King County Target Zero Traffic Safety Coalition's Smart Signs Pilot Project

to Reduce Dangerous Driver Behavior: Summary of Findings

December 23, 2024

TARGET ZERO
KING COUNTY
TRAFFIC SAFETY COALITION

Public Health
Seattle & King County

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Findings from King County's Smart Signs Pilot Project to Reduce Dangerous Driver Behavior

Background

Preventing distracted driving is a Target Zero priority one objective because it results in traffic collisions and fatalities. The 2023 and 2021 Washington State Traffic Safety Commission (WTSC) roadside observation survey showed most Washington (WA) drivers (90%) do not drive distracted,[1] but 20 of King County's 137 traffic fatalities in 2021 (15%) involved a distracted driver[2], and being distracted is an under-reported crash variable. Fatalities involving a distracted driver represented 17% of all Washington (WA) traffic fatalities in 2021. An increase in distracted drivers was observed on city streets (from 8.8% to 15.7%), county roads (from 7.3% to 9.1%), and state routes (from 6.4% to 8.2%) during the 2022 annual statewide WTSC distracted driving observation survey (hereafter WTSC survey).

King County is the highest populated and most dense county in the state; thus has a high potential for distracted drivers. Driving distracted is a risky behavior that increases the probability of fatalities and serious injuries on the road. King County experienced an increase from 5.4% to 7.8% of drivers who were distracted (2022 WTSC survey). Four years of King County survey data about distracted driving behaviors and attitudes reveal troubling and persistent concerns relating to actual cell phone use behaviors, attitudes about cell phone use while driving, perception of threat to self by others using cell phones, and intentions to use cell phones while driving. Most recent findings suggest the prevalence of distracted driving in King County is similar to Washington's; 10.8% and 9.3% respectively and statistically similar; includes holding device, device to ear, and other distractions) and the percent of people engaging in distracted driving has not decreased.[1]

In FY2023-2024, the King County Target Zero Coalition received a grant from WTSC to focus on decreasing fatalities and serious injuries related to distracted driving. This was a three-pronged project involving website development and deployment, a data-driven positive community norms message campaign, and dynamic feedback signs to educate drivers and evaluate the effect of feedback on driver behaviors. This report focuses on results of the dynamic feedback signs.

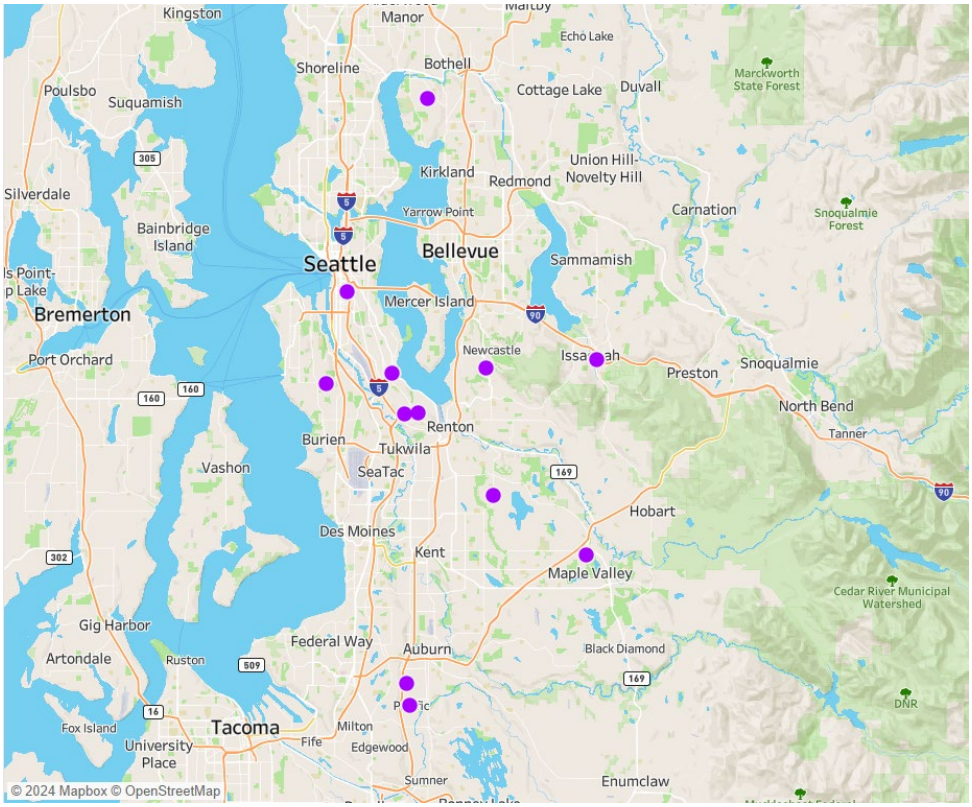
Project Methods

We worked with SaferStreet Solutions | Smart Signs, an intelligent driver feedback sign that can identify speeding, distracted driving, and unbelted drivers and front passengers and notify drivers/passengers in real time of the behaviors. Incorporating a novel driver feedback strategy, dynamic feedback signs detect when drivers engage in these behaviors and display a preventative message, with the goal to immediately change driver behavior.

This project included developing a strategy and deploying feedback signs. We worked with our community partners to identify 12 locations across King County (Table 1). The King County Target Zero team created an Equity Matrix to help guide our partners in choosing locations across the county (see matrix in Appendix A). The Equity Matrix included analysis of crashes, equity, type of roadway, and speed limit and other criteria. Locations selected had the highest overall scores. Also included for consideration was type of roadway such as urban, rural, arterial, etc., and proximity to schools, business districts, and neighborhoods. The sign technology required solar power so factors such as avoiding tree lines and ensuring adequate hours of daylight were also incorporated. Evaluative data below includes pre, during, and post-countermeasure intervention to determine degree of change in driver behaviors.

Table1. Locations Selected for Sign Deployment		
Location	**Address/Intersection**	**Posted Speed Limit (MPH)**
Algona	1100 block of Algona Blvd N.	35
Airport Way S. - Seattle	Airport Way S. from Massachusetts St to S. Holgate St.	30
Fairwood (Renton/unincorporated King County)	140th Ave SE from SE 156th St. to SE Fairwood Blvd.	35
Greenbridge (White Center/Unincorporated King County)	8th Ave SW from 102ND to 97th streets (800 SW 97th ST)	25
Issaquah	900 Front Street North	35
Kenmore	84th Ave NE from NE 155th St. to NE 145th St.	30
Maple Valley	24300 Witte Rd. SE (in front of or south of the school up to 252nd)	35
Newcastle	Coal Creek Pkwy SE/135th Ave SE (northbound)	35
Pacific	199-101 Milwaukee Blvd S. from 3rd Ave SE to Ellingson Rd	25
Seattle-Rainier Valley	Rainier Ave S., north of S Henderson St	25
Skyway (unincorporated King County)	Renton Ave from 126th to 74th	25
Skyway-Beacon Ave S. (unincorporated King County)	Beacon Ave S. and 68th Ave S.	25

Figure 1. Locations for dynamic driver feedback signs pilot: King County, Mar-Sept 2024



Data Analysis Approach

The goal was to observe any changes in driver behavior during or after sign deployment. Data collection phases were:

- pre sign deployment (sensor only, before placement of dynamic feedback sign);
- during sign deployment (when dynamic feedback sign was operational); and
- post sign deployment (after sign was removed).

For each site, we calculated the percentage of vehicles with the following detected traffic safety behaviors per phase:

- vehicle speed;
- driver belted;
- front passenger belted; and
- driver phone in hand.

We measured vehicle speed for each site and data collection phase using mean, minimum, maximum, and 85th percentile values. The 85th percentile speed is a measure commonly used by traffic safety engineers to describe the speed at which 85 percent of free-flowing vehicles are traveling at or below.[3] We examined speeding relative to the posted roadway limit per site and phase as:

- traveling at any speed above the posted roadway limit;
- traveling ≥10 miles per hour (MPH) above the posted limit; and
- speed categories of
    - at or below the posted roadway limit;
    - 1-4 MPH above roadway limit;
    - 5-9 MPH above roadway limit; and
    - ≥10 MPH above the posted roadway limit.

Summarized speed results for each site and phase are:

- Average, minimum, and maximum speeds;
- 85th percentile speed (the measured speed that 85% of vehicles were traveling at or below);
- Percent of vehicles speeding, relative to the posted roadway limit, as defined according to the measures outlined above.

For the traffic safety behaviors of seatbelt use, by driver or front passenger, when present, and whether driver had a phone in hand, we focused the analysis on data that was identifiable by the sensor. We excluded data from vehicles where seatbelt use was not detectable. In other words, when looking at seatbelt use and phone in hand, we limited our analysis to vehicles where the behavior was detectable. For seatbelt use, we excluded vehicles where glare blocked the sensor from detecting the driver or where the algorithm was unable to determine driver seatbelt use and was classified as “unknown”. Similarly, we limited our analysis of front passenger seatbelt use to vehicles with a detected front passenger. While glare is an issue for detecting driver seatbelt use, the contractor conveyed that it was rare for glare to prevent detection of passenger seatbelt use. Therefore, there are instances where data is available for passenger seatbelt use when there is no usable data for driver seatbelt use due to glare issues. When calculating the percent of vehicles where a driver had a phone in hand, we focused the analysis on the subset of vehicles where this behavior was identifiable.

