ticketing vehicles exceeding a preset threshold above the speed limit has been used to enforce speed limits in the United States since 1987 and worldwide since the 1970s. It has the potential to deter excessive speeding because drivers who know that ASE is used in a specific location are certain they will be issued a citation if they speed. ASE also has the potential to be used to deter speeding over a wide area if motorists are well informed of the enforcement area but not of the specific location. Many communities that have used ASE report a reduction in speeds, and some have reported a reduction in crashes following implementation of ASE programs (e.g., Cunningham, Hummer, and Moon, 2005; Retting and Farmer, 2003; Cities of Beaverton and Portland, 1997; Elvik, 1997).

School zones are of particular concern because of the concentrated presence of children and the periodic high level of traffic activity on the arterial or collector roads where most urban schools are located. Between 1994 and 2004 there were 182 school-age pedestrian fatalities (NHTSA, 2005 (2)). Although most of these pedestrians were struck by a school vehicle, 31 percent were struck by a vehicle other than the school vehicle. Child pedestrians are particularly vulnerable due to their lower awareness of risk and impulsive behavior. Nearly half of all school-age pedestrians killed in school transportation-related crashes were ages 5-7.

ASE is an efficient speed-enforcement technique that may be well-suited for use in school zones, where it provides a highly visible speed-enforcement presence with minimal disruption of traffic flow. When deployed in combination with a focused public information and education campaign (PI&E), ASE may have a broad deterrent effect on excessive speeds at school zones.

In 2005, NHTSA joined with the city of Portland, Oregon, to conduct a demonstration of ASE in school zones and to measure the program's effects on traffic speeds and public attitudes and perceptions. Portland was selected for the study because it has an established school zone safety program, and the legal authority to conduct ASE. Westat, Inc., was responsible for designing the study, assisting with data collection and deployment scheduling, analyzing the study data, and preparing this report.

Methods

The City of Portland Office of Transportation (PDOT), with the participation of the Portland Police Bureau Traffic Division, deployed ASE in five school zones with documented traffic speed problems in the inner-east section of Portland during the three-month period from March through May 2005. Five additional school zones, located in north, northeast, and southwest Portland, served as comparison sites without ASE.

School zones in Portland have a 20 mph speed limit 24 hours a day, and many have flashing beacons that are activated during school hours, signifying higher fines for speeding. All the demonstration schools had flashing beacons, as did four of the five comparison schools. Conditions at the demonstration and comparison school zones were generally similar in terms of roadway design and traffic speeds. All school zone roadways were two-lane minor arterials with parking, and speeds at the five demonstration schools and four of five comparison schools were very similar within each study period: pre-demonstration, demonstration without ASE on site, and post-demonstration.

The Portland Police Bureau Traffic Division conducted ASE using two ASE unit vans. Between March 28 and May 20, 2005, ASE was deployed two to three times per week at each of the five demonstration school zones. ASE was conducted for a total of 331 hours, representing an average of approximately 3 hours per deployment, 41 hours per week across all sites, and 33 hours per month at each site.

In an effort to maximize deterrence, prior to deployment a public information and education (PI&E) campaign was targeted in the neighborhoods of the five demonstration school zones and also presented more broadly to the Portland community, including a press conference that produced citywide media attention. The program was implemented by the PDOT Public Information Coordinator, who identified key stakeholders in school zone communities; notified and informed Portland Public School District officials, neighborhood associations, and school community members about the project and secured their endorsement; installed “PHOTO ENFORCED” placards to supplement existing “SCHOOL SPEED 20” signs in demonstration school zones; coordinated media materials and events; provided materials for PDOT publications; and presented at community and professional meetings.

Public perceptions and awareness of the safety risks at school zones and the presence of speed enforcement were surveyed on a sample of 400 residents prior to the PI&E campaign and 400 residents during the demonstration period, with both survey waves equally divided among demonstration and comparison school samples. Public attitudes and awareness were also evaluated by tracking community contacts, media outreach, and media hits.

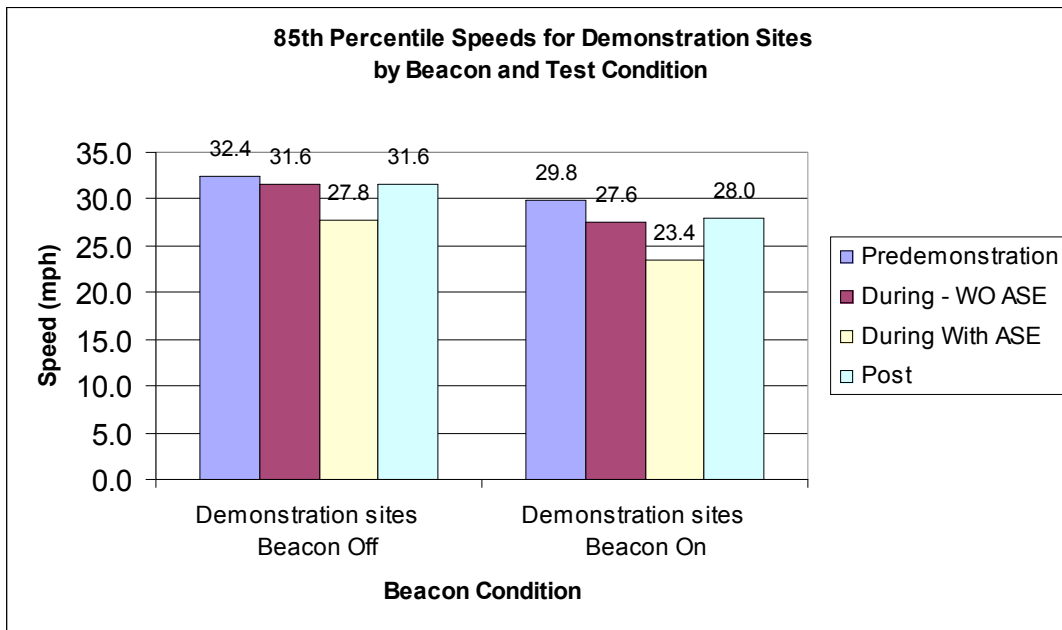
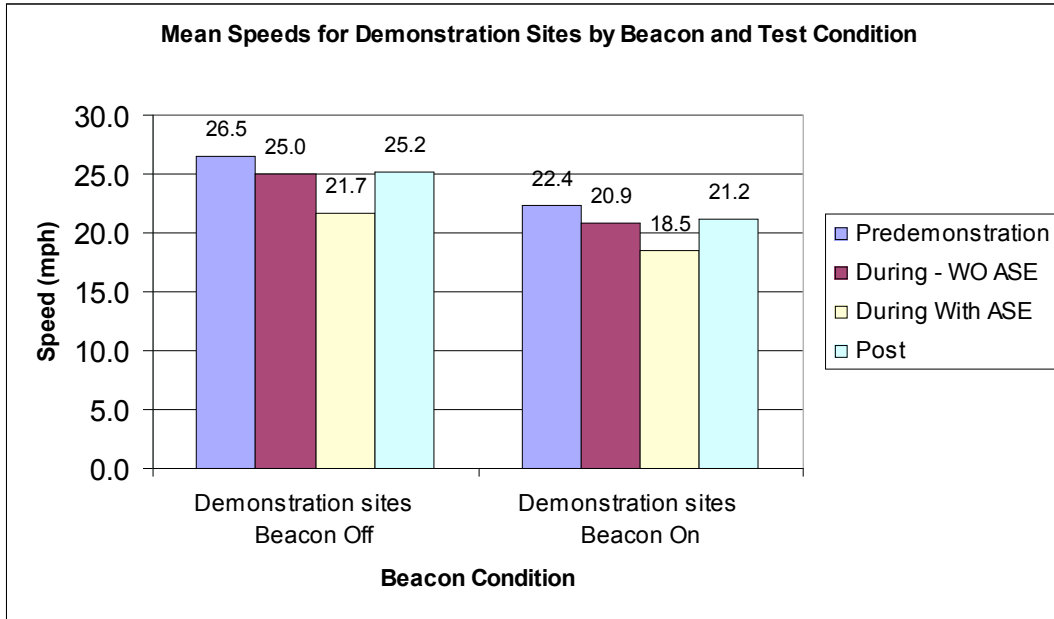
Traffic volume and speeds were measured by means of JAMAR TRAX RD pneumatic road tube traffic counters for at least 24 hours during three periods: (a) prior to the start of the school zone ASE, (b) during the demonstration while ASE was present, (c) during the demonstration when ASE was not present, and (d) after the ASE demonstration ended. Data was grouped according to whether ASE was present and whether flashing school zone beacons were or were not operating at each site. Speeds were also measured during the same periods at five comparison school zones without ASE. Speed, citations and public awareness data were analyzed to determine the effects of the program on speeds.

Results

Principal findings regarding the independent variables of enforcement presence, PI&E flashing beacon, citations, and public awareness, and the dependent variables associated with speeds, are described below.

Speeds

The effects of ASE presence and flashing beacon on mean and 85th percentile speeds are shown in the following figures and discussed below.



Mean and 85th Percentile Speeds

Without Flashing Beacon

- When ASE was onsite at demonstration school zones, speeds averaged across all demonstration sites were about 5 mph lower during the demonstration than prior to the ASE demonstration. Average mean speed decreased from 26.5 mph pre-demonstration to 21.7 mph during the demonstration. Eighty-fifth percentile speed decreased from 32.4 mph to 27.8 mph.
- Of interest is the effect of ASE on speeds when the ASE system was not present at demonstration schools on a particular day, recall that the ASE unit was rotated among demonstration schools. When the ASE unit was not present, speeds were approximately 1 mph lower during the demonstration period than during the pre-demonstration period, and this difference also occurred for the post-demonstration period. Average mean speed decreased from 26.5 mph pre-demonstration to 25.0 mph during the demonstration and 25.2 mph post-demonstration. The average 85th percentile speed was 32.4 mph prior to the demonstration and was 31.6 mph during both the demonstration and post-demonstration periods.

With Flashing Beacon

- The result was similar when the flashing beacon was on, with mean and 85th percentile speeds about 1 to 2 mph lower during the demonstration period when ASE was not onsite, and 4 to 6 mph lower when ASE was onsite compared with the pre-demonstration period.
- *The combination of the presence of ASE onsite and flashing beacon resulted in the lowest mean and 85th percentile speeds at demonstration school zones.* The average mean speed across demonstration school zones was 18.5 mph and the average 85th percentile speed was 23.4 mph with both ASE present and beacon on. These speeds were 8 to 9 mph lower than the pre-demonstration period speeds, when neither ASE nor flashing beacon was present.

Comparison School Zones

- At the comparison school zones, there was no appreciable difference between pre-demonstration period, demonstration period, and post-demonstration period mean or 85th percentile speeds. The average mean speed across comparison sites was approximately 25 mph during all three periods without the beacon on and 21 mph with the beacon on. The average 85th percentile speed during all three periods was 32 mph with the beacon off and 28 mph with the beacon on.

Proportions of Vehicles Over the Speed Limit

Without Flashing Beacon

- The proportions of vehicles traveling in excess of the 20 mph school zone speed limit were lower during the ASE demonstration than before the ASE demonstration. Prior to implementing ASE,, 56 percent of vehicles at the demonstration school zones exceeded the speed limit by more than 5 mph, 26

percent by more than 10 mph, and 6 percent by more than 15 mph when the beacon was off. During the demonstration and with ASE onsite, the proportions of traffic above the 5 mph, 10 mph, and 15 mph thresholds were reduced to about one-half to one-sixth (23%, 8%, and 1%, respectively) the levels without ASE. When ASE was not onsite, the proportions of speeding traffic were reduced to 45, 20, and 5 percent, respectively, with the percentages remaining at those levels during the post-demonstration period.

With Flashing Beacon

- When the flashing beacon was on, with or without ASE present, the proportions exceeding the speed limit were about one-half to one-third of what they were with the beacon off. For example, while 26 percent of traffic without the flashing beacon exceeded the speed limit by more than 10 mph before the demonstration began, only 12 percent did so with the beacon on. After the ASE demonstration began, with no ASE onsite the proportion more than 10 mph over the speed limit was 20 percent without the beacon and 8 percent with the beacon on.
- *With the combination of ASE onsite and flashing beacon, exceeding the speed limit was between one-sixth and one-tenth as prevalent as it was prior to the demonstration with neither ASE onsite nor flashing beacon.* For example, before the ASE demonstration and without a flashing beacon, 26 percent exceeded the school zone speed limit by more than 10 mph. During the demonstration, with ASE onsite and with the flashing beacon on, just 2.3 percent were more than 10 mph over the speed limit.

