

# **Automated Enforcement in Work Zone Pilot Project**

## ***Fall 2008/Spring 2009 Deployment***

### **Executive Summary**

The Washington State Department of Transportation worked with the Washington State Patrol, Lewis County District Court and Thurston County District Court to test the use of automated speed enforcement in highway work zones. Two tests were implemented. Both tests were in Interstate 5 work zones; one in Lewis County and the other in Thurston County. Nearly 1,300 infractions were issued in a five week period in the first pilot in Lewis County. Travel speeds were lower during the enforcement period with a drop in the number of vehicle exceeding 70 mph in the 60 mph work zone. The speeds in the Thurston County work zone also appear to be lower in the enforcement area compared to speeds just to the south of the work zone. Automated enforcement, along with data collection and analysis will continue in the Thurston County work zone until June 30, 2009.

### **1. Background Information**

#### **Worker and Traveler Safety in Work Zones**

The goal for the pilot test of automated traffic safety cameras (ATSC) was to decrease the number of speeding drivers in work zones, making work zones safer for workers and the traveling public.

The department's primary concern is the safety of workers and the public in work zones. Between 2001 and 2006, fatal work zone collisions decreased by 41 percent, but "possible injury" and "non-injury" collisions have increased by nearly 60 percent, from 686 in 2001 to 1,097 in 2006. The top two reasons for work zone crashes are speeding and inattentive driving and, one of the top collision types in work zones is the rear-end collision during daylight hours. An overwhelming majority - close to 99 percent - of people injured or killed in work zone collisions are drivers and passengers. Pedestrians, flaggers and roadway workers account for only one percent of these injuries or fatalities.

Speed is the number one reason for collisions in Washington. In 2006, speeding drivers caused more than 15,000 traffic incidents on state highways. There are close to 2,000 traffic incidents each year in state highway work zones. While the high-profile incidents are decreasing, those smaller incidents that block traffic and cause minor injuries continue to increase.

#### **Agency Request Legislation**

The Legislature authorized ATSC use in work zones as a pilot program during the 2007 session. Subsection (4), Section 220, of ESHB 1094 authorized the department, in consultation with the State Patrol, to conduct a pilot program for the patrol to issue

infractions based on information from ATSC in state highway work zones when workers are present.

The following provisions are specified in ESHB 1094:

- Projects included in the pilot program must be authorized by December 31, 2007
- ATSC may only photograph the vehicle and license plate
- The photograph may not reveal the face of the driver or passengers
- The department must notify drivers through signing that they are entering an ATSC enforcement zone
- Notices of infractions must be mailed to the registered owner within 14 days of the infraction
- Vehicle owners are not responsible for violations through affidavit that others were in care, custody, or control of the vehicle, or any other extenuating circumstances
- ATSC infractions are not part of the registered owner's driving record (reference statutes cited are RCW 46.52.101 and RCW 46.52.120)
- ATSC infractions are processed in the manner of parking infractions (reference statutes cited are RCW 3.46.120, RCW 3.50.100, RCW 35.20.220, RCW 46.16.216, and RCW 46.20.270(3))
- The ATSC infraction fine is \$137, of which \$32 is deposited into the State Patrol's highway account and the remaining funds deposited with the county.
- Rental car businesses are relieved of responsibility, through affidavit, if they provide the State Patrol within 14 days of receiving notice with the name of the driver or renter of the rental car or declare that they are unable to determine the driver or renter
- The department will provide a report to the legislature regarding the use, public acceptance, outcomes, and other relevant issues regarding the pilot project, by June 30, 2009

### **Actions in other States**

There are currently only two active work zone photo enforcement programs in the nation other than Washington State, those being in Illinois and Arizona. Maryland passed legislation in the spring of 2009 to allow automated traffic safety cameras to enforce speed limits. There are a few other states with legislative authority but the programs have not been deployed.

Illinois implemented the nation's first automated work zone enforcement program in 2006 and are continuing to use automated enforcement in five work zones around the state. Arizona deployed their first work zone speed enforcement cameras in early 2008.

A study of work zones in Illinois showed that speed photo enforcement is effective in reducing the average speed and increasing compliance with work zone speed limit. The reduction of the mean speed for work zones studied varied from 4.2 to 7.8 mph.<sup>1</sup>

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<sup>1</sup> Rahim (Ray) F. Benekohal, PhD, "Speed Photo-Radar Enforcement and Its Effects on Speeds in Work Zones" TRB Paper 2009.

## **Implementation of Washington State Pilot**

A team was formed to plan the implementation of the pilot program in Washington State. The team consisted of members of the WSDOT and WSP. The team was also responsible for developing a request for proposal and vendor selection. Prior to the development of the Request for Proposal, the implementation team hosted a product demo and invited all known photo enforcement vendors. Three vendors attended the demo to introduce the implementation team to the technology available on the marketplace.

Additionally, the Illinois DOT was contacted to provide their experiences of developing their RFP and for best practice experiences with the program they developed. They also shared a copy of their RFP and contract to WSDOT so the implementation team could use it for a reference in our development of an RFP.