Implementation Considerations

Across the sites, important implementation issues occurred that could impact the results. At the Pacific location we did not have data records between April 3 and April 8, 2024, due to detector power loss, wherein the battery lost charge and needed to be replaced. At the Issaquah location the trailer carrying the feedback sign was struck, and the dynamic feedback sign was not functional again until Apr 24, 2024. While the sensor remained operational, the trailer with the dynamic feedback sign was not operational.

The trailer was hit a second time at the Issaquah site on April 26, 2024. For The Maple-Valley location the contractor omitted data from June 8, 2024, due to a parade which generated non-usable data. At the Airport Way S. location, due to detector power loss, there was no data April 5-April 24, 2024. Additionally, data collection ended early due to equipment vandalism on May 9, 2024 and there was no post sign deployment data collection.

Overview of Findings

At each site, data collection occurred seven days a week between the hours of 7AM and 7PM PST for the following phases: pre-deployment, smart sign deployment, and post-deployment. Apart from the Pacific location, data collection included both weekdays and weekends across all phases (Appendix Figure B1). The Pacific location had three weekdays (Mon-Wed) of pre-deployment data collection. The Airport Way S. location did not have post-deployment data collection due to equipment vandalism and theft.

Across all sites and data collection phases, sedans accounted for about half of the vehicle types; followed by sports utility vehicles, which were one quarter of the identified vehicle types (Appendix Figure B2). Light trucks contributed the least to the overall vehicle types at about 1%.

Data collection duration varied across the 12 sites and phases. During the pre-deployment of smart signs phase, data collection ranged from 3 days (12,911 vehicles) at the Pacific site to 42 days (249,162 vehicles) at the Greenbridge site (Appendix Figure B1). Across sites, the pre-deployment average duration was 16 days. During sign deployment, collection ranged from 15 days at the Airport Ave S. site to 37 days at the Algona site, with an average of 20 days across all 12 sites. Post-implementation of smart signs, collection ranged from eight days in four sites to 24 days at the Pacific site, with an average of 14 days across all sites.

Speeding Summary

Compared to pre-deployment of smart signs, small reductions in vehicle average speed during and post implementation was noted for sites at: Airport Way S., Algona, Fairwood, Greenbridge and Maple-Valley Figure 2). Similarly, small reductions in 85th percentile speed during and post implementation were also observed among these same sites. This means that 15% of vehicles were traveling faster than the 85th percentile speed value. For most sites, no differences in average or 85th percentile speeds were observed across data collection phases, denoted by overlapping circles in Figure 2.

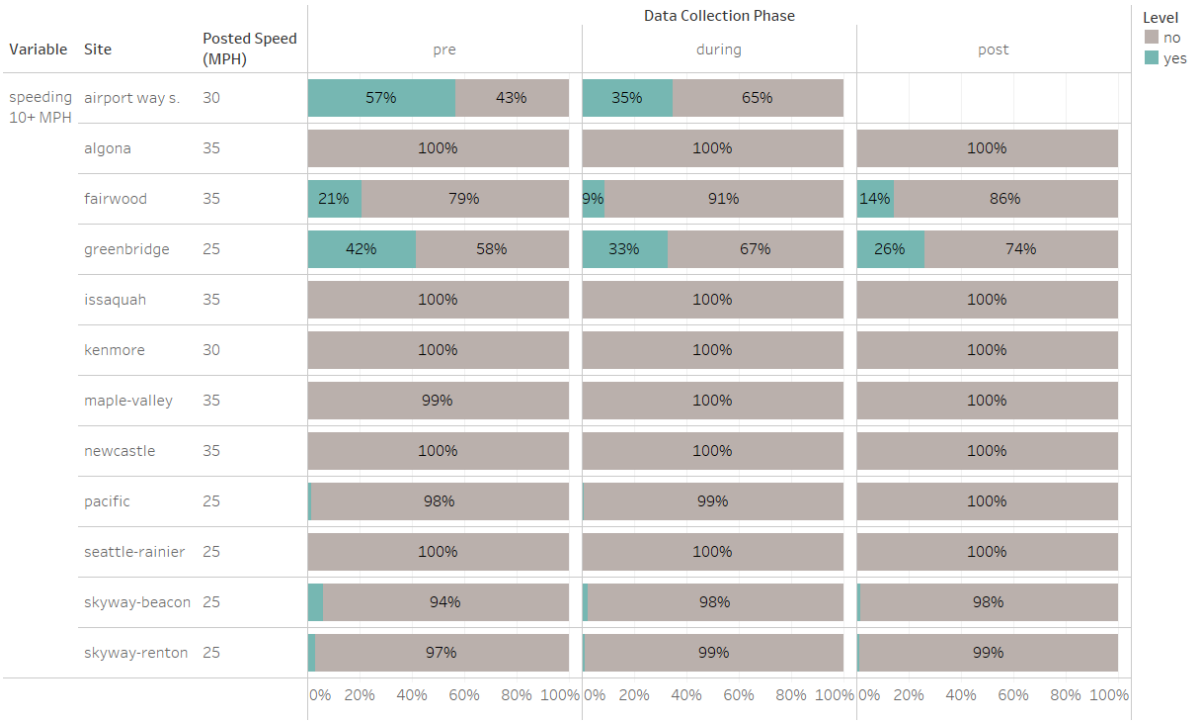
Figure 2. Average & 85th Percentile Speed by Site & Data Collection Phase – King County, WA, Mar 14 – Sept 6, 2024

When we compared detected vehicle speeds to posted roadway speed limits, no vehicles passing by the Algona site travelled more than the 35 miles per hour (MPH) posted roadway limit during the data collection phases (as denoted by the gray bars; Figure 3). In comparison, vehicles at the Skyway (Renton Ave S.) site exceeded the posted roadway speed limit of 25 MPH across all phases of data collection (teal bars). At the Skyway-Beacon Ave S. location, there was a slight decrease in the percent of vehicles traveling at any speed above than the posted roadway speed of 25 MPH during and post sign implementation when compared to pre deployment.

Figure 3. Vehicles Traveling Above Limit by Site & Data Collection Phase – King County, WA, Mar 14 – Sept 6, 2024

With respect to excessive speeding (defined as traveling ≥10 MPH over the posted roadway limit for this analysis), three locations had more than 20% of vehicles meeting this definition during pre-deployment: Airport Way S., Fairwood, and Greenbridge (Figure 4). Notably, at the Greenbridge site, there was a steady decrease in the proportion of vehicles detected to be travelling ≥10 MPH above the posted roadway limit of 25 MPH across the three data collection phases: from 42% at pre deployment, to 33% during smart sign deployment (when the dynamic feedback sign was in use) to 26% post deployment (following removal of smart sign).

Figure 4. Vehicles Traveling ≥10 MPH Above Posted Roadway Limit by Site & Data Collection Phase – King County, WA, Mar 14 – Sept 6, 2024



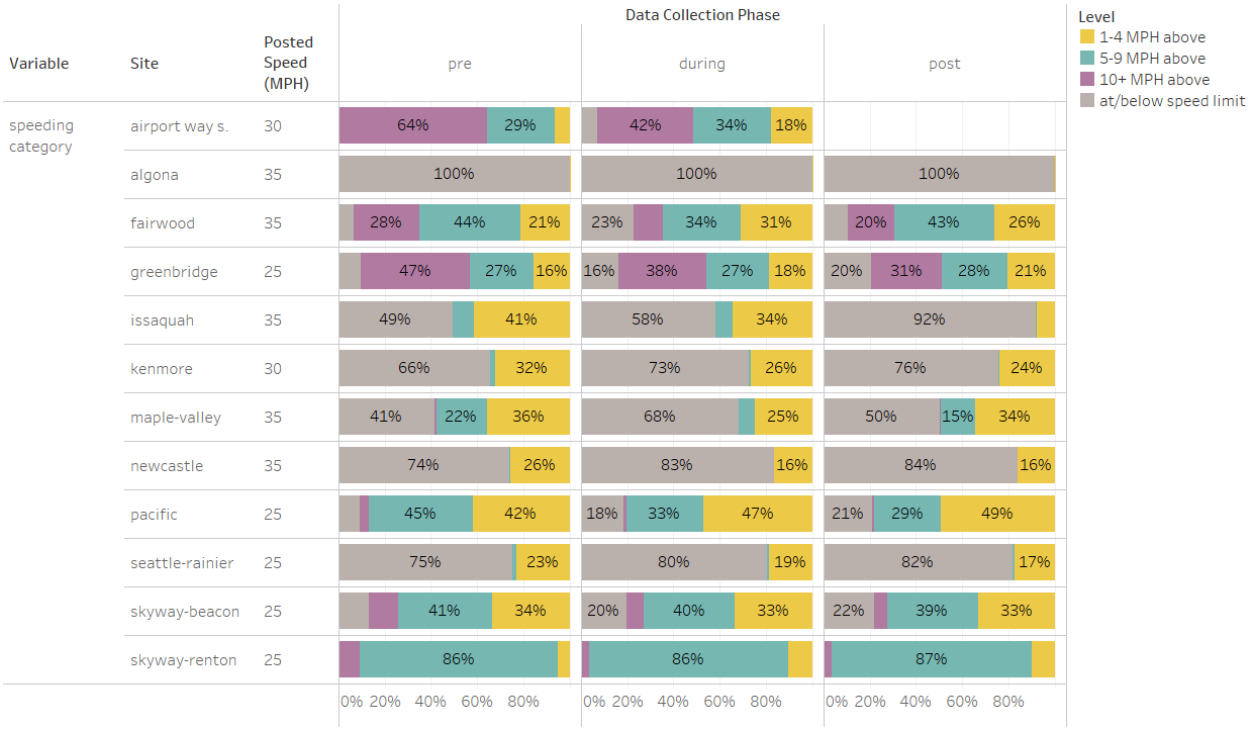
At the Fairwood site, the proportion of vehicles detected to be traveling ≥10 MPH above the posted roadway limit also decreased across the data collection phases, with about 1 in 5 vehicles traveling at speeds ≥10 MPH above the posted limit during pre-deployment, to about 1 in 10 vehicles during sign deployment and 1 in 7 vehicles at post sign deployment.