Comparison School Zones

- At the comparison school zones, there was little difference in the proportions exceeding the speed limit across the pre-demonstration period, demonstration period, and post-demonstration period. For example, across all three periods, without the flashing beacon, 16 to 19 percent of traffic exceeded the speed limit by more than 10 mph, while with the flashing beacon, about 7 percent did so.

Public Awareness and Attitudes

- The public's acceptance of the use of ASE in school zones increased from pre-demonstration to demonstration periods in demonstration school neighborhoods, but did not change in comparison school neighborhoods.
- Following the implementation of ASE, the proportion of drivers in demonstration community neighborhoods who said that speeds near schools were just about right decreased and the proportion who said that people drove too fast increased to a plurality. There was no change from pre-demonstration to demonstration periods in the comparison neighborhoods, where the majority of drivers said that speeds were just about right.
- With the implementation of ASE, there was an increase in the proportion of demonstration community drivers who said they were very likely to drive slower if they saw ASE deployed 3 times a week in school zones. There was no such change in the comparison community driver sample.

- There was an increase from the pre-demonstration to the demonstration period in the proportion of drivers in demonstration neighborhoods who said that driving 20 mph or less in school zones would be a major safety improvement. There was also an increase in the comparison community, but it was smaller.

Findings Summary

The following conclusions are drawn from the results of the demonstration of ASE in Portland school zones:

- The program of ASE operations at the demonstration school zones, where ASE was deployed an average of 2-3 times per week over a two-month period, was the reason for lower speeds during the ASE demonstration than prior to it.
- The maximum effect on speed reduction occurred with the combination of ASE and flashing beacon. The combination of the presence of ASE onsite and flashing beacon resulted in an effect on speed reduction twice that of ASE alone.
- The speed reduction effects achieved at the demonstration school zones were sustained for at least a full month after ASE operations ceased in May 2005. This finding can be used to help guide deployment schedules to maximize ASE efficiency when limited system resources are available.
- Public awareness of and attitudes regarding ASE in school zones were positively influenced during the demonstration program. The combination of public information and visible ASE resulted in a higher level of awareness that traffic speeds in school zones were too high, and that complying with the 20 mph speed limit would be a safety improvement. Drivers who resided in the demonstration neighborhoods also were more likely to say that they would drive slower if ASE was deployed three times a week in the school zones.

1 INTRODUCTION

Reducing the risk of crashes and occupant and pedestrian injuries is an important goal within a community's overall public safety program. It is especially important to manage excessive speeds in school zones, where children and motor vehicle traffic are often concentrated during certain hours of the day and children are more likely to be present at any time. Conventional speed enforcement by law enforcement officers using patrol vehicles and laser or radar speed measurement has limited ability to deter speeding because it can only ticket a small fraction of speeding drivers, and drivers believe that there is little chance that they will be caught. Automated Speed Enforcement has greater potential to deter excessive speeds because it can photograph and issue a ticket for nearly every vehicle that travels at a preset level above the speed limit, and most drivers believe that they will get a speeding citation if they speed. The use of ASE in school zones is more likely to be acceptable to a community than for general speed enforcement because most people understand that there is greater hazard to children at those locations.

1.1 Objective

Evaluate the effectiveness of an ASE program in reducing speeding in school zones, and assess the public's acceptance of ASE where it was demonstrated.

1.2 Background

Excessive speeds have been identified as a contributing factor in nearly one-third of fatal crashes in the United States (NHTSA, 2005a). Higher speeds reduce the driver's ability to safely steer or brake for emergencies and increase the distances traveled while reacting and braking. Crash severity and the risk of significant injury or death also increase with higher speeds. Speed-related crashes accounted for 13,192 deaths in 2004. These are crashes where the driver was cited for a speed-related offense, racing, or driving too fast for conditions, or when exceeding the posted speed limit was indicated as a contributing factor. Many communities that have used ASE report a reduction in speeds, and some have reported a reduction in crashes, following implementation of ASE programs (e.g., Cunningham, Hummer and Moon, 2005; Retting and Farmer, 2003; Cities of Beaverton and Portland, 1997; Elvik, 1997).

NHTSA's mission is to save lives, prevent injuries, and reduce economic costs due to road traffic crashes, through education, research, safety standards, and enforcement activity. NHTSA has considered that ASE may be one of the means to manage speeds and reduce the loss of lives, injuries, and costs associated with crashes in school zones. This study examined how a school zone ASE program could be implemented, and determined the effect of ASE on speeds and on public awareness and acceptance of the ASE program.

In 2005, NHTSA joined with the City of Portland, Oregon, to conduct a demonstration of ASE in school zones. Portland was selected for the study because it has a well-established school zone safety program, legal authority to conduct ASE, and expressed interest in demonstrating ASE in school zones. Westat was responsible for designing the study, analyzing the speed data, assessing the public's acceptance, and preparing this report.

1.3 School Zone Safety

School zones are of particular concern because of the concentrated presence of children and the periodic high level of traffic activity on the arterial or collector roads where most urban schools are located. In the United States between 1994 and 2004 there were 1,479 fatalities in school transportation-related crashes, including 182 school-age pedestrian fatalities (NHTSA, 2005b). Although most of these pedestrians were struck by a school vehicle, 31 percent were struck by a vehicle other than the school vehicle. Child pedestrians are particularly vulnerable due to their lower awareness of risk and impulsive behavior. Approximately 20,000 pedestrian children 15 or younger were injured and nearly 400 were killed during the 1994-2004 period. Nearly half of all school-age pedestrians killed in school transportation-related crashes were age 5 to 7.

1.4 Automated Speed Enforcement

ASE combines speed measurement and photographic technologies to measure each individual vehicle's speed and produce a photograph of those that exceed a preset threshold above the speed limit. It has been used to enforce speed limits in the United States since 1987 and worldwide since the 1970s. ASE devices use a speed detection device such as radar, lidar, or road tubes linked to a film or digital camera to detect and photograph every vehicle that travels faster than the preset threshold. ASE is most often used in a portable operation, deployed either from within a vehicle or on a portable mount outside the vehicle, with an officer present. The threshold amount above the speed limit is normally set according to enforcement agency policy, but it is usually set at a level that will photograph flagrant violators.

The photograph, which shows the vehicle, its registration tag, and an imprint of the date, time, location and speed, is used as evidence of the infraction, and the enforcement agency issues a citation to the registered owner. Most jurisdictions photograph the rear of the vehicle. In some jurisdictions the front of the vehicle is photographed to show the driver's face, which can help determine who should be charged with the violation. Communities with ASE often post signs at jurisdiction boundaries that ASE is used, and ASE is often deployed with an advance warning sign just upstream. ASE has the potential to generally deter excessive speeding because drivers who know that ASE is used in the area are aware that they will be issued a citation if they speed.

2 METHODS

2.1 City Selection and Local Government and Police Support Coordination

NHTSA Regional Representatives identified qualifying communities that expressed an interest in the demonstration. NHTSA's Northwest Region established the necessary coordination that resulted in Portland, Oregon being selected for this test, considered because it had a well-established school zone safety program, legal authority to conduct ASE, and an interest in demonstrating ASE in school zones. The City of Portland Office of Transportation (PDOT) implemented the demonstration of ASE from March through May 2005. This followed several months of planning and coordination with the Portland Public School District, Portland Police Bureau, Community and School Traffic Safety Partnership (CSTSP), Safe Routes to School Program, Westat, and NHTSA

Portland agreed to coordinate and plan the ASE study, select five demonstration and five comparison school zones, develop and implement a PI&E program and public awareness

measurement plan, prepare a detailed work plan conduct ASE in the five demonstration school zones, provide Westat speed data and other enforcement impact measures, and collaborate with Westat in preparing a final report.

2.2 School Zone Selection

Five schools were selected to receive ASE treatments and five schools were chosen to serve as comparison locations without ASE operations. Conditions at the demonstration and comparison school zones were generally similar in terms of roadway design and traffic speeds. All school zone roadways were two-lane minor arterials with parking. Speeds at the five demonstration schools and four of five comparison schools were very similar within each study period (pre-demonstration, demonstration with and without ASE on site, and post-demonstration).

The five demonstration schools were located in inner-east Portland. These schools were selected because they had documented speed issues, a high level of community endorsement, and the roadway conditions such as alignment, curvature, and the number of travel lanes were suitable for both ASE operations and traffic speed measurement. The five comparison school zones were selected in north, northeast, and southwest Portland. The comparison school zones were selected because they also had documented speed issues and they were comparable to the demonstration locations' traffic volume, speeds, and road geometry.

School zones in Portland have a 20 mph speed limit 24 hours a day, and many have flashing beacons that are activated during school hours, signifying higher fines for speeding. All of the demonstration schools had flashing beacons, as did four of the five comparison schools.

The selected demonstration and comparison schools are listed in Table 1.

Table 1. School sites and conditions

School	Site Number	Condition
Alameda	1	Treatment
Boise-Eliot	2	Treatment
Faubion	3	Treatment
Glencoe	4	Treatment
Vernon	5	Treatment
Bridlemile	1	Comparison
Capitol Hill	2	Comparison
Lewis	3	Comparison
Rieke/Wilson	4	Comparison
Portsmouth	5	Comparison

The locations of the demonstration and comparison schools are shown in Figure 1.