American Traffic Solutions (ATS) of Phoenix, Arizona was selected as the pilot project vendor. As part of the contract between the vendor and the state ATS was responsible for providing a vehicle with photo radar equipment, staff to run the equipment, quality check or photos, identification of cited vehicle owners, development, printing and mailing of infractions.

## **2. Enforcement**

### **Photo Radar and Equipment Set-up**

The vendor provided a 2008 Ford Escape SUV as the host vehicle to mount and operate the photo enforcement equipment. The photo technology is a Nikon digital camera with a 12.4 megapixel lens. The radar unit is an “across the road” speed measuring device that is certified by the International Association of Chiefs of Police (IACP). The equipment is capable of capturing images in all weather conditions, day or night.

Figure 1:



### **Capturing, Processing and Issuing Infractions**

The following procedure is used to capture, verify and issue automated speeding in work zone infractions.

1. Vendor operates dashboard-mounted camera and radar equipment to capture motor vehicles exceeding posted speeds in selected work zones. Camera captures photos of rear license plate of vehicle exceeding safe speed.
2. Vendor reviews photographs of license plates captured and selects clearest photograph to enter the license plate information into secure computer system.

3. License plates are sent to DOL/national data base to find registered owner information.
4. When registered vehicle owner information is received, the vendor compares the photographs, vehicle information, and license plate a second time to verify all the information matches.
5. Photographs of identified vehicle violations and corresponding vehicle ownership information are placed on the vendor's secure server for Washington State Patrol to review. WSP Troopers or cadets review the photographs assuring that a violation took place and that the registration information matches the license plate and vehicle seen in the photograph. Trooper or cadet electronically approve the infraction and return it to the vendor for issuance.
6. Infractions are sent to the registered vehicle owner by the vendor. Violation notices are also sent to the applicable District Court for processing.
7. Violators have the option of paying the citation by mail or other means used by the applicable District Court. Those who seek a court hearing may choose: (1) a Mitigation Hearing if they agree to having committed the infraction and want to explain the circumstances or (2) a Contested Hearing if they believe they did not commit the infraction and want to challenge it. Registered vehicle owners may also sign a sworn statement (affidavit of Non-Responsibility) to the court that the vehicle was stolen, not in their care, custody or control at the time of the violation.

### **Automated Enforcement Pilot Locations**

There were several potential projects for the automated speed enforcement in Work zone pilot project. However the pilot program was based in two I-5 work zones. The first pilot project was done in the I-5 Rush road construction zone near Chehalis as it provided the best project timing and could easily be monitored from Olympia. A second pilot operated between May 4<sup>th</sup> and June 30<sup>th</sup> in the I-5 Grand Mound construction work zone beginning in March of 2009.

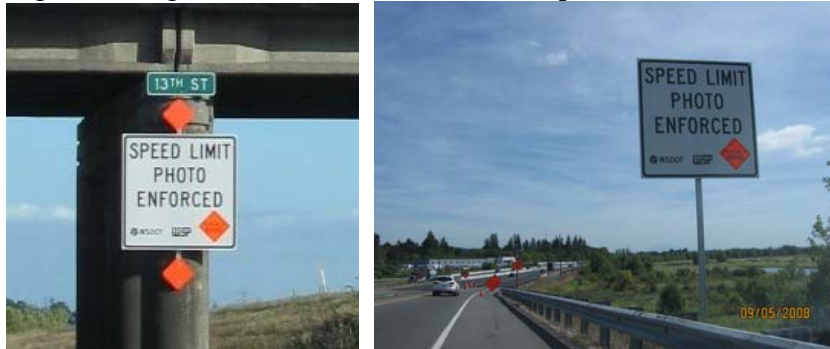
Projects were selected because of speed concerns and for active construction taking place during the pilot phase. The work zones were:

- I-5 at Rush Road to 13th St (MP 73 vicinity)  
This project included 4-miles of widening of I-5 in Lewis County from 2 lanes to 3 and the construction of a new interchange at LaBree Road. Automated enforcement began September 15<sup>th</sup> and ended October 24<sup>th</sup>, 2008.
- I-5 at Grand Mound to Maytown Widening (MP 88 vicinity)  
This project includes 8 miles of widening of I-5 from 2 lanes to 3. Automated enforcement began May 4<sup>th</sup> and will continue to June 30, 2009. Data being

presented from the I-5 Grand Mound Deployment covers the period from May 4<sup>th</sup> to 29<sup>th</sup>.

The work zone speed limits were set at 60 mph in both work zones. In the I-5 Rush Road work zone, six signs were installed warning drivers of the photo enforcement operation on all approaches in advance of the project. Also used for advance warning were a portable highway advisory radio and a portable changeable message sign.

Figure 2: Signs used to alert drivers about photo enforcement.