While there was no post-deployment data collection at the Airport Way S. location, a little over one-third (35%) of vehicles were traveling at speeds ≥10 MPH above the posted roadway limit of 30 MPH during the sign deployment stage, compared to close to 57% of vehicles at the pre-deployment stage when there was no feedback sign.

To identify changes in speeding over time, we further grouped speeding into four categories relative to posted roadway limits as follows: (1) posted speed limit or below, (2) 1-4 MPH above the posted limit, (3) 5-9 MPH above posted limit, and (4) ≥10 MPH above posted limit. In general, at sites where there were decreases in the percent of vehicles travel 5-9 MPH or ≥10 MPH above the posted roadway limit during and post Smart Signs deployment, there was an increase in the percent of vehicles detected traveling 1-4 MPH above the posted roadway limit (Figure 5). However, at the Skyway-Beacon Ave S. location, one-third (33%) of vehicles had measured speeds of 1-4 MPH above the posted roadway limit of 25 MPH across all three data collection phases. Notably, at the Algona site, vehicles were detected traveling at or below the posted speed limit of 35 MPH across all three phases. Whereas, at the Skyway-Renton Ave S. location no vehicles were detected to be traveling at or below the posted roadway limit of 25 MPH.

Among four sites (Issaquah, Kenmore, Newcastle, and Seattle – Rainier Ave. S), the percentage of vehicles traveling at or below the posted road limit increased sizably during and post, compared to pre, implementation of smart signs.

Figure 5. Shifts in Vehicle Speeds by Site and Data Collection Phase – King County, WA, Mar 14 – Sept 6, 2024



Summary of Changes in Traffic Safety Behavior: Driver and Front Passenger Seatbelt Use

Among vehicles with driver seat belt use detected, the percentage of belted drivers during pre-deployment of smart signs ranged from 84% at the Pacific site to 91% at the Newcastle site (Figure 6). At the Greenbridge site, the percentage of belted drivers among vehicles where seatbelt use was detected remained consistent (88%) across all three data collection phases. Overall, the percentage of vehicle with a belted driver did not change substantially across the data collection phases and was lower than published rates for King County of 94% from Washington Traffic Safety Commission's 2023 Statewide Survey[4] and 95.5% (range of 94.7% to 96.3%) from a 2023 observational study of seatbelt use in WA State.[5] During sign deployments across the sites, the percentage point increase in vehicles with a belted driver ranged from 0% to 1%. Post sign deployment, the percentage point increase in vehicles with a belted driver ranged from 0% to 2% across sites.

Figure 6. Vehicles with Driver Belted by Site & Data Collection Phase – King County, WA, Mar 14 – Sept 6, 2024

A similar pattern of passenger seatbelt use, among vehicles with a front passenger, was detected for vehicles traveling at each of the 12 sites (Figure 7). At pre deployment of signs, the percentage of vehicles with a belted front passenger, ranged from 85% at the Issaquah site to 92% at the Newcastle site. During and post deployment of smart signs, the percent of vehicles with a belted front passenger, ranged from 86% to 92% across the 12 sites. Published 2023 seatbelt use rates for King County of 94% from WTSC Statewide Survey and 95.5% from observation survey are higher than rates observed across sites during this project (all phases). During sign deployments across the sites, the percentage point increase in vehicles with a belted front passenger ranged from -1% to 2%. Post sign deployment, the percent of vehicles with a belted front passenger ranged from -1% to 1% across sites.

Figure 7. Vehicles with Front Passenger Belted by Site & Data Collection Phase – King County, WA, Mar 14 – Sept 6, 2024

Overall, comparing the data collection phases of during- and post- to pre-deployment, the percentage of belted drivers and/or front passenger did not substantively change. The percentages of seatbelt usage detected was less than the county-level seatbelt use rate for 2023 and in some sites, the percentages were below 90% pre-deployment.

Summary of Changes in Traffic Safety Behavior: Driver No Phone in Hand

Across all sites and phases, among vehicles where phone in hand was detectable, a high percentage of vehicles had drivers that did not have a phone in hand during the pre-deployment phase; from 88% (Airport Way S.) to 93% (Skyway-Beacon Ave S.; Figure 8). There were small increases in the percentage of vehicles with no phone in hand detected during and post deployment with the Issaquah site exhibiting the largest increase of four percentage points compared to pre deployment.

During sign deployment across the sites, the percentage point increase in vehicles where the driver had no phone in hand ranged from 0% to 3%. Post sign deployment, the percentage point increase of vehicles where the driver did not have a phone in hand ranged from 0% to 4% across sites.

Figure 8. Vehicles with Driver No Phone in Hand by Site and Data Collection Phase – King County, WA, Mar 14 – Sept 6, 2024

Interpretation Caveats and Limitations

Given the variability across sites in data collection duration, seasonality, and traffic volumes, comparisons across sites should be interpreted with caution. Findings should incorporate site-specific context and challenges during implementation that likely impacted results.

The lower estimate for seatbelt use could have been impacted by data collection and detection issues. For example, the algorithm classifies unknown driver seatbelt use in situations where: (1) there are objects blocking the driver (e.g. objects hanging from rear view mirror), (2) vehicle is not fully in lane, (3) bright/dark light on the windshield. To ensure we measured correct use of seatbelts, the classification for driver incorrect seatbelt use is included in the group with unknown driver seatbelt use.

The contractor indicated that while it was very rare for glare to prevent detection of passenger seatbelt use, in situations where a passenger cannot be detected, then a classification of “No-passenger” was assigned by the algorithm. Long term placement of the sensor (e.g. throughout the day vs. four hours) at a location has increased glare due to the sun curvature. If placement is for four hours, the contractor can adjust sensor to decrease windshield glare. For sensor placement throughout the day there is no adjustment available and 11%-12% of vehicles across the sites at each data collection phase were omitted due to unknown driver seat belt use or glare blocking driver.

The sensor can still detect phone in hand even if it is not able to detect the driver due to glare. For taller vehicles (e.g. trucks) which have higher frames, the placed sensor does not have a clear angle to make the detection. Most of the vehicle traffic across the 12 sites were sedans followed by sports utility vehicles. We cannot make conclusions about driver distraction solely based on whether a driver had a

phone in hand and reported results according to the algorithm assignment of whether a driver was detected to have a phone in hand or not.

Overall Summary

To account for variability in data collection duration and vehicle volumes, we used percentages to compare across sites and data collection phases to examine changes in driver behaviors related to speeding, seatbelt use, and phone in hand. Key findings follow.

- We observed moderate decreases in speed at some locations during and post driver dynamic feedback sign implementation.
- We found little to no change in seatbelt use or phone in hand during or post sign implementation.
- The percent of vehicles with seatbelt use was lower than published rates for King County, WA from self-report and observational studies. We observed percent of belted drivers ranging from: 84%-91% pre-deployment and 85%-91% during and post-deployment.
- There was a sizeable percent of vehicles with driver unknown seatbelt use or not detectable due to glare. We excluded 11%-12% of vehicles across sites and phases.

While we cannot make conclusions about the dynamic feedback sign's impact on driver behavior change, these findings provide insights into driver behavior on the given roadway as well as the utility of the deployed sign. Considerations for whether this technology might be cost-effective for use include:

- potential for equipment theft/vandalism,
- solar power operational issues,
- equipment damage due to vehicle strikes, and
- monitoring for operational issues during sign deployment.

The next section reviews site-specific results for speed and traffic safety behaviors related to seatbelt use, by driver and front passenger, and phone in hand among drivers. Appendixes follow with additional findings by site and phase.