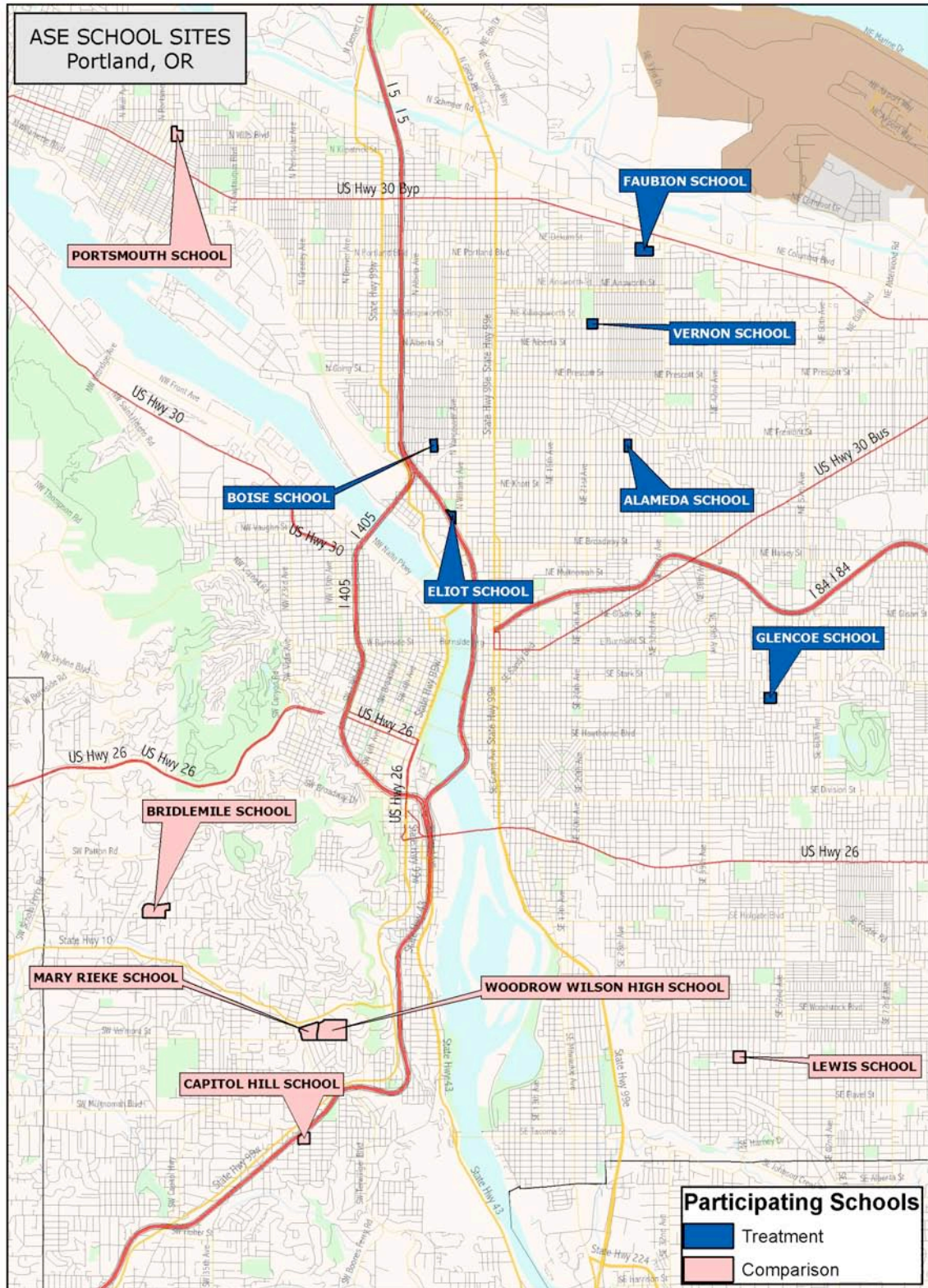


Figure 1. ASE demonstration and comparison school locations

2.3 Public Information and Education Activities

A PI&E campaign was targeted in the neighborhoods of the five demonstration school zones and also presented more broadly to the Portland community, prior to the ASE deployment. The purpose of PI&E campaign was to secure community acceptance of the speed enforcement program and to maximize deterrence. The program was implemented by PDOT's Public Information Coordinator, who identified key stakeholders in school zone communities; notified and informed Portland Public School District officials, neighborhood associations, and school community members about the project and secured their endorsement, installed "PHOTO ENFORCED" placards to supplement existing "SCHOOL SPEED 20" signs in demonstration school zones; coordinated media materials and events; provided materials for PDOT publications; and presented at community and professional meetings. The campaign included a press conference that produced citywide media attention.

2.3.1 PI&E Issues

Prior to implementation of the study, PDOT identified the following public information issues:

1. PDOT was aware that the ASE project would affect the selected school communities and the broader Portland community in a variety of ways, potentially both positively and negatively (in that traffic citations for speeding could generate concern among residents and school parents and staff).
2. People in the selected school zones would need and would likely want information about the nature of the demonstration project and its potential impacts on them and their school community.
3. People in the broader Portland community would need and would likely want information about the nature of the demonstration project and its potential impacts on them, their own school communities, and the larger Portland community.

PDOT designed public information activities around the following topics that served as a content guide for the specific communications strategies listed later in this plan.

- Project information – when, where, and what PDOT is doing and what the study hopes to learn;
- Partners involved in the project and their roles;
- Funding for the project;
- Why Portland was selected as a demonstration partner;
- How the school zones for ASE demonstration locations were selected;
- Connection of this ASE project to Portland's traffic safety programs, including the CSTSP and SR2S efforts, and how this project might have lasting value to the schools and to the community;
- Traffic safety enforcement issues;
- Role of enforcement in Portland's traffic safety program;
- ASE tools and technologies currently used in Portland for school zone enforcement and speed management;

- What is already known about the use, effectiveness, and public acceptance of these tools and technologies;
- Relevant traffic, pedestrian, and bicycle safety issues;
- Existing conditions in the selected locations; and
- Impact of enforcement in these locations on school safety and neighborhood safety.

2.3.2 PI&E Goals and Activities

To provide structure to the PI&E program, PDOT established a set of five PI&E program goals that addressed the known issues and information topics. The set of goals and the activities for each program goal were as follows:

Goal 1: Create public awareness in selected test school zone communities only regarding the ASE project. The following plan was implemented only in the five test school zones.

Strategies implemented:

1. Identified key stakeholders in selected school zone communities.
2. Notified Portland Public School District administration and other key personnel about the ASE project via email, phone, and in-person meetings. Sought and secured endorsement of selected school zone locations. Engaged the school district Assistant Superintendent's Office and the school district Communications Office in outreach to impacted school communities.
3. Notified impacted neighborhood associations about the ASE project via phone and in-person meetings. Engaged neighborhood associations in outreach to impacted residents.
4. Developed and distributed – via e-mail, newsletters, and student backpack mail – a public information item about the project for school communities.
5. Engaged Portland Police Bureau Traffic Division and School Police Division in communication of public information messages to impacted residents. Sought and secured endorsement of the ASE project.
6. Published project information for major stakeholders in their existing media markets, i.e., school newsletters and neighborhood newsletters.
7. In school speed zones where ASE was deployed, installed placard on SCHOOL SPEED 20 signs that read PHOTO ENFORCED.

Evaluation methods implemented:

1. Conducted stakeholder interviews before, during, and after the project. Talked to knowledgeable persons (District Student Transportation Office, school principals, parents, and residents). Informed neighborhood association leaders.
2. Sought and secured endorsement letters of the ASE project from Portland Public School District and Portland Police Bureau.
3. Implemented public information measurement in the selected school attendance areas before and after the project.
4. Tracked contacts in schools and neighborhoods.
5. Compiled summaries of interviews and meeting notes.

6. Completed public information measurement reports.

Goal 2: Create public awareness in broader Portland community regarding ASE project.

Strategies implemented:

1. Inventoried existing ASE public information.
2. Developed media packet – media advisory and press release – for press event at start of project.
3. Developed and distributed – via e-mail, FAX, and newsletters – a public information item about the project for key stakeholders.
4. Sought and secured print and TV/radio media coverage of project work at test school zones.
5. Included information about ASE project in existing PDOT publications.
6. Made presentations about ASE project in community and professional meetings.
7. Used team meetings to inform project team of ongoing project information.
8. In test school speed zones, installed placard on SCHOOL SPEED 20 signs that read PHOTO ENFORCED.

Evaluation methods implemented:

1. Tracked contacts in the community.
2. Tracked media outreach and response activities.
3. Tracked media hits and compiled copies of print media.
4. Completed public information measurement reports.

Goal 3: Assure accuracy and consistency in the project’s PI&E processes and publications.

Strategies implemented:

1. Identified a project director within PDOT to manage the project.
2. Identified a PI&E coordinator to coordinate PI&E for the project.
3. Assigned responsibility for public information and education.

Evaluation methods implemented:

Throughout implementation, the project director and PI&E coordinator reviewed PI&E processes and publications for accuracy and consistency and tracked currency of information.

Goal 4: Work with communications representatives for PDOT to ensure successful media relations (outreach and response).

Strategies implemented:

1. Informed the new mayor and his staff of the project.

2. Adhered to the PDOT media policy and guidelines – clarified processes for media outreach and response for this project.
3. Tracked media activities, including media outreach, response to media inquiries, and copies of news items about the project, copies of all media related to the project.
4. Provided summaries of media activities to project team, stakeholders, and PDOT communications representatives.

Evaluation methods implemented:

1. Tracked contacts in the media.
2. Tracked media outreach and response activities.
3. Tracked media hits and compiled copies of print media.

Goal 5: Evaluate the impacts of school zone ASE and the PI&E program on public perceptions and attitudes.

PDOT contracted with Davis, Hibbits, and Midghall, Inc. (DHM) to measure and assess the impacts of deploying ASE in school zones and of the accompanying public information campaign on public knowledge, awareness, and attitudes. The complete results of this evaluation are presented in Section 4.2 later in this report.

2.4 Enforcement Procedures at Demonstration and Comparison Schools

At demonstration schools, the Portland Police Bureau Traffic Division conducted the enforcement operation using two ASE unit vans. The city implemented ASE operations for eight weeks at the five designated demonstration locations, which were all 20 mph “At All Times” school zones. These zones are defined in law as zones that are on streets that are adjacent to a school and where the speed zone adjacent to the school speed zone is 30 mph or lower. No ASE was deployed at the five control schools. Table 2 shows the schedule of ASE deployments and number of hours of enforcement throughout the demonstration period.

Table 2. ASE hours of deployment by week and site

	School		Monday	Tuesday	Wednesday	Thursday	Friday
	Week of 3/28/05	t1	Alameda	3	3		
t2		Boise-Eliot	2.5			3	3.8
t3		Faubion		4		4	
t4		Glencoe	3		3.5		3.8
t5		Vernon	3		3.5		4
Week of 4/4/05			Monday	Tuesday	Wednesday	Thursday	Friday
	t1	Alameda	0		3.5		2.7
	t2	Boise-Eliot		4		4	
	t3	Faubion	0	2.2			0
	t4	Glencoe	3			3.7	0
t5	Vernon	3		2.3		3.9	
Week of 4/11/05			Monday	Tuesday	Wednesday	Thursday	Friday
	t1	Alameda	3		2.2		3.5
	t2	Boise-Eliot	3	4			0
	t3	Faubion	0		3.6		2
	t4	Glencoe		3.8		4	
t5	Vernon	2.7			2.9	2.4	
Week of 4/18/05			Monday	Tuesday	Wednesday	Thursday	Friday
	t1	Alameda	3.3			3.5	2.2
	t2	Boise-Eliot	3		3		2.7
	t3	Faubion	2.5		2		3.5
	t4	Glencoe	3	2.7			3
t5	Vernon		4		4		
Week of 4/25/05			Monday	Tuesday	Wednesday	Thursday	Friday
	t1	Alameda		3.2		4	
	t2	Boise-Eliot	3		2.2		3
	t3	Faubion	3			4	3.2
	t4	Glencoe	1.9		3.9		3
t5	Vernon	0.6	1.9			3.8	
Week of 5/2/05			Monday	Tuesday	Wednesday	Thursday	Friday
	t1	Alameda	3.6	2.6			3.3
	t2	Boise-Eliot	2.5			2.9	3
	t3	Faubion		3.7		2	
	t4	Glencoe	2		2.2		3
t5	Vernon	4		3.7		2.3	
Week of 5/9/05			Monday	Tuesday	Wednesday	Thursday	Friday
	t1	Alameda	2		3.6		3.8
	t2	Boise-Eliot		4		4	
	t3	Faubion	2	2			3
	t4	Glencoe	2.7			3.6	2.5
t5	Vernon	3		2.6		3.8	
Week of 5/16/05			Monday	Tuesday	Wednesday	Thursday	Friday
	t1	Alameda	0		4		3.6
	t2	Boise-Eliot	3	3.4			3.5
	t3	Faubion	2.6		3.5		4
	t4	Glencoe		4		3.5	
t5	Vernon	2.5			3.8	2.5	

Between March 28 and May 20, 2005, ASE was deployed 2 to 3 times per week at each of the five demonstration school zones. ASE was conducted for a total of 331 hours, representing an average of approximately 3 hours per deployment, 41 hours per week across all sites, and 33 hours per month at each site. One uniformed officer was present in the van during each deployment. Deployments typically occurred between 8 a.m. and 5 p.m..

ASE operations consisted of the manned operation of one or more Police Department vehicles with ASE units at designated locations. The evidence of speeding produced by the ASE units was used to issue citations following the same rules and procedures currently used by the City for its ongoing Photo Radar speed-enforcement program. Both front and rear photographs are taken of violators.

Current practice for ASE in Portland includes placing warning signage 100 yards in advance of the enforced location, parking the ASE van in a position that does not interrupt the flow of traffic, and issuing citations to motor vehicles that exceed the posted speed limit by at least 11 mph. Violations are then processed, including a step to verify that the gender of the driver is the same as the registered owner. Oregon law mandates that moving vehicle citations are the responsibility of the driver, as opposed to laws in many states where the owner of the violating vehicle is responsible for the citation.

Figure 2 shows the ASE van in operation at a demonstration school. ASE units are mounted inside the van. A speed feedback display is provided on the left rear door of the van.

Figure 2. ASE unit in operation



Figure 3 illustrates the front-mounted ASE camera and radar unit that photographs the rear of vehicles as they pass the van. A similar unit is mounted at the rear window to photograph the front of offending vehicles.



Figure 3. Detail of ASE equipment

In addition to the normal school speed-limit signage located at the approaches to each school zone, an additional special “PHOTO ENFORCED” placard was installed notifying drivers that the speed limit was enforced by ASE. Figure 4 illustrates the signage at each demonstration school.