Signs were placed on both the mainline approaches to the work zones and on all entrance ramps in the work zone. Mainline signs were installed on both the right shoulder and in the left median

### **3. Description of pilot project work zones.**

#### **I-5 Rush Road Work Zone**

During ATSC deployment in the I-5 Rush Road project, the roadway configuration primarily consisted of narrowed 11 foot travel lanes with nominal 2 foot shoulders with temporary concrete barrier protecting the work area during the life of the construction project. The concrete barrier was in place at the time of the initial deployment of the photo enforcement. Final roadway paving occurred during ATSC deployment and toward the end of the first month the concrete barrier was removed. Large orange traffic safety drums replaced the barrier to delineate the work area.

Figure 3: I-5 Rush Road construction zone changes during automated enforcement.



Figure 3 shows how the work zone looked with concrete barrier installed to protect workers. The photograph on the left shows the concrete barrier in place early in the project. The photo on the right shows how some sections of barrier remained in place until late in the automated enforcement deployment.

Figure 4:



Figure 4 shows the work zone after paving, removal of some sections of concrete barrier and the placement of barrels to demark the work zone. Vehicle speeds increased slightly as concrete barrier was removed and replaced with the barrels. The photo on the right shows the speed enforcement van parked to the right of the barrels.

### **I-5 Grand Mound Work Zone**

During the first part of May 2009 there were two major areas where work was taking place. In the south bound direction, most of the work was taking place at the north end of the project. Concrete barrier narrowed travel lanes. Northbound, most of the active construction was taking place at the south end of the project, south of the US 12 interchange where new alignment was being created. The active work at both the beginning areas of the work zone seemed to reduce vehicle speeds.

By the end of May concrete barrier was being removed from the active work areas in the south bound direction.