Airport Way S. Data Summary

Sensors temporarily installed at the Airport Way S. location collected data for a total of 37 days, with the pre deployment phase being March 16 – April 4, 2024 (22 days), and during smart signs deployment covering the period April 24 – May 8, 2024 (15 days). Figure 9 summarizes the vehicle count by data collection phase and duration in days. Due to detector power loss, there was no data April 5-April 24, 2024. As a result of equipment vandalism on May 9, 2024, there was no post sign deployment data collection (Figure 9). Due to these implementation challenges, the total number of data collection days during sign deployment was the lowest among the 12 sites. However, the total length of data collection pre sign deployment exceeded the average of 15.5 days across all sites.

Figure 9. Vehicle Count by Data Collection Phase and Duration in Days

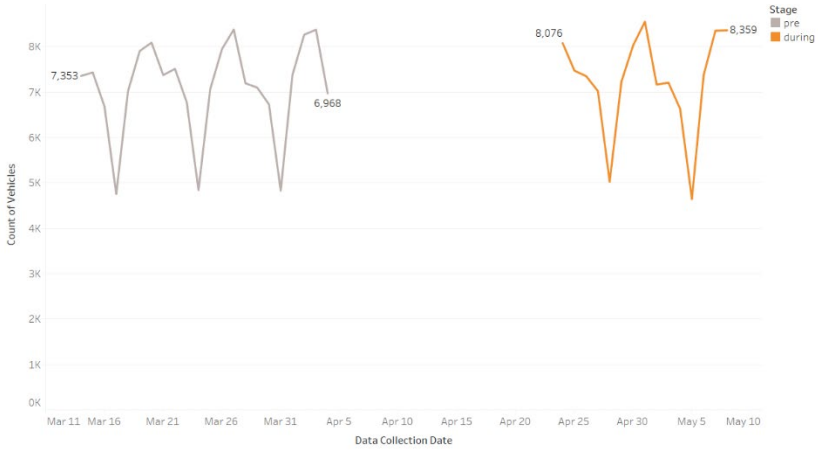
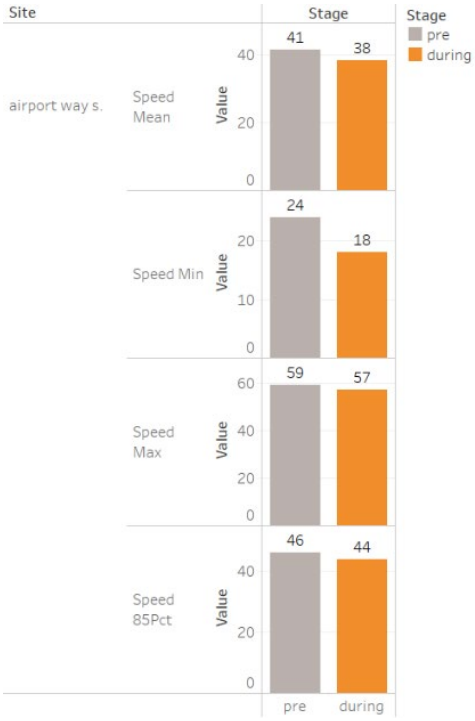


Figure 10. Average and 85th Percentile Speeds by Data Collection Phase

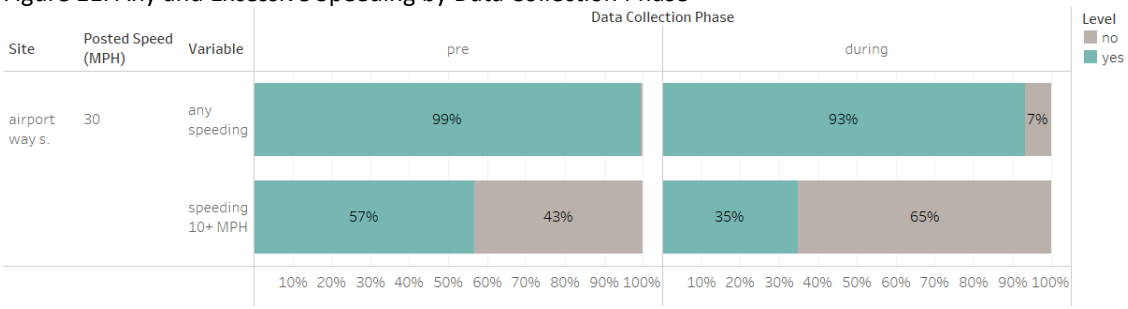


Changes in vehicle speed

Figure 10 summarizes changes in average and 85th percentile speeds by data collection phase. From the available data, there were small changes in average and 85th percentile vehicle speeds during, compared to pre, deployment of smart signs. There was a decrease in mean speed of 3 MPH, from 41 MPH to 38 MPH: corresponding to a 7% decrease in the mean speed comparing during to pre deployment. Minimum speed detected also decrease during sign deployment, from 24 MPH to 18 MPH while the decrease in maximum vehicle by 2 MPH, from 59 MPH pre to 57 MPH during sign deployment. The 85th percentile speed decreased from 46 MPH to 44 MPH. When compared to the posted roadway speed of 30 MPH, the percentage of vehicles detected as traveling ≥10 MPH above the posted roadway limit decreased by 22 percentage points (from 57% to 35%) during compared to pre sign deployment. This corresponds to a reduction of 38.6% from pre-deployment levels.

The percent of vehicles traveling any speed above the posted roadway speed decreased by six percentage points comparing during (93%) to pre (99%) sign deployment (Figure 11). The six-percentage point reduction also corresponded to a six percent change from pre sign deployment.

Figure 11. Any and Excessive Speeding by Data Collection Phase



Across grouped categories of speeding (Figure 12), the largest reduction between pre and during sign deployment was in the category of vehicles traveling ≥10 miles per hour above the posted roadway limit. While there was an increase in the percent of vehicles traveling at or below the posted limit, there was also an increase in the percent of vehicles travel 1-4 MPH and 5-9 MPH above the posted speed limit during compared with pre sign deployment.

Figure 12. Speeding Categories by Data Collection Phase

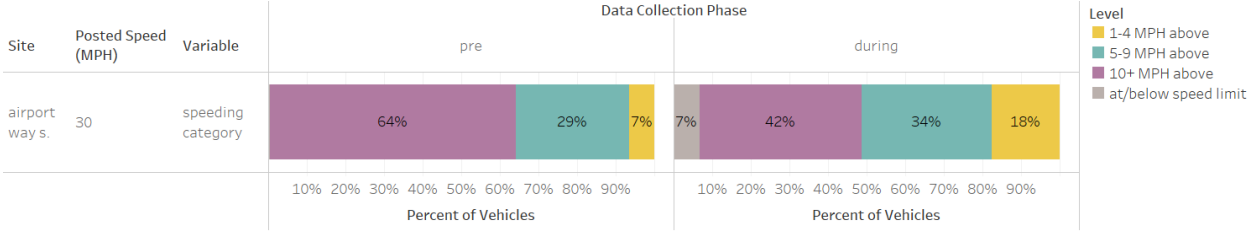


Table 2 below shows the absolute, as percentage point changes, from pre deployment levels in percent of vehicles speeding defined as two or four categories. Of note, there was a very small percent of vehicles traveling at or below the post speed limit at the Airport Way S. site at the pre data collection phase and increases in this group during the deployment period can result in large percent change values relative to pre deployment levels.

Table 2. Percentage Point Changes in Speeding by Data Collection Phase

Site	Posted Speed (MPH)	Variable	Level	Percent of Vehicles		Percentage Point Difference from Pre	
				pre	during	pre	during
airport way s.	30	any speeding	yes	99.5%	93.2%	0.0%	-6.3%
		speeding 10+ MPH	yes	56.6%	34.8%	0.0%	-21.9%
		speeding category	1-4 MPH above	6.6%	17.6%	0.0%	11.0%
			5-9 MPH above	29.2%	33.7%	0.0%	4.5%
			10+ MPH above	63.7%	41.9%	0.0%	-21.8%
			at/below speed limit	0.5%	6.8%	0.0%	6.3%

Changes in safe driving behaviors

Figure 13 summarizes seatbelt and phone use by data collection phase. The percentage of vehicles with a belted driver was the same (86%) at pre and during sign deployment. Similarly, among vehicles with a front passenger, the precent of vehicles with a belted front passenger remained the same (87%) across the data collection phases. As a context for comparison, the percentages of seatbelt usage detected was less than the WSTC provided county-level seat belt use rate for 2023 of 94% from the WTSC Statewide Survey and 95.5% from a statewide observational study. However, the percent of vehicles with no phone in hand, among vehicles where a phone was detectable, increased from 88% at pre to 90% during sign deployment, corresponding to both an increase of two percentage points from pre to during sign deployment levels (Table 3).