Figure 4. ASE enforcement and flashing beacon signage

At comparison school zones, traffic enforcement officers used conventional speed-enforcement methods and maintained the same schedule of enforcement that was normally used at those locations during the pre-demonstration and demonstration periods.

2.5 Speed Measurements

Traffic speeds were measured for at least 24 hours during three periods: (a) prior to the start of the school zone ASE, (b) during the demonstration, and (c) after the ASE demonstration ended. Speeds were also measured during the same periods at five comparison school zones without ASE. Data were grouped according to whether ASE was present and whether flashing school zone beacons were or were not operating at each site.

It was important to measure speeds as unobtrusively as possible so that speeds would not be influenced by the presence of measurement equipment personnel or equipment. JAMAR TRAX RD pneumatic road tube traffic counters were used to collect volume and speed data on study streets.

Data was collected once during the month preceding deployment, twice during deployment, and once during the month following deployment. A TRAX unit was deployed for one-week duration at each school zone during each data collection period. The JAMAR units provided a speed measurement record for each vehicle that crossed the road tubes. ASE units also collected a record of the speed of each vehicle that passed the unit while ASE was operating.

Speed data was obtained from both JAMAR TRAX RD pneumatic road tube traffic counters and ASE units at demonstration school sites. Only JAMAR data was available for the comparison school zones. All data from the JAMAR and ASE units were provided to Westat for analysis.

2.6 Assessment of Public Awareness and Attitudes

Residents of the demonstration and comparison school neighborhoods were contacted by telephone to assess the impact on their attitudes and perceptions of ASE deployment in school zones and the accompanying public information campaign. The survey was designed to facilitate a comparative analysis to determine the level of change in public attitudes and perceptions as a result of the ASE deployment and PI&E campaign. PDOT contracted with DHM, Inc. to conduct the evaluation.

Four hundred interviews were completed in each of the pre-demonstration and demonstration periods (margin-of-error +/- 4.9% at the 95% confidence level). During each period, 200 interviews were completed in the demonstration school neighborhood areas and 200 interviews in the treatment school areas (margin-of-error +/-6.9%). Respondents were drivers 18 or older. The respondent sample was drawn from reverse telephone directory listings of households in each demonstration and comparison school zone. The questionnaire is shown in Appendix B.

3 RESULTS

3.1 Speeds

The effects of ASE on speeds at demonstration and comparison school zones during conditions of ASE presence (present/absent), flashing beacon (on/off), and time period (pre-demonstration--demonstration--post-demonstration) were examined by looking at mean speeds, 85th percentile speeds, and proportions of drivers exceeding the speed limit by more than 5,10, and 15 miles per hour. Complete speed data are presented in tabular format in Appendix A.

3.1.1 Mean and 85th Percentile Speeds

Figure 5 shows the variation in mean speeds under various conditions of ASE presence, time period, and flashing beacon summarized over all of the demonstration school zone sites. Mean speeds were highest prior to the demonstration at all school zones, averaging 26.5 mph with the flashing beacon off and 22.4 mph with the beacon on. The lowest mean speeds occurred during the demonstration period when ASE was present, averaging 21.7 mph with the beacon off and 18.5 mph with the beacon on. When ASE was not present during the demonstration period, mean speeds averaged 25 mph with the beacon off and 20.9 mph with the beacon on. After the demonstration period ended, speeds remained at 25.2 mph without the beacon and 21.2 mph with the beacon, about the same level as during the demonstration when ASE was not present.

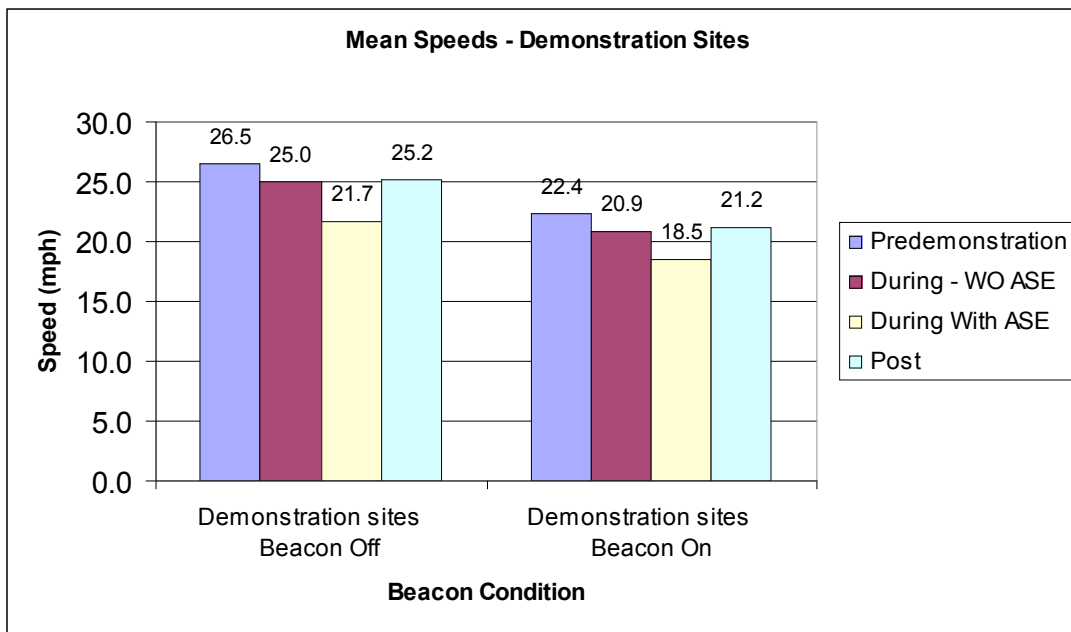


Figure 5. Mean speeds averaged across all demonstration sites by beacon and test condition (ASE presence or absence)

There was little difference in mean speeds across sites for comparable combinations of ASE treatment and beacon condition at each measurement period (see Appendix A, Table A1). The highest mean speed was 27.7 to 28.0 mph at demonstration sites t3 and t5 with the beacon off and prior to the start of ASE enforcement, while the lowest speed was 17.5 mph at t1 with the beacon on and ASE present. At each site, the mean speed when the flashing beacon was on was 3 to 4 mph lower than when the flashing beacon was off, both with and without the presence of ASE.

Figure 6 below shows 85th percentile speeds summarized over all demonstration sites. Eighty-fifth percentile speeds followed the same pattern as mean speeds. They were highest prior to the demonstration, averaging 32.4 mph without the flashing beacon and 29.8 mph with the flashing beacon. The lowest 85th percentile speeds occurred with ASE present: 27.8 mph with the beacon off and 23.4 mph with the beacon on. During the month following the end of the demonstration speeds increased to the same level as during the demonstration but without ASE present, 1 to 2 mph lower than the pre-demonstration levels.

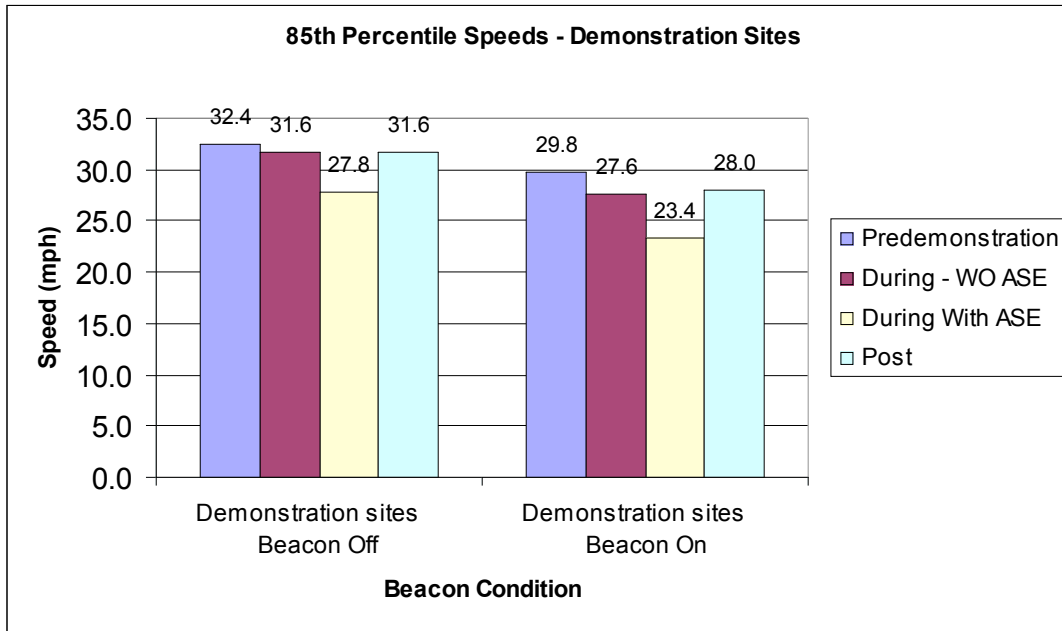


Figure 6. 85th percentile speeds averaged across all demonstration sites by beacon and test condition (ASE presence or absence)

Figures 7 and 8 show mean and 85th percentile speeds averaged across comparison sites. Speeds changed very little from the pre-demonstration through the post-demonstration periods for each flashing beacon condition. When the flashing beacons were on, speeds were about 4 mph lower than when the beacon was off.

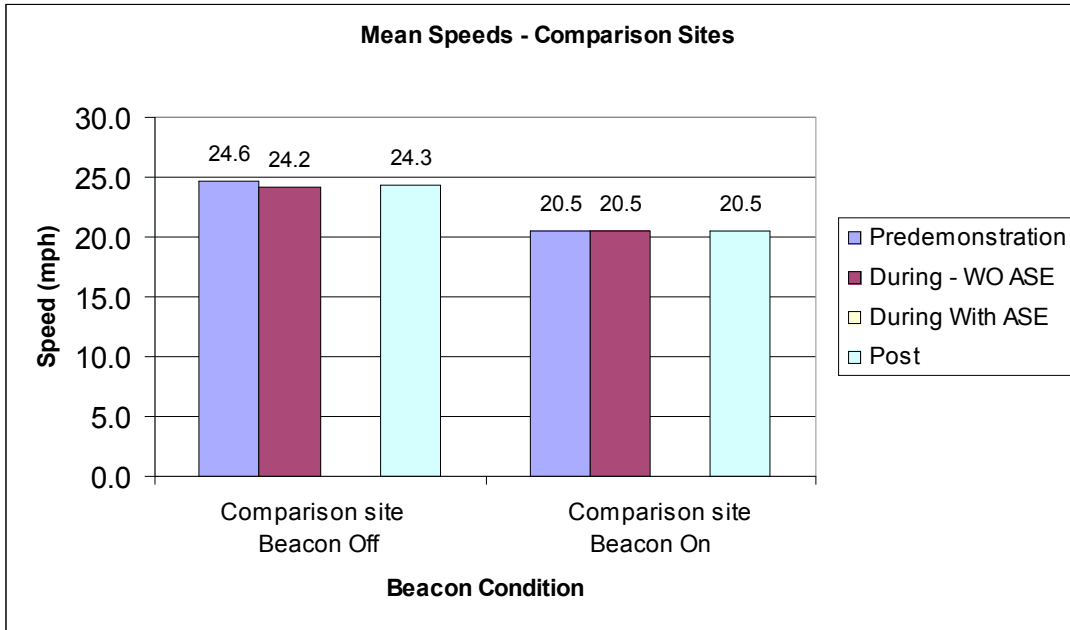


Figure 7. Mean speeds averaged across all comparison sites by beacon condition

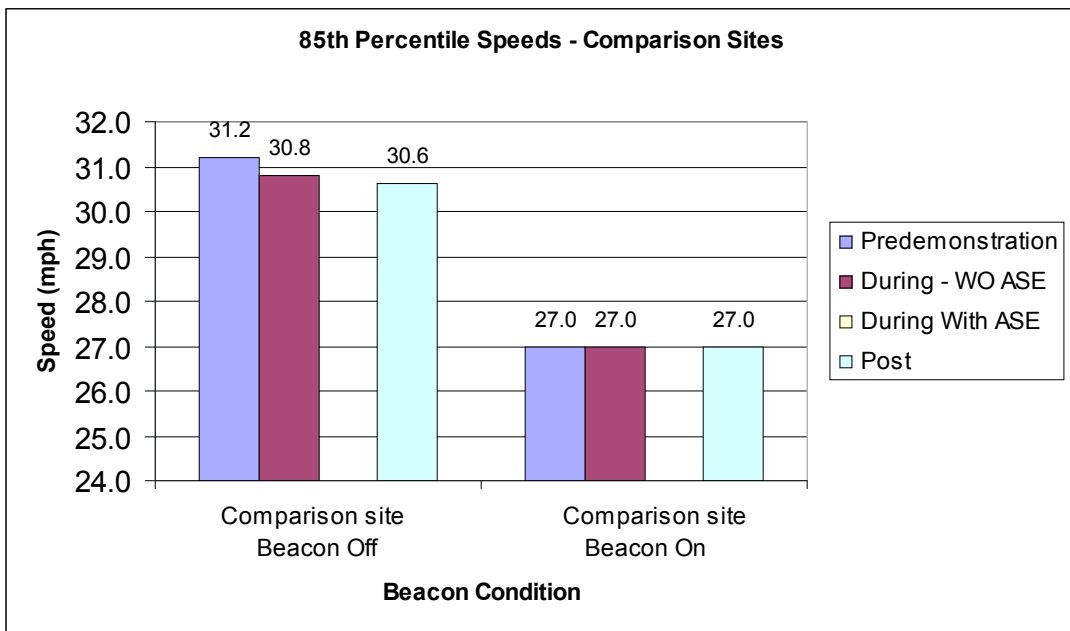


Figure 8. 85th percentile speeds averaged across all comparison sites by beacon condition