**Effects of Automated Enforcement.  
I-5 Rush Road Deployment**  
Figure 5:

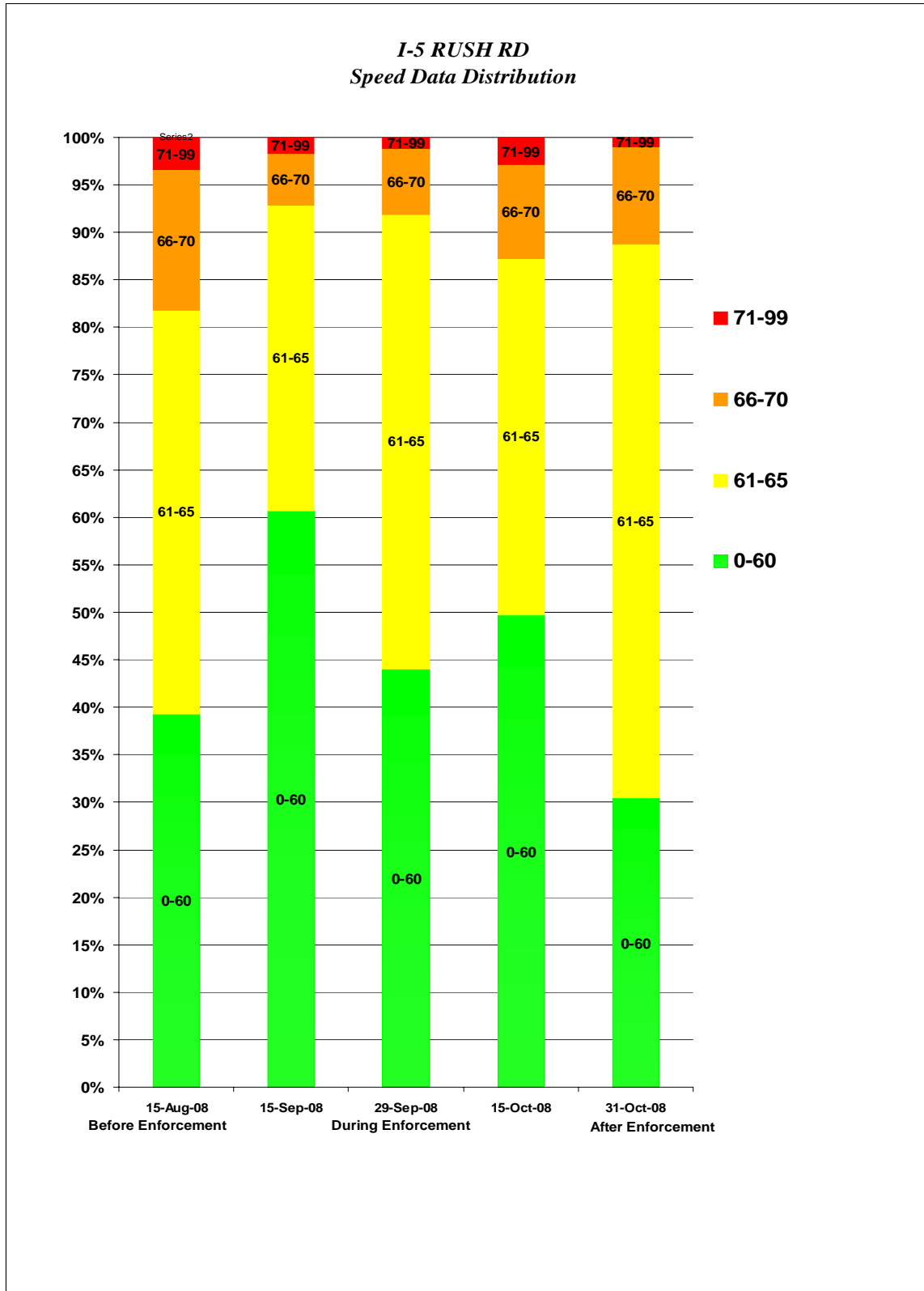


Figure 5 shows vehicle speed distribution from before, during, and after automated speed enforcement in the I-5 Rush Road work zone. The first bar on the chart shows speed data groupings from the before the enforcement began. The middle two bars are from the enforcement period and the last bar is from the week after enforcement ended

A wireless detection system was installed on I-5 in the northbound and southbound lanes near Rush Road at MP.72.99 for detecting vehicle speeds. The sensors were installed two per lane and spaced 14 feet apart in the center of the lane. The sensors were installed just north of the most active sections of the work zone, so it may not have accurately gauged driver reactions. South bound drivers passed the sensor before encountering active construction work, where as northbound drivers passed through most of the work zone and by the photo-radar van before passing the speed sensor.

Figure 5 shows the numbers of drivers traveling faster than 70 mph decreased from the pre enforcement period to the enforcement period. Prior to the enforcement, about 18 % of drivers were exceeding 70 mph, after the enforcement began that number ranged between 8-13%. The number of drivers traveling faster than 70 mph remained lower in the post enforcement period than the pre-enforcement period. Figure 5 also shows the number of drivers traveling 60 mph or less increased from the pre-enforcement period to the first data collection period after enforcement began (bar 1 to bar 2). The number of drivers traveling 60 mph or less during the enforcement period (bars 2 and 3) was higher than the before and after enforcement periods. During the enforcement period concrete barrier separating the work zone from the travel lanes were removed, as a result drivers may have felt less constrained and may have been more likely to increase their speeds.

**Figure 6:**

	<b>August 15-21</b>	<b>Volume (Veh)</b>	<b>September 15-21</b>	<b>Volume (Veh)</b>	<b>October 15-21</b>	<b>Volume (Veh)</b>	<b>Oct.31- Nov 7</b>	<b>Volume (Veh)</b>
<b>Northbound</b>								
85th Percentile Speed	67	197,936	64	179,632	64	99,360	64	160,126
Average Speed	62	116,429	59	105,668	61	168,899	62	94,198
% Cars exceeding speed limit	75.31%	57,499	48.27%	109,323	64.60%	70,348	69.48%	57,502
<b>Southbound</b>								
85th Percentile Speed	66	196,941	65	167,108	65	166,650	66	158,746
Average Speed	62	115,858	60	98,315	61	98,030	62	93,377
% Cars exceeding speed limit	60.78%	90,878	39.32%	119,305	50.24%	97,547	54.18%	85,582



Figure 6 shows average speeds, 85<sup>th</sup> percentile speeds and the percent of drivers exceeding the speed limit. Northbound, the average speed and 85<sup>th</sup> percentile speed decreased during the enforcement period. The number of drivers exceeding the speed limit was lower during the enforcement period compared to the before and after enforcement periods. Southbound traffic doesn't show the same reduction in average and 85<sup>th</sup> percentile speeds as northbound traffic, but it does show that fewer vehicles were exceeding the speed limit during the automated enforcement period.

WSDOT project staff reported that they thought automated enforcement reduced the number of high speeds vehicles and made traffic in the work zone travel at about the same speeds and in a more predictable manner. Tim Grochowski, Public Works Director for the city of Chehalis sent the following e-mail in support of the automated enforcement project:

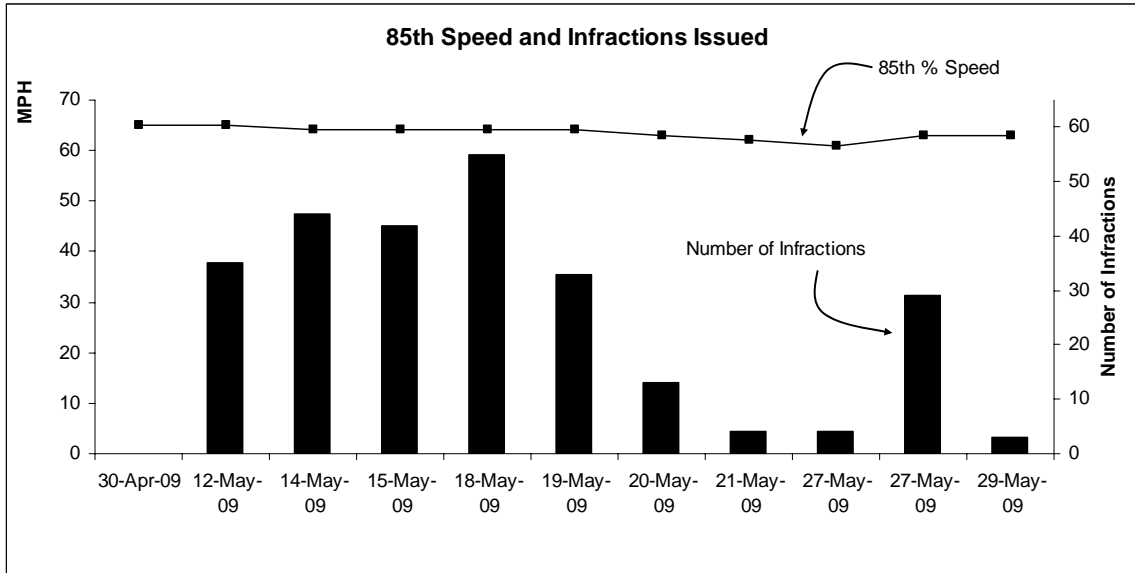
*I work for the City of Chehalis, as the Public Works Director, but I am also a citizen who travels the stretch of I-5 from Chehalis to Napavine (the area of the ATSC location) to work and then home. I just want you to know that the device made a HUGE difference lowering the speed on that stretch of Interstate. The signs alone made a difference but seeing the white vehicle along the side of the road made a lot of tail lights go on. I think that this is a great way to slow traffic through construction zones for the safety of the highway workers. I hope that WSDOT continues the use of this device in all work zones on the Interstate. Even if no speeding tickets were issued, it made a huge difference!*

### **Grand Mound Deployment**

Figures 8 and 9 show the 85<sup>th</sup> % speed and the number of infractions for two enforcement locations in the I-5 Grand Mound work zone. Figure 8 shows data from motor vehicles traveling northbound near mile post 92. Figure 9 shows data from vehicles traveling southbound near milepost 89. The 85<sup>th</sup> percentile speed line is essentially flat showing a fluctuation of only a few miles per hour. The 85<sup>th</sup> percentile speed and infraction data are from the vendor's equipment in the photo-radar vehicle.

Figure 10 shows speed distribution detected by a WSDOT traffic sensor installed at milepost 86.32. This sensor is located just south of the work zone. It shows that vehicles are traveling at a high rate of speed both as they approach and depart the work zone. The 85<sup>th</sup> percentile speed at milepost 86.32 is above 65 mph and goes above 70 mph on Sunday May 3, 2009 (the fourth bar in Figure 10). Figure 10 also shows the 85<sup>th</sup> percentile speed approaching 70 mph on Saturday and Sunday, May 9 and 10 (bars 10 and 11).