Figure 13. Seatbelt and Phone Use by Data Collection Phase

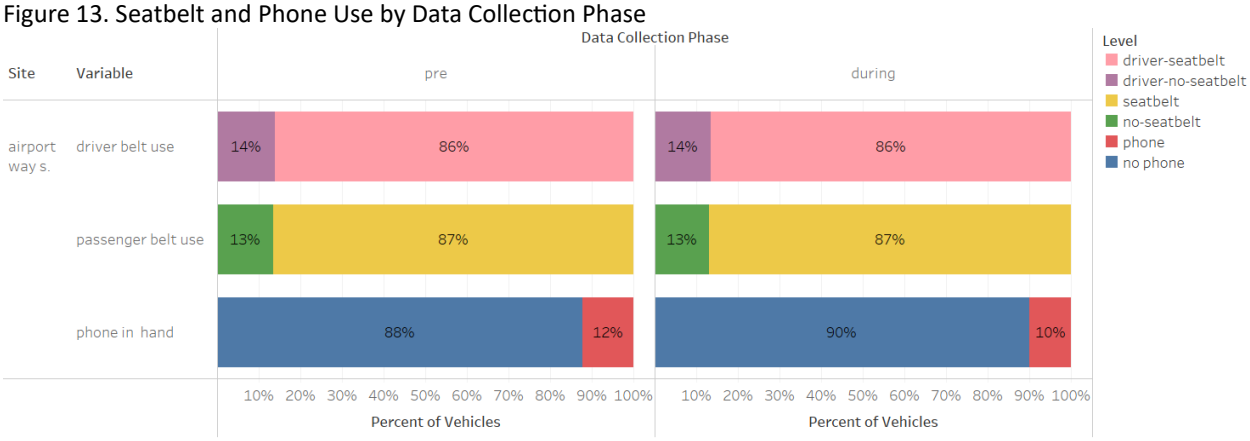
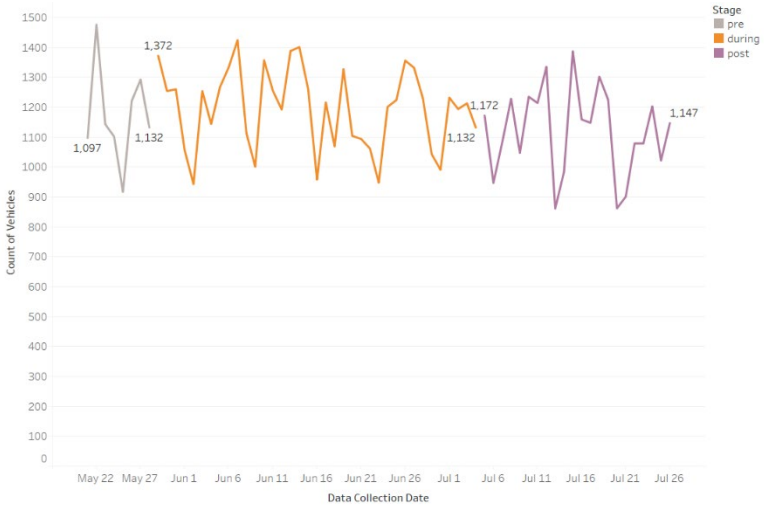


Table 3. Percentage Point Changes in Seatbelt Use and Phone in Hand by Data Collection Phase

Site	Variable	Level	Percent of Vehicles		Percentage Point Difference from Pre	
			pre	during	pre	during
airport way s.	driver belt use	driver-seatbelt	86.0%	86.5%	0.0%	0.4%
	passenger belt use	seatbelt	86.6%	87.1%	0.0%	0.4%
	phone in hand	no phone	87.7%	89.9%	0.0%	2.1%

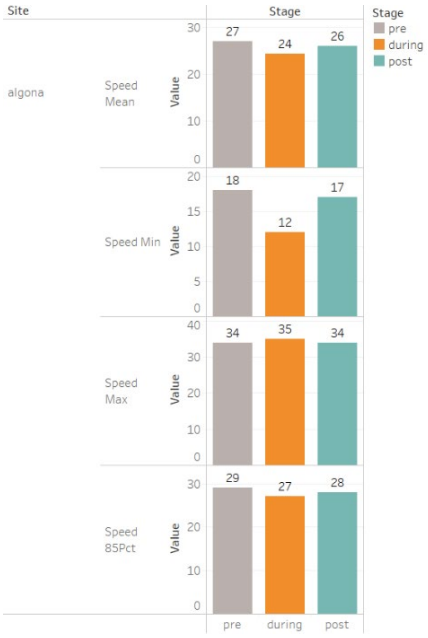
Algona Data Summary

Figure 9. Vehicle Count by Data Collection Phase and Duration in Days



Sensors temporarily installed at the Algona location collected data for a total of 67 days. Figure 9 summarizes the vehicle count by data collection phase and duration in days. Data collection at the Algona site covered the period May 21 – May 28, 2024 (8 days pre); May 29 – July 4, 2024 (37 days during); and July 5 – July 26, 2024 (22 days post) deployment of smart signs. Across the 12 sites, Algona ranked second, along with Fairwood, for the least number of days of pre sign deployment data collection. Algona exceeded the average length of data collection across the sites during and post sign deployment. In fact, the Algona site had the longest duration of data collection during sign deployment and the second longest post sign deployment data collection.

Figure 10. Average and 85th Percentile Speeds by Data Collection Phase

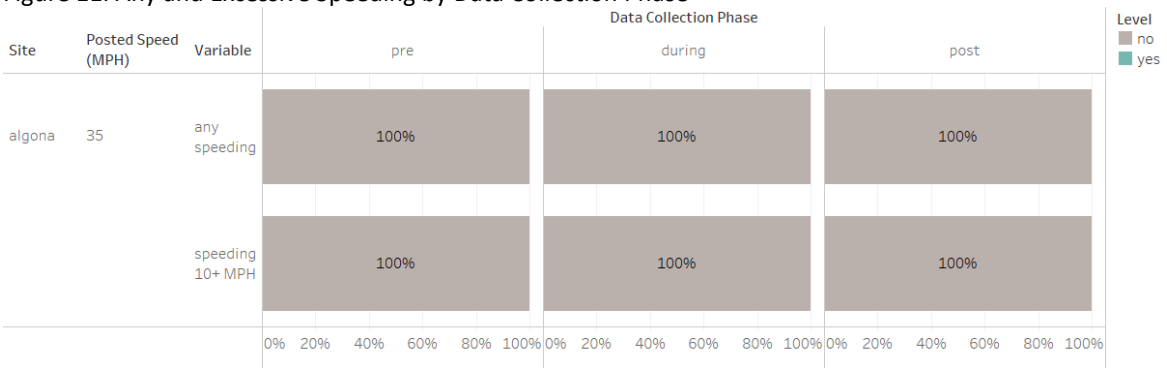


Changes in vehicle speed

Figure 10 summarizes changes in average and 85th percentile speeds by data collection phase. There was a decrease in average speed of three MPH during and one MPH post deployment of smart signs. While minimum vehicle speed decreased from 18 MPH at pre to 12 MPH during sign deployment, at post deployment when sign was removed measured minimum speed increased to 17 MPH. The maximum vehicle speed was similar across the three data collection phases: 34 MPH at pre, 35 MPH during, and 34 MPH at post deployment. The 85th percentile speed decreased two MPH during and one MPH post deployment.

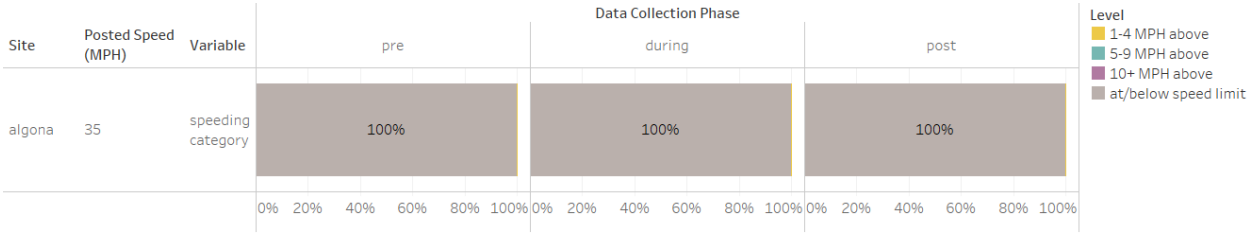
No vehicles traveling past the sensor at the Algona site had a measured speed above the posted roadway limit of 35 MPH during any of the data collection phases (Figure 11). Specifically, 100% of vehicles were traveling at measured speeds at or below the posted limit of 35 MPH in all three phases of data collection. As such, there were not observed changes during or post, relative to pre, deployment of smart signs.

Figure 11. Any and Excessive Speeding by Data Collection Phase



Similarly, there were no changes across the data collection phases in percent of vehicles detected in the speeding categories relative to the posted roadway limit (Figure 12). Among vehicles traveling at past the Algona site, all were traveling at or below the posted limit.

Figure 12. Speeding Categories by Data Collection Phase



Changes in safe driving behaviors

Figure 13 summarizes seatbelt and phone use by data collection phase. Among vehicles where seatbelt use was detectable, the percentage of vehicles with a belted driver was similar (90%) during and post, compared to pre (89%), sign deployment. Similarly, among vehicles with a front passenger, the precent of vehicles with a belted front passenger remained similar across the data collection phases: pre (91%), during (89%) and post (90%). The percentages of seat belt usage detected was less than the WSTC provided county-level seat belt use rate for 2023 of 94% from the WTSC Statewide Survey and 95.5% from a statewide observational study. Relatedly, the precent of vehicles with no phone in hand, among vehicles where a phone was detectable, were also similar across phases: pre (90%), during (91%) and post (90%). As a result, the observed percentage point difference, from pre signage deployment, was 1% or less during and post deployment (Table 3).