3.1.2 Proportions Exceeding Speed Limit by Various Thresholds

Proportions of vehicles exceeding the speed limit by more than 5 mph, 10 mph, and 15 mph in demonstration school zones with the flashing beacon off and on are shown in Figures 9, 10 and 11. The proportions of traffic that exceeded the speed limit by various amounts were similar to the patterns for mean and 85th percentile speeds. Prior to the demonstration and without the

flashing beacon, on average 56.0 percent of traffic exceeded the 20 mph speed limit by more than 5 mph, 25.6 percent by more than 10 mph and 6.5 percent by more than 15 mph, although the proportions exceeding the thresholds varied considerably across sites (see details in Appendix A Tables A3, A4 and A5). With the beacon on, the proportions exceeding the speed limit by various amounts were lower, and the proportions were lowest when both ASE and flashing beacon were present, when just 9.5 percent exceeded the speed limit by more than 5 mph, 2.3 percent by more than 10 mph, and 1.1 percent by more than 15 mph. After the demonstration ended, the proportions of speeding traffic remained lower than they were prior to the demonstration and, in fact, were at the same levels as during the demonstration but without ASE present.

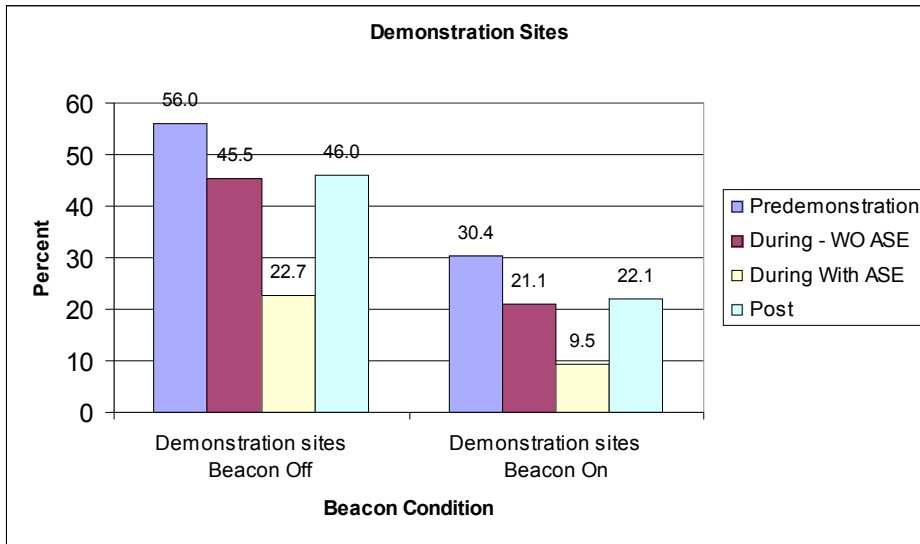


Figure 9. Proportions exceeding speed limit by more than 5 mph averaged across all demonstration sites by beacon and test condition (ASE presence or absence)

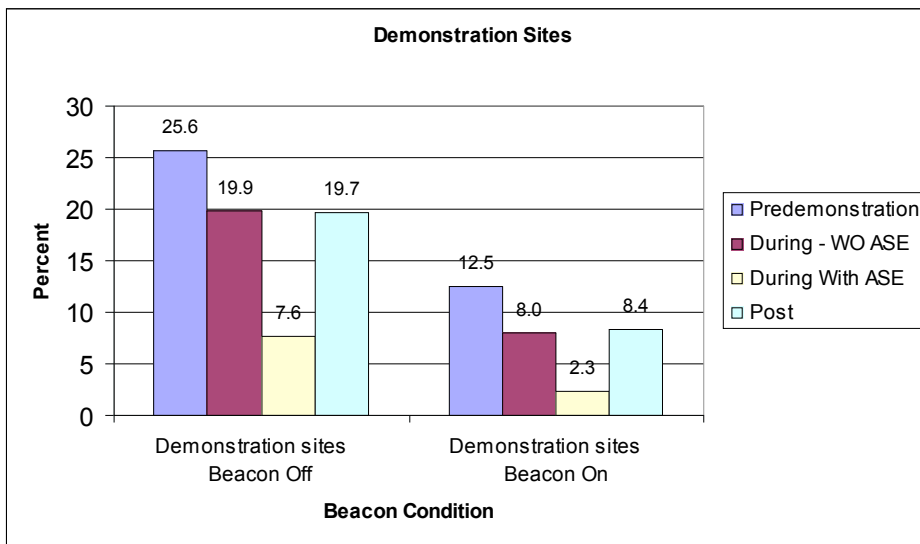


Figure 10. Proportions exceeding speed limit by more than 10 mph averaged across all demonstration sites by beacon and test condition (ASE presence or absence)

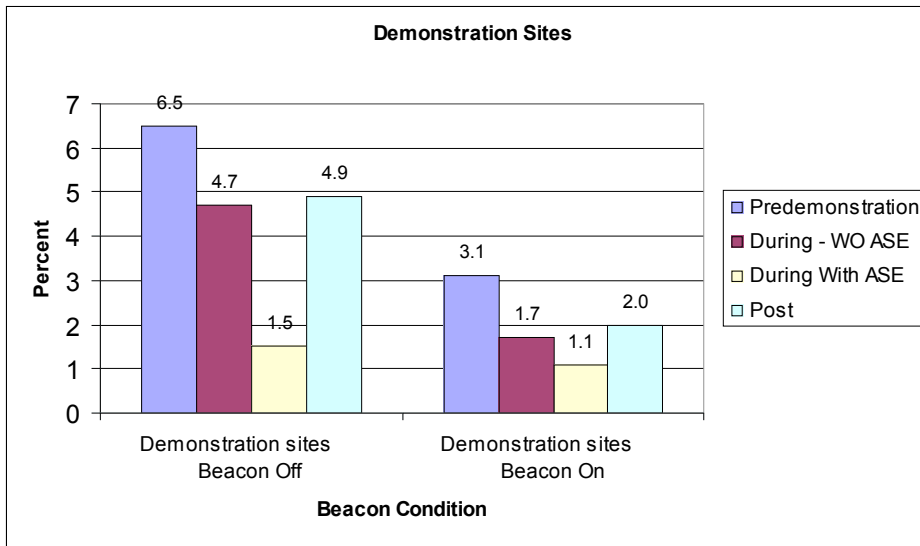


Figure 11. Proportions exceeding speed limit by more than 15 mph averaged across all demonstration sites by beacon and test condition (ASE presence or absence)

Figures 12, 13, and 14 show the proportions of speeding at various thresholds at comparison school zone sites, where there were small differences in the proportions exceeding the speed limit from one study period to another. The proportions exceeding the speed limits averaged across all comparison zones were lower than for demonstration school zones, but that was due to one school zone where the speeding proportion was at least half that of other comparison school zones (see Appendix A Tables A3, A4 and A5). When data from that school zone was excluded, the proportions of speeders at comparison school zones during all study periods were similar to the proportion at demonstration school zones during the pre-demonstration period.

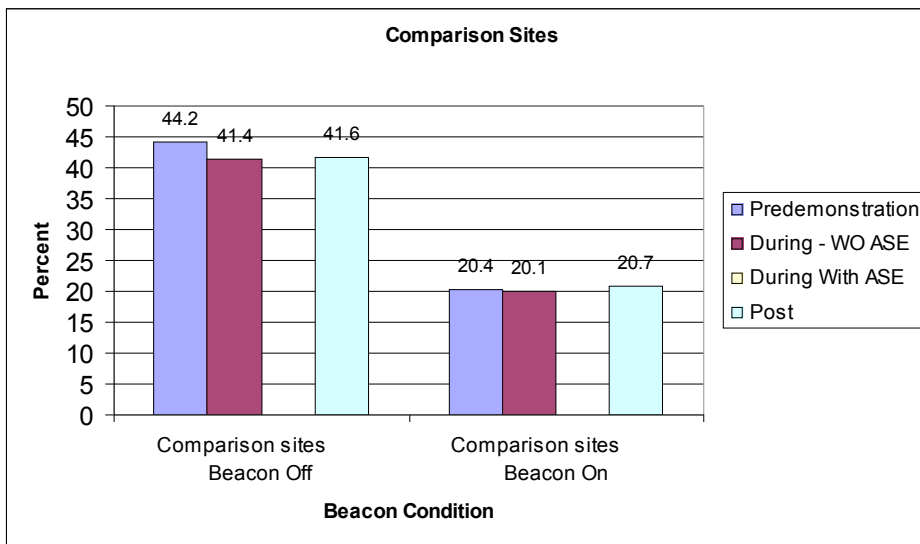


Figure 12. Proportions exceeding speed limit by more than 5 mph averaged across all comparison sites by beacon condition

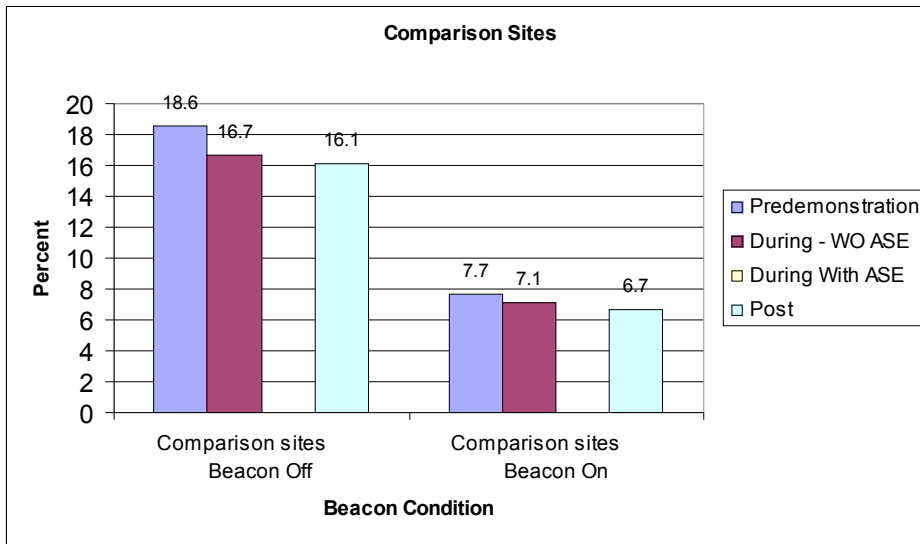


Figure 13. Proportions exceeding speed limit by more than 10 mph averaged across all comparison sites by beacon condition