**Figure 8: 85th % Speeds and Infractions issued near I-5 milepost 92 (Northbound)**



**Figure 9: 85th % Speeds and Infractions issued near I-5 milepost 89 (Southbound)**

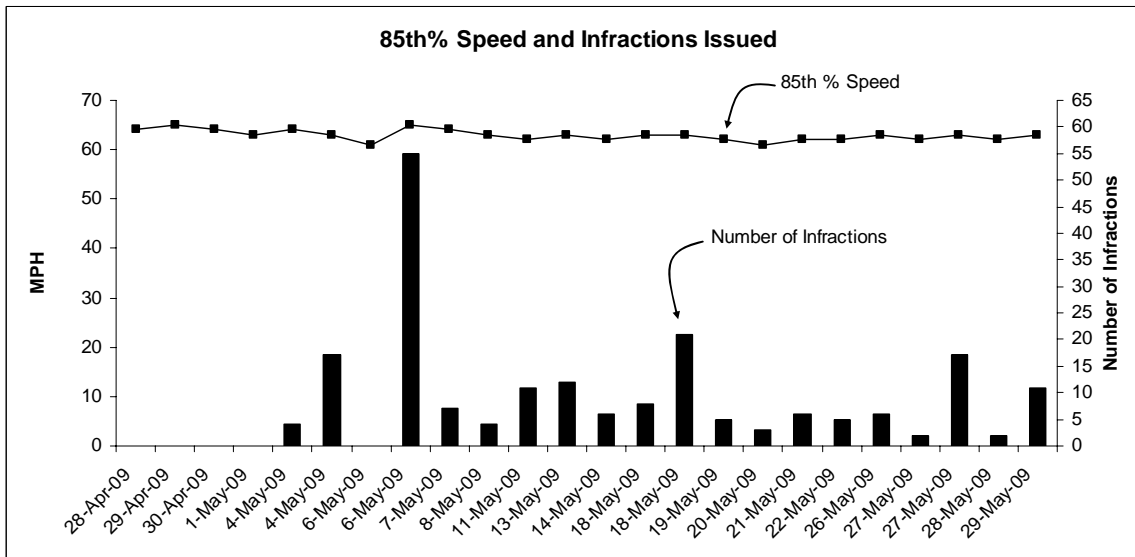
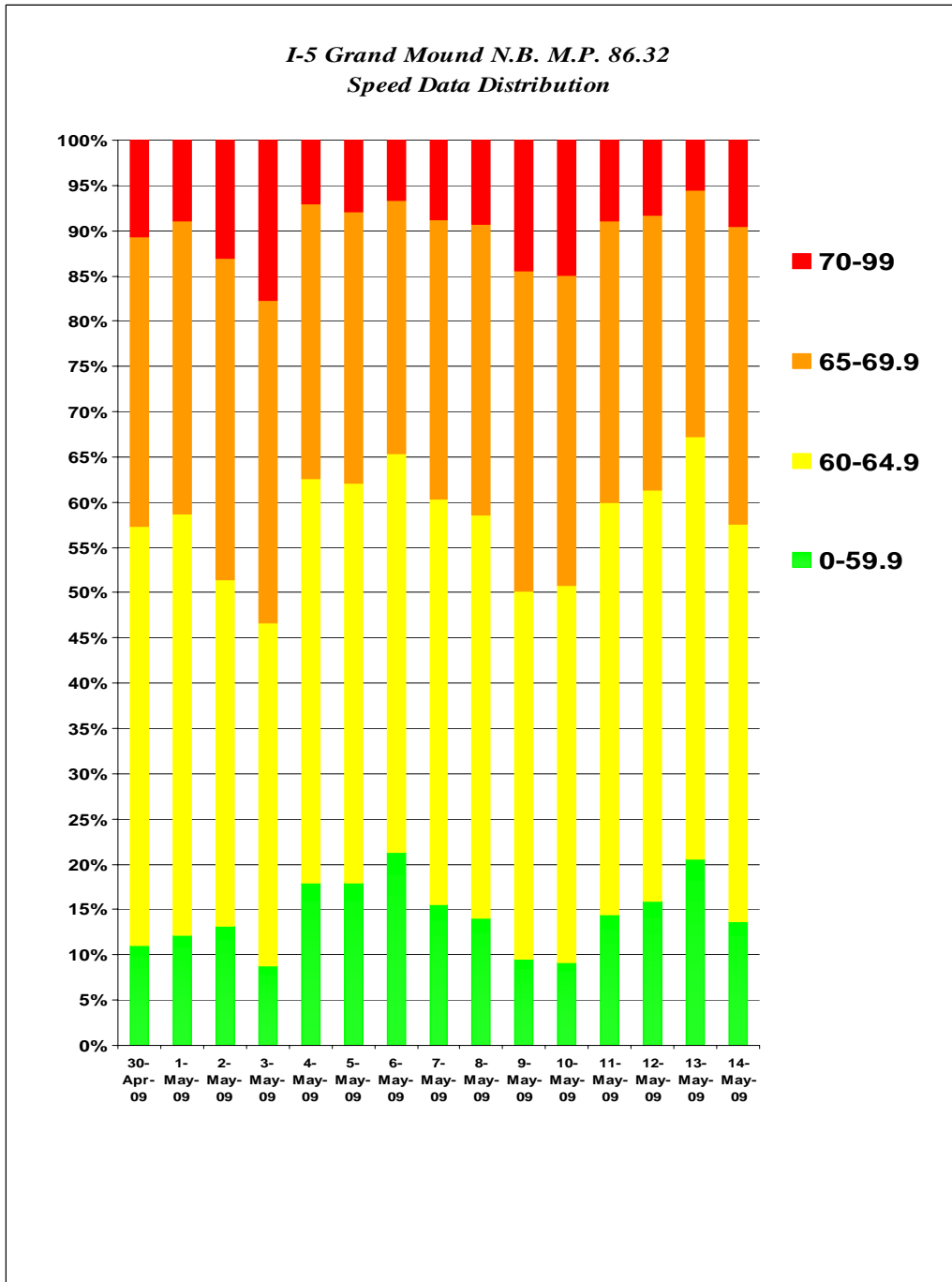


Figure 10:



**4. Infraction numbers and distribution for Lewis County Deployment** (At the time of writing this report these numbers have not been compiled for the I-5 Grand Mound Project)

Figure 11 shows the results of a review of 472 infractions from the Lewis County Deployment and the state where the violator vehicle was registered. It also shows that during enforcement, about 90% of the vehicles issued infractions were travelling below 75 mph, only 10% were travelling greater than 75 mph. During this initial enforcement period, no infractions were issued for vehicles traveling less than 71 mph.

**Figure 11**

	Totals	%	Speed	
WA	276	58%	<= 75	425 90%
OR	152	32%	>75	47 10%
BC	12	3%		472
CA	20	4%		
AK	2	0%		
NE	1	0%		
NV	1	0%		
AZ	2	0%		
NM	1	0%		
MT	1	0%		
TX	1	0%		
MN	1	0%		
ID	1	0%		
MA	1	0%		
	472	100%		

Figure 12 shows the infraction outcomes for the infractions issued during the five weeks of enforcement from September 15, 2008 through October 24, 2008. Lewis County District Court scheduled 86 hearings. Thirty-six were mitigation by mail (person completes form, judge reviews, persons gets another form of what to pay and when), 25 were contested hearings, and 25 mitigation hearings. The Court has either scheduled payment plans or referred unpaid infraction to a collection agency.