Figure 13. Seatbelt and Phone Use by Data Collection Phase

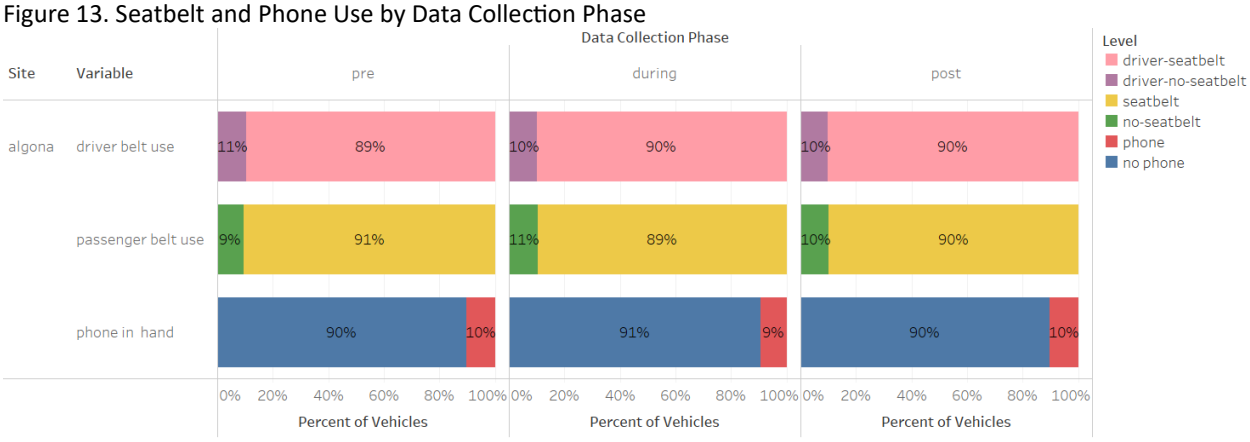
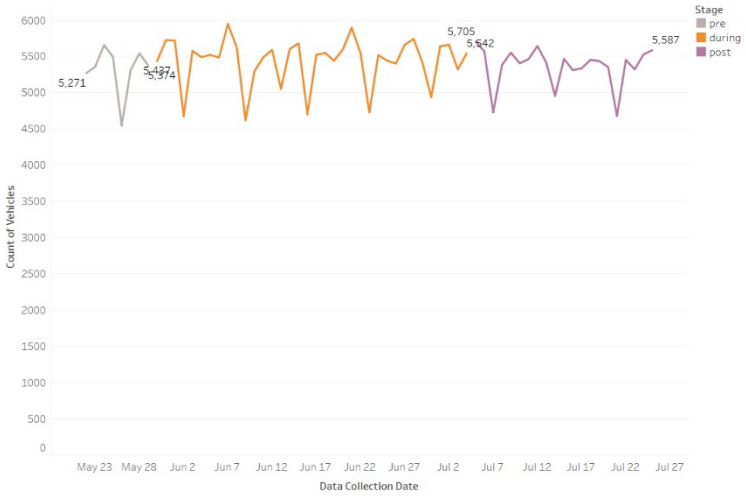


Table 3. Percentage Point Changes in Seatbelt Use and Phone in Hand by Data Collection Phase

			Percent of Vehicles			Percentage Point Difference from Pre		
Site	Variable	Level	pre	during	post	pre	during	post
algona	driver belt use	driver-seatbelt	89.5%	89.8%	90.1%	0.0%	0.4%	0.6%
	passenger belt use	seatbelt	90.6%	89.5%	89.9%	0.0%	-1.1%	-0.7%
	phone in hand	no phone	89.6%	90.8%	89.7%	0.0%	1.2%	0.2%

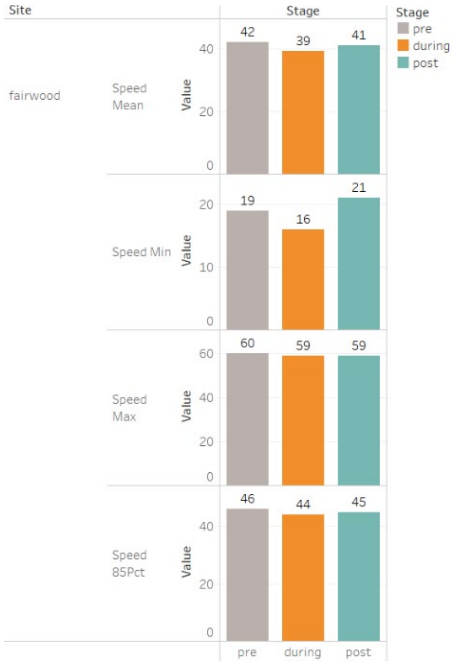
Fairwood Data Summary

Figure 9. Vehicle County by Data Collection Phase and Duration in Days



Sensors temporarily installed at the Fairwood location collected data for a total of 65 days. Figure 9 summarizes the vehicle count by data collection phase and duration in days. Data collection at the Fairwood site ranged from May 22 – May 29, 2024 (9 days pre); May 30 – July 4, 2024 (36 days during); and July 5 – July 25, 2024 (21 days post) deployment of smart signs. Fairwood tied with Algona as the site with the second shortest duration of pre deployment data collection, lower than the average of 15.5 days across the 12 sites. During sign deployment, Fairwood had the second longest duration of data collection and third longest duration post deployment, exceeding the average across sites of 27.1 days and 14.3 days, respectively. The contractor noted this site had lower confidence of detection, compared to other sites, due to: (1) higher and variable speeds, (2) multiple lanes, and (3) position of the sensor.

Figure 10. Average and 85th Percentile Speeds by Data Collection Phase



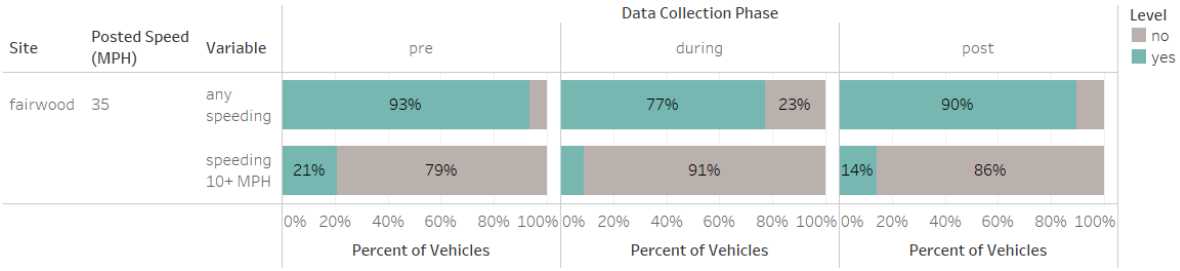
Changes in vehicle speed

Figure 10 summarizes changes in average and 85th percentile speeds by data collection phase. There was a decrease in average speed of three MPH during and one MPH post, compared to pre, smart sign deployment. Relative to pre deployment minimum speed of 19 MPH, the minimum speed decreased to 16 MPH during and increased to 21 MPH post sign deployment. The maximum speed across the data collection phases fluctuated between 60 MPH pre, to 59 MPH during and post. The 85th percentile speed decreased four MPH during, and one MPH post deployment compared to pre deployment.

Compared to the posted speed limit of 35 MPH, the percent of vehicles traveling ≥10 MPH above the posted roadway limit decreased to 9% during and increased to 14% post sign deployment; whereas 21% of vehicles at pre were traveling ≥10 MPH above the 35 MPH posted limit (Figure 11).

The percent of vehicles traveling any speed above the posted roadway limit decreased by 16 percentage points during, compared to pre deployment (Figure 11). At post deployment, 90% of vehicles were traveling at speeds above the posted limit, an increase of thirteen percentage points compared to during sign deployment. However, this was three percentage points lower than pre deployment.

Figure 11. Any and Excessive Speeding by Data Collection Phase



Compared to pre smart signs deployment, the percent of vehicles traveling 1-4 MPH above the posted speed increased during and post deployment (Figure 12). There was a shift to lower percentage of vehicles travelling ≥10 MPH or 5-9 MPH above the posted roadway limit during and post deployment phases. Notably, the percent of vehicles traveling at or below the posted roadway limit increased from 7% at pre to 23% during sign deployment, an increase of 16 percentage points (Table 2). Post deployment 10% of vehicles were traveling at or below the posted limit.