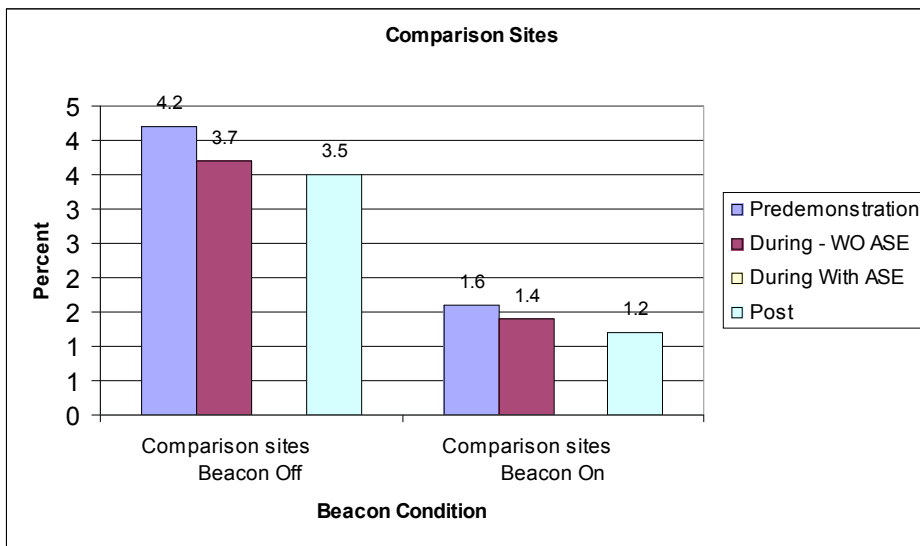


Figure 14. Proportions exceeding speed limit by more than 15 mph averaged across all comparison sites by beacon condition

3.2 Speed Limit Violations

While the ASE unit photographed just vehicles that exceeded the speed limit by at least 11 mph (designated as “violator”), the speed of every vehicle that passed the ASE van was recorded and stored by the ASE unit. Table 3 shows the number and proportion of vehicles designated as violators and photographed while Table 4 indicates the proportion of vehicles that exceeded the speed limit. Proportions of violators and proportions of vehicles exceeding 30 mph were determined from the ASE data. The proportions of violators represent vehicles that were

designated by ASE back office staff who review the evidentiary quality of the photos, while proportions exceeding the speed limit by at least 10 mph were determined from the speed data gathered by the ASE units. Both of these proportions are similar to but slightly lower than the proportions discussed previously for speeds measured by the JAMAR TRAX units. The ASE data represent vehicles that passed the ASE van, thus their drivers would have been able to see the ASE unit and the speeds of many of the vehicles were likely to have been influenced by the van's presence.

Table 3. ASE device violators (V) and nonviolators (N) at demonstration school Zones

Identified Violators (V) and Nonviolators (N) by Beacon Condition												
School	Beacon Off				Beacon On				Total Violators			
	% N	n	%V	n	% N	n	%V	n	% N	n	%V	n
t1	96.8	11993	3.2	398	99.7	5016	0.8	42	97.5	17009	2.5	440
t2	95.2	4932	4.8	248	98.4	2040	1.6	34	96.1	6972	3.9	282
t3	86.6	2357	13.4	365	95.9	1026	4.1	44	89.2	3383	10.8	409
t4	95.1	6389	4.9	329	97.9	2830	2.1	60	96.0	9219	4.1	389
t5	94.6	13221	5.4	750	98.8	4312	1.2	52	95.6	17533	4.4	802

Table 4. Proportions of vehicles exceeding threshold for enforcement

Percent of Vehicles Traveling 10 mph Above Posted Speed Limit by Beacon Condition								
School Site	Beacon Off				Beacon On			
	% ≤ 30 mph	n	% > 30 mph	n	% ≤ 30 mph	n	% > 30 mph	n
t1	96.2	11910	3.8	475	98.6	4984	1.4	71
t2	94.3	4882	5.7	293	97.3	2014	2.7	56
t3	85.0	2310	15.0	408	94.1	1004	5.9	63
t4	94.5	6342	5.5	372	97.7	2824	2.3	66
t5	94.0	13124	6.0	839	97.9	4270	2.1	91

3.3 Public Awareness and Attitudes

Key results of the analysis of public awareness and attitudes data are presented below and tabulated in Appendix B. The analysis focused on the differences between demonstration and comparison school area respondents and changes from pre-demonstration period to demonstration period.

1. Driving frequency: There were no changes in the ASE demonstration school group that were not also observed for the comparison school group for respondent's frequency of driving (Q3) and frequency of driving through school zones (Q4).
2. Driving speed: A plurality of respondents in the demonstration school group said people drive too fast near schools compared with the pre-demonstration period, when a majority felt people drive just about the right speed (Q5). The comparison school group showed most people agreeing that people drive just about the right speed for both the pre-demonstration period and demonstration period. There are no statistically significant differences between the pre-demonstration and demonstration periods for either the demonstration or comparison school group.

3. Agreement with use of ASE: Though the percentage agreeing with the use of ASE to enforce speed limits in school zones remained the same for the comparison school group, the strength of agreement increased somewhat for the demonstration school group (Q6); the increase is significant at the 80-percent confidence level. In the demonstration school group, four out of the five schools saw an increase in strong agreement between 8 percent and 26 percent. In the comparison school group only two schools saw an increase: Bridlemile (8%) and Ball (22%).
4. Enforcement presence: There was a small increase among both the comparison and the demonstration school group in percentages seeing police enforcing speed limits at least occasionally in school zones in Portland (Q7). The change in the perceptions of the demonstration school group is significant at the 90-percent confidence level, while for the comparison school group the change is significant at the 80-percent confidence level. This is validated by fewer people in the demonstration school group now saying they rarely or never see police enforcing the speed limits.
5. Likelihood of driving slower: The demonstration school group is now more likely to drive slower if they see ASE being deployed three times each week in a school zone (Q8). Compared to the pre-demonstration period, they also are now more often “very likely” than “somewhat likely” to drive slower; the difference is significant at the 90-percent confidence level. Significant increases in percentages “very likely” were observed for Alameda, Faubion, and Vernon. A similar pattern of changes was not observed for the comparison school group.
6. Awareness of speed limit: There was no significant change in either the demonstration school group or the comparison school group in the number of people who knew what the speed limit is for school zones in Portland (Q9). Knowledge that the limit is 20 mph was very high among all groups.
7. Benefit of driving within speed limit: There was a significant (at the 95-percent confidence level) increase in the demonstration school group in the number of people feeling that it would be a major safety improvement if people drove 20 mph or less in school zones (Q10). Validation included fewer people feeling it would make “no difference.” Also, every school in the demonstration school group showed higher percentages saying it would be a major safety improvement, compared with only three in the comparison school group.
8. Seen ASE in past month: More respondents in each school area reported seeing ASE on the targeted street in their area (Q11); the observed differences are significant at the 99-percent confidence level. Percentage increases were Alameda (3% to 20%), Boise-Eliot (5% to 28%), Faubion (5% to 18%), Vernon (5% to 33%), and Glencoe (15% to 28%). This was validated by the finding that nearly all of those who had seen ASE (Q11) said they had driven on the targeted street (Q12).
9. Seen ASE x Driving speed: There was a greater increase among demonstration school group respondents who had both seen ASE on the targeted street (Q11) and said people drive too fast near schools (Q5) than among those who had not seen ASE; a chi-square test shows the difference to be significant ($p > .001$).
10. Seen ASE x Agreement with use of ASE: Among respondents from demonstration school neighborhoods, those who had seen ASE(Q11) during the demonstration period

strongly agreed with its use in school zones (Q6) significantly more (at the 95% confidence level) than all pre-demonstration period respondents and demonstration period respondents who had not seen ASE.

11. Driven on ASE demo street x Agreement with use of ASE: Demonstration school group respondents who said they had driven on the demonstration street (Q12) and strongly agreed with the use of ASE in school zones (Q6) increased more in the demonstration period (+13%; significant at the 98% confidence level) than those who had not driven on the street (no significant difference between pre-demonstration and demonstration periods).
12. Seen ASE in past month x Enforcement presence: Demonstration period demonstration school group respondents who had seen ASE (Q11) and who said they never saw police enforcing speed limits in school zones (Q7) dropped from 42 percent during the pre-demonstration period to only 10 percent during the demonstration, while those who said they occasionally saw such enforcement increased from 0 percent to 26 percent. These changes are significant at the 95-percent and >99-percent confidence levels, respectively. Those who had not seen ASE had no significant change in these response categories from pre-demonstration to demonstration period.
13. Likelihood of driving slower x Seen ASE x Driven on ASE demo street: There was an increase in those who say they are likely (combined “very” and “somewhat”) to drive slower if they see ASE deployed in their school zone (Q8) among demonstration school group respondents who had both seen ASE (Q11) and driven on the targeted street (Q12). The pre-demonstration to demonstration period change is not statistically significant with the sample sizes available.
14. Benefit of driving within speed limit x Seen ASE x Driven on ASE demo street: Demonstration period demonstration school group respondents who had seen ASE (Q11) and driven on the targeted street (Q12) were much more likely to say it would be a major safety improvement if people drove 20 MPH or less in schools zones (Q10). Again, the change from pre-demonstration to demonstration period is not statistically significant with the sample sizes available.
15. Seen ASE in past month x Driven on ASE demo street: Nine out of 10 in the demonstration period who had not driven on the targeted street (Q12) said they had not seen ASE speed enforcement (Q11), whereas nearly a third of those who had driven on the targeted streets had seen the ASE. This is a significant difference (chi-square, $p < .001$).

4 FINDINGS

Principal findings regarding the independent variables of enforcement presence, PI&E, flashing beacon, citations, and public awareness, and the dependent variables associated with speeds, are described below.

4.1 Speeds

The effects of ASE presence and flashing beacon on mean and 85th percentile speeds are discussed below.

4.1.1 Mean and 85th Percentile Speeds

4.1.1.1 Treatment School Zones

Without Flashing Beacon

- When ASE was onsite at demonstration school zones, speeds averaged across all demonstration sites were about 5 mph lower during the demonstration than prior to the ASE demonstration. Average mean speed decreased from 26.5 mph pre-demonstration to 21.7 mph during the demonstration, and 85th percentile speed decreased from 32.4 mph to 27.8 mph.
- When ASE was absent from the demonstration schools, speeds were approximately 1 mph lower during the demonstration period than during the pre-demonstration period, and this difference also occurred for the post-demonstration period. Average mean speed decreased from 26.5 mph pre-demonstration to 25.0 mph during the demonstration and 25.2 mph post-demonstration. The average 85th percentile speed was 32.4 mph prior to the demonstration and was 31.6 mph during both the demonstration and post-demonstration periods.

With Flashing Beacon

- The result was similar when the flashing beacon was on, with mean and 85th percentile speeds about 1 to 2 mph lower during the demonstration period when ASE was not onsite, and 4 to 6 mph lower when ASE was onsite compared with the pre-demonstration period.
- The combination of the presence of ASE onsite and flashing beacon resulted in the lowest mean and 85th percentile speeds at demonstration school zones. The average mean speed across demonstration school zones was 18.5 mph and the average 85th percentile speed was 23.4 mph with both ASE present and beacon on. These speeds were 8 to 9 mph lower than the pre-demonstration period speeds, when neither ASE nor flashing beacon was present.

4.1.1.2 Comparison School Zones

- At the comparison school zones, there was no appreciable difference between pre-demonstration period, demonstration period, and post-demonstration period mean or 85th percentile speeds. The average mean speed across comparison sites was approximately 25 mph during all three periods without the beacon on and 21 mph with the beacon on. The average 85th percentile speed during all three periods was approximately 31 mph with the beacon off and 27 mph with the beacon on.

4.1.2 Proportions of Vehicles Over the Speed Limit

4.1.2.1 Treatment School Zones

Without Flashing Beacon

- The proportions of vehicles traveling in excess of the 20 mph school zone speed limit were lower during the ASE demonstration. Prior to the ASE demonstration, 56.0 percent of vehicles at the demonstration school zones exceeded the speed limit by more than 5 mph, 25.6 percent by more than 10 mph, and 6.5 percent by more than 15 mph when the beacon was off. During the demonstration and with ASE onsite, the proportions of traffic above the 5 mph, 10 mph, and 15 mph thresholds were reduced to about one-half to one-sixth (22.7, 7.6, and 1.5 percent, respectively) the levels without ASE. When ASE was not onsite, the proportions of speeding traffic were reduced to 45.5, 19.9, and 4.7 percent, respectively, with the percentages remaining at those levels during the post-demonstration period.