**Figure 12: Infraction Outcomes from Lewis County (from vendor data)**

Action	Number	% of all Infractions
Infractions issued	1271	
Infractions paid	1002	78.8%
Paid after hearing	2	0.2%
Dismissals	71	5.6%
Not Paid	196	15.4%

**Figure 13: Revenue from Lewis County Deployment  
(from Lewis County District Court)**

Lewis County	\$108,094
WSP	\$32,948
<b>Total</b>	<b>\$141,042</b>

**Figure 14:**

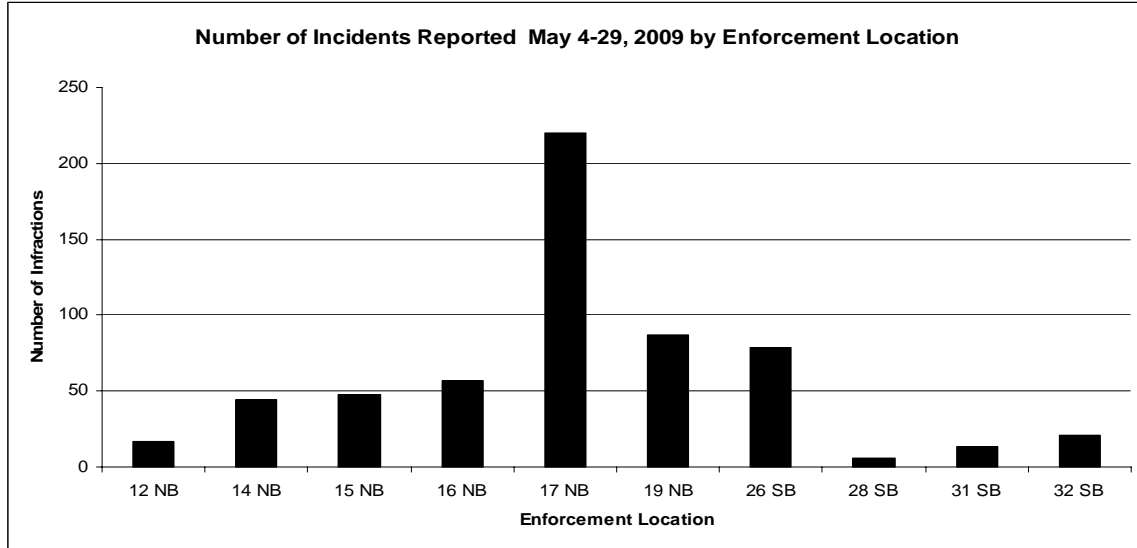


Figure 12 shows the number of incidents issued in each section of the I-5 Grand Mound work zone. The chart shows the number of potential infractions captured but the final number of infractions may be lower due to vendor quality checks, problems with matching vehicle registration information and WSP certification. The chart and anecdotal information from work zone observations indicate that vehicle speeds are higher in the northbound direction. There were 592 infractions issued in the first four weeks of deployment in the I-5 Grand Mound deployment for an average 148 infractions per week. The I-5 Rush Road project averaged about 260 per week. (Note: There was no automated enforcement in place on Friday, May 22<sup>nd</sup> or Monday May 25<sup>th</sup>, Memorial Day).

**5. Impacts to Agencies**

The support and cooperation of participating agencies helped ensure the deployment of automated speed enforcement in both Lewis and Thurston Counties. The Washington State Patrol, Administrative Office of the Courts, and Lewis and Thurston County District Courts all played key roles.

**Washington State Patrol**

WSP played three key roles in the automated speed enforcement:

- Key members of the team that development the Request for Proposal, helped review vendor Proposals and participated in selecting the vendor;
- Instrumental in setting standards for the speed measuring device used by the vendor; and

- Responsible for reviewing and certifying that an infraction took place. WSP personnel spent nearly 40 hours reviewing and certifying infractions during enforcement (September 15 to October 24<sup>th</sup>, 2008 and May 4 to 29, 2009). The Patrol will spend additional staff time reviewing and certifying infractions until the first automated speed pilot deployment ends on June 30, 2009.

The WSP entered into a Memorandum of Understanding with the Washington State Patrol Troopers' Association (WSPTA), which allowed for trooper cadet participation with reviewing and certifying speeding infractions during the initial six month pilot project.

The WSP will negotiate with the WSPTA prior to the project moving beyond June 30, 2009.

### **Lewis County and Thurston County District Court**

The major concern to District Court Administrators was the potential impact to staffing and work levels due to automated enforcement infractions. Lewis County, because they were the first pilot site, did not know what impact they faced. WSDOT was able to identify the number of drivers exceeding the posted speed limit, but was not able to estimate the number of infractions that could be issued.