Figure 12. Speeding Categories by Data Collection Phase

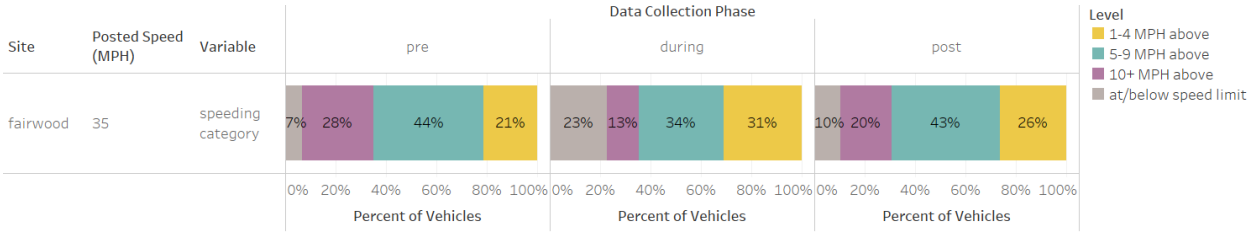


Table 2. Percentage Point Changes in Speeding by Data Collection Phase

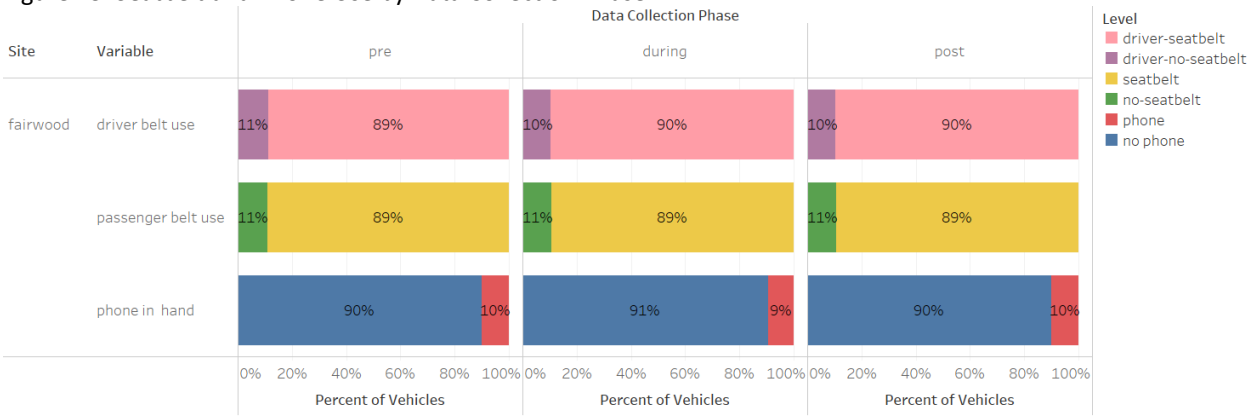
Site	Posted Speed (MPH)	Variable	Level	Percent of Vehicles			Percentage Point Difference from Pre		
				pre	during	post	pre	during	post
fairwood	35	any speeding	yes	93.3%	77.4%	89.5%	0.0%	-15.9%	-3.8%
		speeding 10+ MPH	yes	21.0%	8.8%	14.5%	0.0%	-12.2%	-6.5%
		speeding category	1-4 MPH above	21.3%	31.1%	26.2%	0.0%	9.8%	5.0%
			5-9 MPH above	43.9%	33.7%	43.0%	0.0%	-10.2%	-0.9%
			>= 10+ MPH	28.2%	12.6%	20.3%	0.0%	-15.5%	-7.9%
			at/below speed limit	6.7%	22.6%	10.5%	0.0%	15.9%	3.8%

Changes in safe driving behaviors

Figure 13 summarizes seatbelt and phone use by data collection phase. Driver seatbelt use was consistent across data collection phases: 89% at pre, and 90% for both during and post signage deployment phases. Front passenger seatbelt use was also constant at 89% for each data collection phase. The percentages of seatbelt usage detected was less than the WSTC provided county-level seat

belt use rate for 2023 of 94% from the WTSC Statewide Survey and 95.5% from a statewide observational study. Likewise, the percentage of vehicles with no phone in hand detected was stable across the data collection phases: 90% at pre, 91% during, and 90% post sign deployment.

Figure 13. Seatbelt and Phone Use by Data Collection Phase



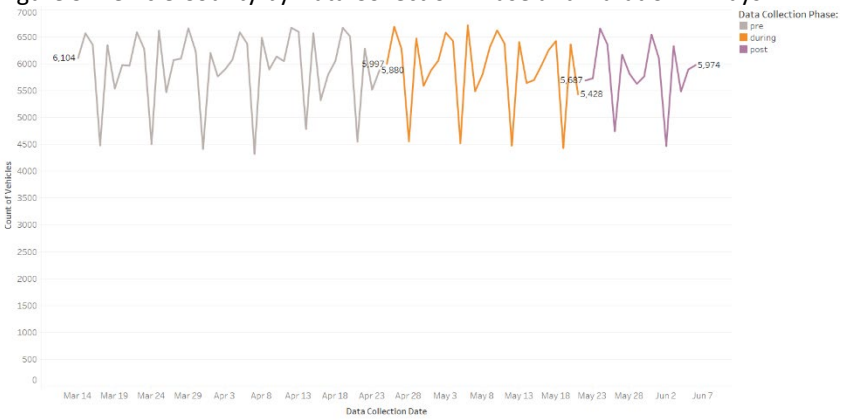
As a result, the observed percentage point difference from pre signage deployment was 1% or less during and post deployment (Table 3).

Table 3. Percentage Point Changes in Seatbelt Use and Phone in Hand by Data Collection Phase

			Percent of Vehicles			Percentage Point Difference from Pre		
Site	Variable	Level	pre	during	post	pre	during	post
fairwood	driver belt use	driver-seatbelt	88.7%	89.7%	89.6%	0.0%	1.0%	0.9%
	passenger belt use	seatbelt	89.1%	89.4%	89.4%	0.0%	0.3%	0.3%
	phone in hand	no phone	89.9%	90.5%	90.0%	0.0%	0.7%	0.2%

Greenbridge Data Summary

Figure 9. Vehicle County by Data Collection Phase and Duration in Days



The sensor placed at the Greenbridge location had a total of 85 days of data collection across the three phases in 2024 as follows: March 11 – April 24 (42 days pre), April 25 – May 21 (27 days during), and May 22 – June 6 (16 days post). Figure 9 summarizes the vehicle count by data collection phase and duration in days. This site had the longest period of pre deployment data collection at 42 days. The duration of data collection during sign deployment was the same as the average of 27.1 days for all sites and post deployment data collection was above average of 14.3 days across the 12 sites. The contractor noted that "sun exposure due to the building's position limits the potential locations [for the sensor]".

Changes in vehicle speed

Figure 10. Average and 85th Percentile Speeds by Data Collection Phase

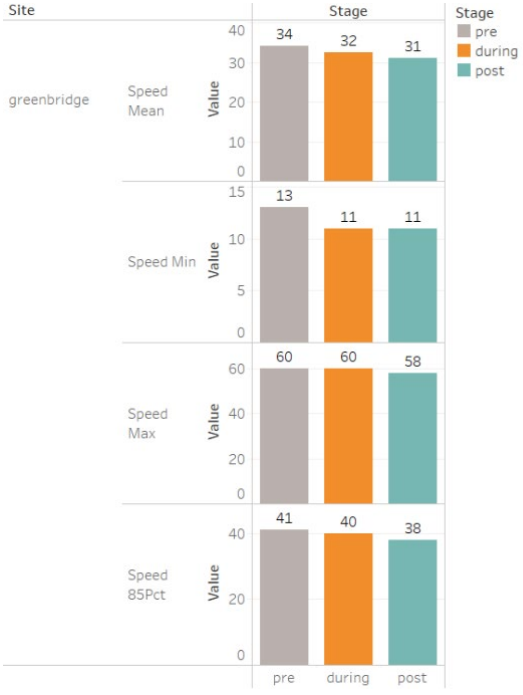
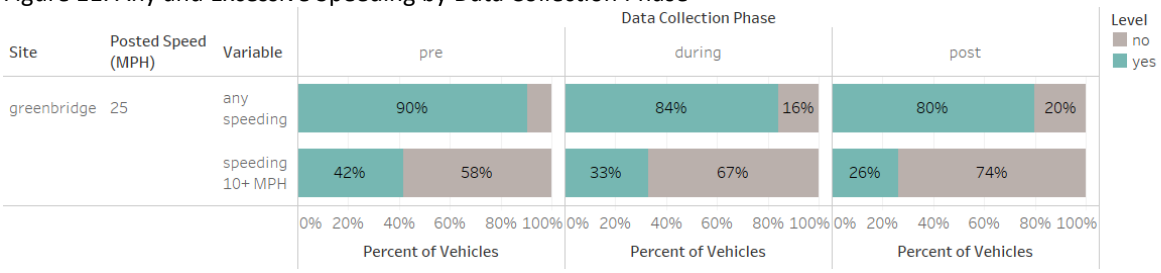


Figure 10 summarizes changes in average and 85th percentile speeds by data collection phase. At the Greenbridge site, the speed of vehicles was captured as vehicles went over the hill. There were small fluctuations in the measured minimum speed from 13 MPH at pre to 11 MPH for both during and post implementation. The maximum speed was similar between pre and during sign implementation, at 60 MPH. At post implementation the maximum speed detected decreased to 58 MPH.

Compared to pre implementation, stepwise decreases in average speed and 85th percentile speed was observed for vehicles traveling past the Greenbridge site comparing during and post smart sign implementation. However, the reductions were small with a decrease in average speed from 34 MPH at pre to 32 MPH during and 31 MPH post implementation. Similarly, the 85th percentile speed decreased incrementally from 41 MPH at pre to 40 MPH during and 38 MPH post sign implementation.