With Flashing Beacon

- When the flashing beacon was on, with or without ASE present, the proportions exceeding the speed limit were about one-half to one-third of what they were with the beacon off. For example, while 25.6 percent of traffic without the flashing beacon exceeded the speed limit by more than 10 mph before the demonstration began, only 12.5 percent did so with the beacon. After the ASE demonstration began, with no ASE onsite the proportion more than 10 mph over the speed limit was 19.9 percent without the beacon and 7.6 percent with the beacon on.
- With the combination of ASE onsite and flashing beacon, exceeding the speed limit was between one-sixth and one-tenth as prevalent as it was prior to the demonstration with neither ASE onsite nor flashing beacon. For example, before the ASE demonstration and without a flashing beacon, 25.6 percent exceeded the school zone speed limit by more than 10 mph. During the demonstration, with ASE onsite and with the flashing beacon on, just 2.3 percent were more than 10 mph over the speed limit.

4.1.2.2 Comparison School Zones

- At the comparison school zones, there was little difference in the proportions exceeding the speed limit across the pre-demonstration period, demonstration period, and post-demonstration period. For example, across all three periods, without the flashing beacon, 16.1-18.6 percent of traffic exceeded the speed limit by more than 10 mph, while with the flashing beacon, 6.7-7.7 percent did so.

4.2 Public Information and Education

The following are the findings from the PI&E activities conducted by the City of Portland.

Goal 1: Create public awareness in selected test school zone communities only regarding the ASE project.

Support for the project from key stakeholders, including Portland Public School District administrators, police, and neighborhood association leaders, was high before, during, and after

the project. Portland Transportation staff maintained contact with key stakeholders throughout the project via phone, email, and in-person meetings. Communications with stakeholders before, during, and after the project revealed strong statements of support and revealed the following:

1. Neighborhood association leaders found that the best method for informing the majority of residents near the test schools about the ASE project was through neighborhood newsletters. The PI&E Coordinator found e-mail through neighborhood association distribution lists as the most effective neighborhood communications strategy.
2. Portland Police Bureau commanders found that the best methods for maintaining communications with participating divisions were phone and e-mail.
3. Portland Public Schools public information staff found that the best method for informing school district administrators about the ASE project was through e-mail with the Assistant Superintendent's Office, the Communications Office, the Student Transportation Office, and the test school principals.
4. Portland Public Schools public information staff found that the best method for informing the majority of parents about the ASE project was through student backpack mail. A challenge in providing ASE project information to parents was a language barrier and limited resources for translation services. A total of 14 different languages were spoken in the five test schools. Therefore, each test school was responsible for providing translations where possible.

Goal 2: Create public awareness in broader Portland community regarding ASE project.

1. An inventory of existing ASE public information materials revealed that the most current information existed on the Portland Police Bureau Web site, which posted a concise, clear, and readable page about ASE, including background of the program, program goals and objectives, ASE technology and citation processing, ASE demonstration project evaluation (1995-1997), and ASE Q&A.
2. A conversation with the City's Communications Director resulted in the PI&E Coordinator obtaining a media email distribution list and a media Fax distribution list. The email distribution list included major newspapers, editors, and reporters; neighborhood newspapers and newsletters and editors; radio stations; and television news desks. The Fax distribution list included major newspapers, radio stations, and television stations.
3. The PI&E Coordinator distributed ASE project information to the broader Portland public using the media lists described above. See **Goal 4** findings below for a summary of media outreach and response activities.

Goal 3: Assure accuracy and consistency in the project's PI&E processes and publications.

The Project Team for PDOT maintained close communications throughout the project to ensure accuracy of information and consistency of message. The PI&E Coordinator reviewed drafts of all public information materials, important written stakeholder communications, and project reports with the Project Director before production and distribution.

Goal 4: Work with communications representatives for PDOT to ensure successful media relations (outreach and response).

The best strategies for informing the broader general public about the ASE project was through major media markets, including newspapers (*The Oregonian* and *The Portland Tribune*), radio (K103, KEX, KINK, KOPB, KPAM, KXL), television (KATU, KGW, KOIN, KPDX, KPTV), and the City's Web site (PortlandOnline.com). The ASE project story was picked up by print media (*The Oregonian* and *The Portland Tribune*), Portland's Citywide News Web site, the MSNBC News Web site, and the Mount Tabor Neighborhood Association newsletter. The project story was also picked up by electronic media, including radio KPAM 860 and KXL 750 and television KOIN Channel 6, KGW Channel 8, and KPTV FOX Channel 12.

Goal 5: Evaluate the impacts of school zone ASE and the PI&E program on public perceptions and attitudes.

The findings regarding public awareness and attitudes are presented in Section 4.3.

4.3 Public Awareness and Attitudes

- The strength of agreement with the use of ASE in school zones increased from pre-demonstration to demonstration periods in demonstration school neighborhoods, but did not change in comparison school neighborhoods.
- Following the implementation of ASE, the proportion of drivers in demonstration community neighborhoods who said that speeds near schools were just about right decreased and the proportion who said that people drove too fast increased to a plurality. There was no change from pre-demonstration to demonstration periods in the comparison neighborhoods, where the majority of drivers said that speeds were just about right.
- With the implementation of ASE, there was an increase in the proportion of demonstration community drivers who said they were very likely to drive slower if they saw ASE deployed three times a week in school zones. There was no such change in the comparison community driver sample.
- There was an increase from the pre-demonstration to the demonstration period in the proportion of drivers in demonstration neighborhoods who said that driving 20 mph or less in school zones would be a major safety improvement. There was also an increase in the comparison community, but it was smaller.

5 CONCLUSIONS

The following conclusions are drawn from the results of the demonstration of ASE in Portland school zones:

5.1 Speeds

- Conducting ASE operations in school zones an average of 2 to 3 times per week across a number of schools reduces traffic speeds compared to not having a school zone ASE program. In this particular demonstration the effect was to reduce speeds by approximately 4 to 5 mph
- A school zone ASE program is likely to reduce speeds even when an ASE unit is not deployed at a school zone, although the reduction will be less than when ASE is present.
- The full benefit of ASE can be achieved with the combination of a school zone ASE program and flashing beacons in school zones. The presence of a flashing beacon presents a highly conspicuous warning of the hazard present at a school zone and reminds drivers that ASE may be present. This combination motivates drivers to slow down, as much as 8 to 9 mph lower than without either countermeasure.
- At least some of the speed reduction effect of ASE is sustained at school zones even when it has been absent for one month or more. Agencies may consider that for developing deployment schedules to maximize ASE efficiency when limited resources are available.

5.2 Public Awareness and Attitudes

- A school zone ASE program that includes both visible ASE operations and public communications and media components (e.g., school based information sent home to parents, press materials and earned media events, community Web site) is likely to heighten public awareness of the risks of excessive speeds in school zones and positively influence attitudes regarding ASE.

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Appendix A

Table A1. Mean speeds by site and condition

School	Beacon Off							
	PRE-DEMO		DURING DEMO				POST-DEMO	
	WO/ASE		WO/ASE		W/ASE		WO/ASE	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
t1	26.7	6.2	25.0	6.4	21.1	4.8	25.1	6.1
t2	25.5	5.0	25.0	5.1	21.9	5.0	24.8	5.1
t3	28.0	6.8	26.3	6.9	23.0	6.4	26.9	6.8
t4	24.5	5.6	23.2	5.7	20.6	4.8	23.3	5.6
t5	27.7	6.4	25.5	6.7	21.8	6.0	25.8	6.6
Demonstration site average	26.5		25.0		21.7		25.2	
c1	21.2	5.9	21.4	6.0			21.2	5.7
c2	24.3	6.3	24.1	6.2			24.0	6.2
c3	26.0	5.6	25.8	5.6			26.1	7.3
c4	25.9	6.5	24.9	6.4			25.4	6.3
c5	25.8	6.0	25.0	6.3			25.0	6.2
Comparison site average	24.6		24.2				24.3	
School	Beacon On							
	PRE-DEMO		DURING DEMO				POST-DEMO	
	WO/ASE		WO/ASE		W/ASE		WO/ASE	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
t1	21.4	7.1	20.1	6.5	17.5	4.7	20.1	6.6
t2	21.8	5.7	20.7	5.6	18.7	5.2	20.7	5.6
t3	23.5	6.9	21.3	6.5	19.3	5.2	22.5	6.7
t4	22.0	6.5	20.8	6.0	18.9	5.2	20.5	5.9
t5	23.4	6.9	21.3	6.4	18.2	5.9	22.0	6.3
Demonstration site average	22.4		20.9		18.5		21.2	
c1	18.1	5.8	17.9	5.7			18.0	5.7
c2	20.9	6.2	20.9	6.0			20.9	6.1
c3	21.9	6.2	22.2	6.1			22.0	6.6
c4	21.2	6.7	21.2	6.3			21.2	6.4
c5								
Comparison site average	20.5		20.5				20.5	

Table A2. Eighty-fifth percentile speeds by site and condition

School	Beacon Off			
	PRE-DEMO	DURING DEMO		POST-DEMO
	WO/ASE	WO/ASE	W/ASE	WO/ASE
	85th %	85th %	85th %	85th %
t1	33	32	27	32
t2	30	30	27	30
t3	35	34	28	34
t4	30	29	27	29
t5	34	33	29	33
Demonstration site average	32.4	31.6	27.8	31.6
c1	28	28		27
c2	31	31		31
c3	32	32		32
c4	33	32		32
c5	32	31		31
Comparison site average	31.2	30.8		30.6
School	Beacon On			
	PRE-DEMO	DURING DEMO		POST-DEMO
	WO/ASE	WO/ASE	W/ASE	WO/ASE
	85th	85th	85th	85th
t1	30	27	22	28
t2	28	27	24	26
t3	31	30	24	30
t4	29	26	24	27
t5	31	29	23	29
Demonstration site average	29.8	27.6	23.4	28.0
c1	24	24		24
c2	27	27		27
c3	29	29		29
c4	28	28		28
c5				
Comparison site average	27.0	27.0		27.0

Table A3. Percent exceeding speed limit by more than 5 mph by site and condition

School	Beacon Off			
	PRE-DEMO	DURING DEMO		POST-DEMO
	WO/ASE	WO/ASE	W/ASE	WO/ASE
	%>5mph	%>5mph	%>5mph	%>5mph
t1	56.4	44.9	18.0	45.4
t2	50.2	46.2	22.2	44.5
t3	63.7	52.2	32.7	55.4
t4	44.8	35.2	16.7	34.0
t5	64.9	48.9	24.3	50.5
Demonstration site average	56.0	45.5	22.7	46.0
c1	23.7	24.4		22.7
c2	41.4	40.6		39.9
c3	50.6	49.4		49.5
c4	50.8	44.3		48.1
c5	54.5	48.2		48.0
Comparison site average	44.2	41.4		41.6
School	Beacon On			
	PRE-DEMO	DURING DEMO		POST-DEMO
	WO/ASE	WO/ASE	W/ASE	WO/ASE
	%>5mph	%>5mph	%>5mph	%>5mph
t1	26.4	19.3	6.2	19.3
t2	26.4	19.0	12.3	18.7
t3	33.9	22.6	10.7	26.5
t4	30.0	22.0	9.1	19.5
t5	35.3	22.9	9.2	26.4
Demonstration site average	30.4	21.1	9.5	22.1
c1	10.8	10.0		11.3
c2	21.9	20.8		20.7
c3	26.3	26.8		26.8
c4	22.8	22.8		23.8
c5				
Comparison site average	20.4	20.1		20.7

Table A4. Percent exceeding speed limit by more than 10 mph by site and condition