District Court responsibilities included processing the infractions, collecting infraction payments, scheduling mitigation or contested hearing when requested, holding hearings, and trying to collect payments from delinquent infractions.

Thurston County District Court was able to base their decision to participate in the automated enforcement program on Lewis County results. Thurston County hired a temporary employee to handle the work, based on input from Lewis County, where they estimated processing the infractions required an extra employee to handle the workload. Thurston County, through the first four weeks of deployment, faced only about 60% of the infractions generated in Lewis County.

Both courts expressed frustration with the start and stop nature of infraction transfers, especially at the beginning of the deployments. Infractions moved through the vendor system to the WSP in large batches, which when certified and forwarded, overwhelmed the Courts on some days, but left little or no work on others. Both Courts recommended a way to smooth the transfer of infractions to the courts. The Courts also expressed concern about having to enter infraction dispositions in both their internal systems and into the vendor's system. One of the reasons for duplicate entries was a requirement in the RFP for the vendor to supply information on the number of infractions paid and the outcome of hearings.

## 6. Public Perception

Part of WSDOT's effort in evaluating ATSC was to measure public perception. Prior to deployment the department held media awareness events and distributed press release. These efforts were done to help raise awareness of the automated enforcement efforts in hopes that drivers would voluntarily comply with the work zone speed limit.

The program's communications efforts had the following key messages:

- WSDOT and WSP place a high priority on safety of workers, drivers and passengers in the work zone and speed remains the most likely cause of incidents in the work zone.
- Cameras are just one part of WSDOT's efforts to keep work zones safe.
- WSDOT will use the cameras and accompanying signing as a deterrent, not a punishment.
- WSDOT has done its research to make sure this program is successful.
- Through communications efforts, drivers will slow down to increase worker safety, driver safety and passenger safety in work zones.

WSDOT engaged an active media outreach prior to each deployment. The department also posted program information, including a question and answer document on the WSDOT website. The communications campaign garnered the program stories on Seattle TV (KING and KIRO) and along with Portland coverage (KATU). Daily newspapers in Seattle, Tacoma, Olympia, Longview, Vancouver and Portland ran stories. Readers and viewers left comments on these stories and on other blogs, with bloggers having the following comments:

- Protecting workers is very important.
- People who worked in or had family members work in highway construction zones supported the use of automated enforcement. Their hope was that the use of automated enforcement would encourage drivers to reduce their speed when traveling near workers.
- People were concerned about the speeds other drivers traveled. Drivers who didn't speed were glad the cameras were out there to catch those who do speed. Many expressed a similar message of "you don't pay the fine if you don't do the crime".
- Many saw the use of automated enforcement to be a revenue source for the State, not a safety enhancement.
- The cameras are "big brother" like because there is no option to offer an explanation to a camera, as there would be if stopped by a police officer

While WSDOT did monitor and offer answers to blog postings that were inaccurate, such as the fact WSDOT was receiving none of the ticket revenue, most of the blogs postings about the "big brother" aspect were answered by other bloggers who responded that the writer should not be speeding. In one story in The Chronicle (Lewis County), the comments numbers were 24 against the program (main reasons were money grab or "big

brother”) with 45 comments for the program, noting it improved safety and would reduce speeding.

## **7. Conclusions and Next Steps**

With less than 10 weeks of ATSC enforcement to date, there is insufficient data to draw firm conclusions but initial indicators show improved work zone safety. The number of vehicles greatly exceeding the speed limit (traveling over 75 mph) was reduced significantly in the I-5 Rush Road Project. There were no speed related collisions during the automated enforcement period.

The revenue collected appears adequate to cover costs of administering the program but does not represent a “windfall” for WSP or the local District Court. WSDOT collects no percentage of the revenue. It appears revenue collected by local courts may exceed the cost of administering the program, once start up, processing and court costs had been recovered. However, automated speed infraction revenue, like other traffic infraction revenue goes to the County general fund, not the District Court.

WSDOT traffic sensor data south of the I-5 Grand Mound project showed a high number of vehicles exceeding the work zone speed limit. Speeds were extremely high on weekend hours when no work was taking place, but there were still narrowed lanes and concrete barrier in place. Legislative authority in the 2009 session to extend the pilot also allowed automated speed enforcement use any time, not just when workers are present. Use of automated speed enforcement outside of active work time will have to be balanced with public safety in mind. A test for one or two weekends may be warranted to see if travel speeds are reduced and safety is improved.

People opposed to the use of cameras often said they were opposed because there was no way to face their accuser. However, of the 1,271 infractions issued nearly 80% paid their infraction, less than 100 asked for a hearing.

The automated enforcement pilot should be extended in a cooperative manner between WSDOT and the WSP. There are a number of significant construction projects occurring over the next year that could use enforcement. It would also be helpful to test automated speed enforcement in one location for 6-9 month period to see how driver behavior changes over time.