School	Beacon Off			
	PRE-DEMO	DURING DEMO		POST-DEMO
	WO/ASE	WO/ASE	W/ASE	WO/ASE
	%>10mph	%>10mph	%>10mph	%>10mph
t1	28.5	22.1	4.4	20.9
t2	14.6	13.9	5.5	12.3
t3	37.5	28.9	13.7	31.5
t4	12.4	9.5	3.1	8.6
t5	35.1	24.9	11.2	25.4
Demonstration site average	25.6	19.9	7.6	19.7
c1	6.8	7.2		5.7
c2	17.3	16.6		15.6
c3	21.5	20.9		19.5
c4	24.7	19.6		21.2
c5	22.5	19.3		18.6
Comparison site average	18.6	16.7		16.1
School	Beacon On			
	PRE-DEMO	DURING DEMO		POST-DEMO
	WO/ASE	WO/ASE	W/ASE	WO/ASE
	%>10mph	%>10mph	%>10mph	%>10mph
t1	13.4	8.7	0.5	8.7
t2	6.2	5.2	0.0	4.6
t3	16.7	10.1	4.1	13.7
t4	8.4	5.3	1.7	4.3
t5	17.6	10.9	5.1	10.9
Demonstration site average	12.5	8.0	2.3	8.4
c1	3.6	2.9		2.4
c2	7.5	6.9		6.9
c3	9.5	10.4		9.4
c4	10.2	8.1		8.0
c5				
Comparison site average	7.7	7.1		6.7

Table A5. Percent exceeding speed limit by more than 15 mph by site and condition

School	Beacon Off			
	PRE-DEMO	DURING DEMO		POST-DEMO
	WO/ASE	WO/ASE	W/ASE	WO/ASE
	%>15mph	%>15mph	%>15mph	%>15mph
t1	6.9	5.2	0.8	4.4
t2	2.0	1.9	0.4	1.7
t3	12.6	9.1	3.2	10.7
t4	1.8	1.4	0.5	1.4
t5	9.1	6.2	2.4	6.3
Demonstration site average	6.5	4.7	1.5	4.9
c1	1.3	1.5		0.9
c2	3.7	3.2		3.0
c3	4.6	4.5		4.9
c4	7.3	5.3		5.4
c5	4.0	3.9		3.6
Comparison site average	4.2	3.7		3.5
School	Beacon On			
	PRE-DEMO	DURING DEMO		POST-DEMO
	WO/ASE	WO/ASE	W/ASE	WO/ASE
	%>15mph	%>15mph	%>15mph	%>15mph
t1	3.3	1.8		1.75
t2	0.4	0.7		0.49
t3	5.7	3.0	1.65	4.76
t4	1.6	0.5	0.17	0.49
t5	4.4	2.4	1.54	2.48
Demonstration site average	3.1	1.7	1.1	2.0
c1	0.5	0.6		0.5
c2	1.4	1.3		1.1
c3	1.7	1.9		1.7
c4	2.9	2.0		1.5
c5				
Comparison site average	1.6	1.4		1.2

Appendix B. Public awareness study questionnaire and results

Annotated Questionnaire: Control Area/n=200; Test Area/n=200; Total/n=400

Hello, this is _____ and I'm calling for the Portland Office of Transportation. The purpose of this survey is to help the Portland Office of Transportation improve school zone safety. Your participation is voluntary and your answers will be completely confidential.

1. Are you a member of this household and at least 18 years old?

- A. Yes (*Go to 2*)
- B. No (*Go to 1a*)
- C. Probable Business (*Stop Interview*)
- D. Answering Machine (*Stop Interview*)
- E. Redial (*Stop Interview*)
- F. Nonworking Disconnected (*Stop Interview*)
- G. Refusal (*Stop Interview*)

1a. May I speak with a household member who is at least 18 years old?

- A. Yes (*Go back to Intro A*)
- B. No/ Refused (*Stop Interview*)
- C. Not Available (*Make Callback Appointment*)

2. Are you a driver?

- A. Yes (*Go to 3*)
- B. No (*Go to 2a*)
- C. Refused

2a. May I speak with another household member who is a driver?

- A. Yes (*Go to Intro A and Question 1*)
- B. No, Not Currently Available (*Make Callback Appointment*)
- C. No, No driver in household (*Stop Interview- Thank you very much. That's all we need to ask you*)
- D. No / Refused (*Stop Interview*)

3. How often do you drive? Would you say:

	<u>Pre-Test</u>		<u>Post-Test</u>	
	<u>Test</u>	<u>Control</u>	<u>Test</u>	<u>Control</u>
A. Every day	73%	74%	81%	81%
B. 2-3 times per week	21%	22%	16%	16%
C. Once a week	4%	2%	2%	2%
D. 2-3 times per month	1%	0%	0%	1%
E. Once a month	0%	1%	1%	1%
F. Rarely	1%	2%	0%	1%
G. Never (<i>Go to 11</i>)	1%	0%	1%	0%
H. DON'T KNOW (<i>Go to 11</i>)	0%	0%	1%	0%
I. REFUSED (<i>Go to 11</i>)	0%	1%	0%	0%

4. When you drive, how often do you drive through school zones in Portland? Would you say:

	<u>Pre-Test</u>		<u>Post-Test</u>	
	<u>Test</u>	<u>Control</u>	<u>Test</u>	<u>Control</u>
A. Each time you drive	45%	48%	51%	49%
B. Most of the times you drive	28%	22%	25%	28%
C. About half of the times you drive	16%	17%	15%	11%
D. Rarely when you drive	9%	11%	8%	10%
E. Never	1%	2%	1%	2%
F. DON'T KNOW	1%	1%	0%	1%
G. REFUSED	0%	0%	0%	0%

5. Which of the following statements do you agree with most?

	<u>Pre-Test</u>		<u>Post-Test</u>	
	<u>Test</u>	<u>Control</u>	<u>Test</u>	<u>Control</u>
A. People drive too fast near schools.	43%	38%	48%	41%
B. People drive just about the right speed near Schools	51%	52%	42%	48%
C. People drive too slow near schools	2%	4%	4%	5%
D. DON'T KNOW	4%	6%	5%	6%
E. REFUSED	0%	1%	1%	1%

6. How strongly do you either agree or disagree with the use of photo radar to enforce speed limits in school zones? Do you:

	<u>Pre-Test</u>		<u>Post-Test</u>	
	<u>Test</u>	<u>Control</u>	<u>Test</u>	<u>Control</u>
A. Strongly Agree	21%	30%	32%	32%
B. Somewhat Agree	34%	25%	25%	29%
C. Neither Agree nor Disagree	7%	10%	11%	7%
D. Somewhat Disagree	14%	17%	12%	13%
E. Strongly Disagree	22%	17%	18%	21%
F. DON'T KNOW	1%	2%	1%	1%
G. REFUSED	1%	0%	1%	0%

7. How often do you see police enforcing speed limits in school zones in Portland? Do you see them:

	<u>Pre-Test</u>		<u>Post-Test</u>	
	<u>Test</u>	<u>Control</u>	<u>Test</u>	<u>Control</u>
A. Very Often	1%	3%	3%	6%
B. Somewhat Often	8%	13%	8%	10%
C. Occasionally	14%	19%	18%	20%
D. Rarely	41%	27%	40%	34%
E. Never	36%	37%	29%	29%
F. DON'T KNOW	1%	2%	2%	2%
G. REFUSED	0%	1%	0%	0%

8. If you saw photo radar being deployed three times each week in a school zone you drive through, how likely is it that you would drive slower? Would you say:

	<u>Pre-Test</u>		<u>Post-Test</u>	
	<u>Test</u>	<u>Control</u>	<u>Test</u>	<u>Control</u>
A. Very Likely	51%	54%	63%	53%
B. Somewhat Likely	14%	12%	10%	13%
C. Neither Likely nor Unlikely	17%	17%	12%	14%
D. Somewhat Unlikely	5%	4%	6%	4%
E. Very Unlikely	11%	9%	8%	12%
F. DON'T KNOW	2%	6%	2%	4%
G. REFUSED	1%	0%	1%	3%

9. What is the speed limit for school zones in Portland?

- A. _____ MPH (If correct, say, "That's right." If incorrect, say, "The School Zone Speed Limit in Portland is 20 miles per hour.")
 B. DON'T KNOW (say, "The School Zone Speed Limit in Portland is 20 miles per hour.")
 C. REFUSED (say, "The School Zone Speed Limit in Portland is 20 miles per hour.")

	<u>Pre-Test</u>		<u>Post-Test</u>	
	<u>Test</u>	<u>Control</u>	<u>Test</u>	<u>Control</u>
A. 20 MPH	90%	91%	87%	91%
B. Not 20 MPH	9%	7%	11%	9%
C. DON'T KNOW	1%	2%	2%	0%

10. If people drove 20 MPH or less in school zones, would you say this would:

	<u>Pre-Test</u>		<u>Post-Test</u>	
	<u>Test</u>	<u>Control</u>	<u>Test</u>	<u>Control</u>
A. Be a major safety improvement	48%	44%	60%	52%
B. Be a minor safety improvement	27%	29%	23%	25%
C. Make no difference	18%	19%	13%	18%
D. DON'T KNOW	5%	8%	3%	4%
E. REFUSED	2%	0%	1%	2%

Questions 11-13 NOT ASKED IN CONTROL AREA

11. Have you seen photo radar speed enforcement on (specific street/avenue name) in the past month?

	<u>Pre-Test</u>	<u>Post-Test</u>
A. Yes	7%	25%
B. No	87%	69%
C. DON'T KNOW	7%	6%
D. REFUSED	0%	0%

12. Have you driven on (specific street/avenue name) in the past month?

	<u>Pre-Test</u>	<u>Post-Test</u>
A. A. Yes (<i>Go to 13</i>)	70%	77%
B. No (<i>Skip to 14</i>)	29%	23%
C. DON'T KNOW (<i>Skip to 14</i>)	2%	1%
D. REFUSED (<i>Skip to 14</i>)	0%	0%

13. Were you ticketed by the photo radar speed enforcement on (specific street/avenue name) in the past month?

	<u>Pre-Test</u>	<u>Post-Test</u>
A. Yes	0%	2%
B. No	99%	97%
C. DON'T KNOW	1%	1%
D. REFUSED	0%	0%

DEMOGRAPHIC QUESTIONS

14. Are there any school age children (*elementary school through high school*) in your home?

	<u>Test/Pre(Post)</u>	<u>Control/Pre(Post)</u>
A. Yes	27% (30%)	25% (31%)
B. No	74% (71%)	75% (69%)
C. DON'T KNOW	0% (0%)	0% (0%)
D. REFUSED	0% (0%)	1% (1%)

15. Please tell me your age:

	<u>Test/Pre(Post)</u>	<u>Control/Pre(Post)</u>
A. 18-34	24% (25%)	9% (18%)
B. 35-44	26% (22%)	15% (18%)
C. 45-54	23% (25%)	30% (25%)
D. 55-64	17% (20%)	20% (23%)
E. 65+	9% (6%)	24% (13%)
F. REFUSED	3% (3%)	4% (4%)

16. Please stop me when I get to the category that best describes your household's total income, before taxes, in the past 12 months.

	<u>Test/Pre(Post)</u>	<u>Control/Pre(Post)</u>
A. \$20,000 or less	10% (8%)	6% (10%)
B. \$20,001 to \$40,000	17% (26%)	14% (15%)
C. \$40,001 to \$60,000	17% (18%)	20% (12%)
D. \$60,001 to \$80,000	19% (15%)	16% (16%)
E. \$80,001 to \$100,000	8% (7%)	7% (10%)
F. More than \$100,000	9% (11%)	14% (17%)
G. DON'T KNOW	3% (1%)	5% (4%)
H. REFUSED	18% (16%)	20% (18%)

17. Gender (**DO NOT ASK/RECORD**):

	<u>Test/Pre(Post)</u>	<u>Control/Pre(Post)</u>
A. Female	50% (50%)	50% (50%)
B. Male	50% (50%)	50% (50%)

18. SAMPLE AREA (DO NOT ASK/RECORD):

	<u>Test/Pre(Post)</u>	<u>Control/Pre(Post)</u>
A. TEST – ALAMEDA	20% (20%)	
B. TEST – BOISE-ELIOT	20% (20%)	
C. TEST – FAUBION	20% (20%)	
D. TEST – VERNON	20% (20%)	
E. TEST – GLENCOE	20% (20%)	
F. CONTROL – LEWIS		20% (20%)
G. CONTROL – BALL		20% (20%)
H. CONTROL – BRIDLEMILE		20% (20%)
I. CONTROL – RIEKE		20% (20%)
J. CONTROL - CAPITOL HILL		20% (20%)

Thank you for participating. The results will be used to improve traffic safety in Portland

DOT HS 810 764
May 2007



U.S. Department
of Transportation
**National Highway
Traffic Safety
Administration**