Relative to posted roadway speed of 25 MPH, 90% of vehicles during pre-deployment were traveling at measured speeds above the posted limit (Figure 11). During and post sign deployment the percent of vehicles traveling at any speed over the posted limit decreased to 84% and 80% respectively. The percent of vehicles traveling ≥10 MPH above the posted limit decreased sequentially from 42% at pre to 33% during to 26% at post implementation (Figure 11).

Figure 11. Any and Excessive Speeding by Data Collection Phase



The decrease in the percent of vehicles travelling ≥ 10 MPH above the posted limit at Greenbridge was offset by an increase in the percent of vehicles traveling at or below or 1-4 MPH over the posted roadway limited (Figure 12 and Table 2).

Figure 12. Speeding Categories by Data Collection Phase

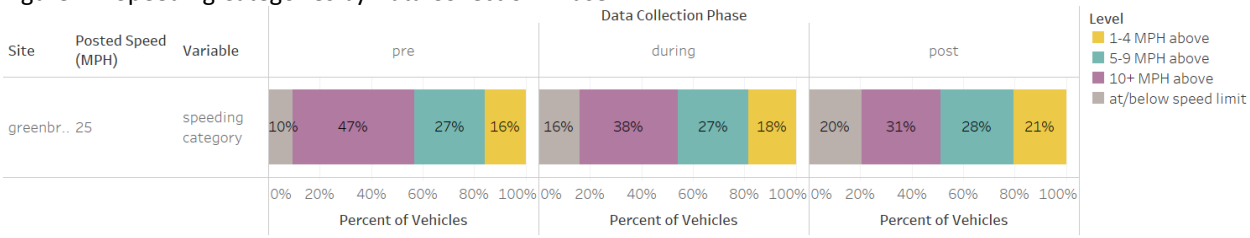


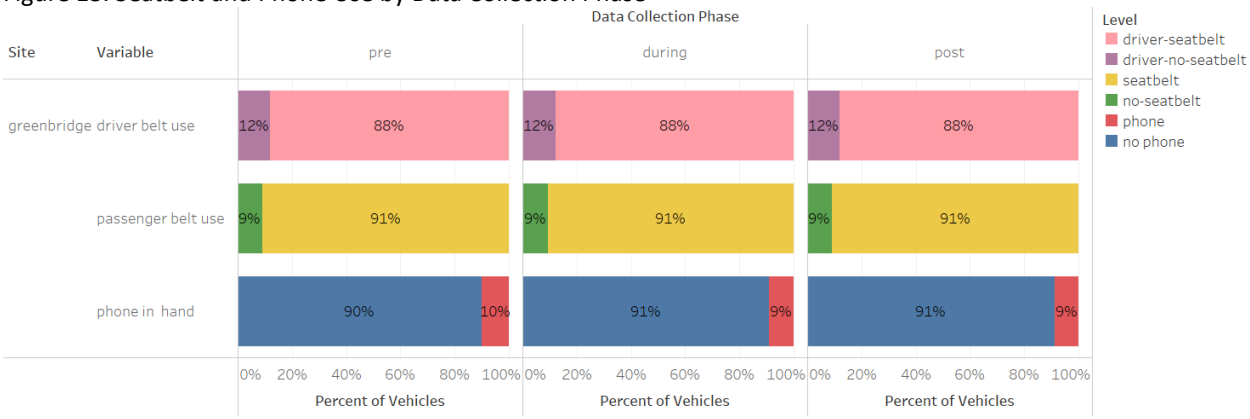
Table 2. Percentage Point Changes in Speeding by Data Collection Phase

Site	Posted Speed (MPH)	Variable	Level	Percent of Vehicles			Percentage Point Difference from Pre		
				pre	during	post	pre	during	post
greenbridge	25	speeding category	1-4 MPH above	15.7%	18.4%	20.5%	0.0%	2.7%	4.8%
			5-9 MPH above	27.4%	27.3%	28.1%	0.0%	-0.1%	0.7%
			>= 10+ MPH	47.3%	38.1%	30.9%	0.0%	-9.1%	-16.4%
			at/below speed limit	9.6%	16.1%	20.5%	0.0%	6.5%	10.8%

Changes in safe driving behaviors

Figure 13 summarizes seatbelt and phone use by data collection phase. Driver and front passenger seat belt use was consistent across the three data collection phases, at 88% and 91% respectively. The percentages of seat belt usage detected was less than the WSTC provided county-level seat belt use rate for 2023 of 94% from the WTSC Statewide Survey and 95.5% from a statewide observational study. Likewise, the percentage of vehicles with no phone in hand detected among drivers was consistent, between 90% pre and 91% each during and post sign implementation across the data collection phases.

Figure 13. Seatbelt and Phone Use by Data Collection Phase



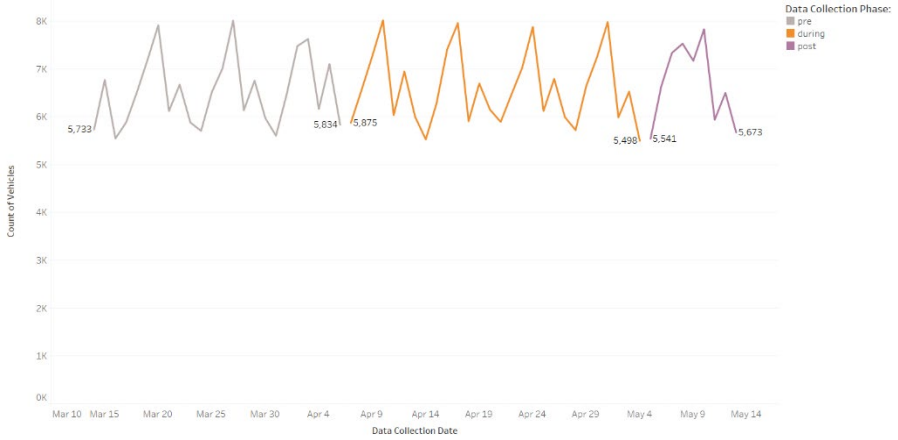
The observed percentage point difference from pre signage deployment levels was 1.3% or less during and post deployment (Table 3).

Table 3. Percentage Point Changes in Seatbelt Use and Phone in Hand by Data Collection Phase

			Percent of Vehicles			Percentage Point Difference from Pre		
Site	Variable	Level	pre	during	post	pre	during	post
greenbridge	driver belt use	driver-seatbelt	88.1%	87.8%	88.0%	0.0%	-0.3%	-0.2%
	passenger belt use	seatbelt	91.0%	90.7%	90.8%	0.0%	-0.4%	-0.2%
	phone in hand	no phone	90.0%	91.0%	91.3%	0.0%	1.0%	1.3%

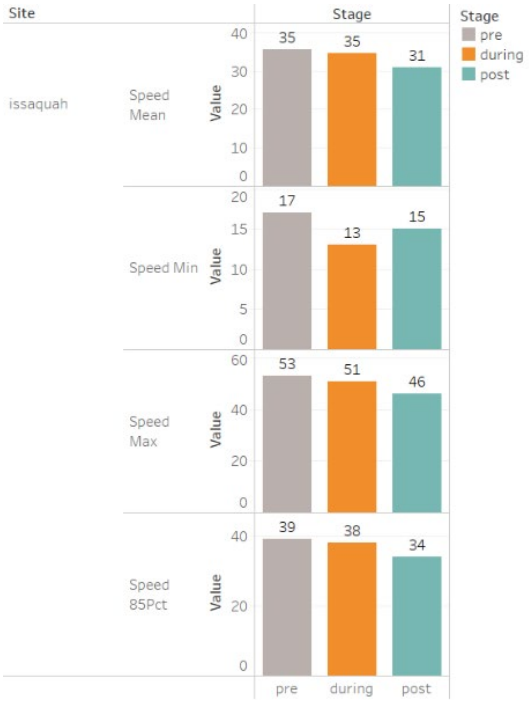
Issaquah Data Summary

Figure 9. Data Collection Phase and Duration in Days



The Issaquah location sign and detector placement was shortly off the highway before entering the town center. Figure 9 summarizes the vehicle count by data collection phase and duration in days. Of the 61 days of data collection at the Issaquah location, pre deployment accounted for 24 days (March 14 – April 6, 2024), during sign deployment was collected for 28 days (April 7 – May 4, 2024) and post deployment had 9 days (May 5 –13, 2024) of data collection. The Issaquah site ranked second among the 12 sites for the longest duration of pre sign deployment data collection and exceeded the over site average of 15.5 days. The Issaquah site also exceed all-sites average of 27.1 days for duration of data collection during sign deployment, however it was the third lowest among all sites for duration of post data collection (average of 14.3 days). Public Health staff passing by the sign on April 3, 2024, during the noon time hour noted the sign appeared to be off. Additionally, the contractor reported the trailer was hit and the system was not operational until April 24, 2024. Then on Friday, April 26, 2024, the sign was involved in a hit and run after hours and was removed from the site on Monday, April 29.

Figure 10. Average and 85th Percentile Speeds by Data Collection Phase

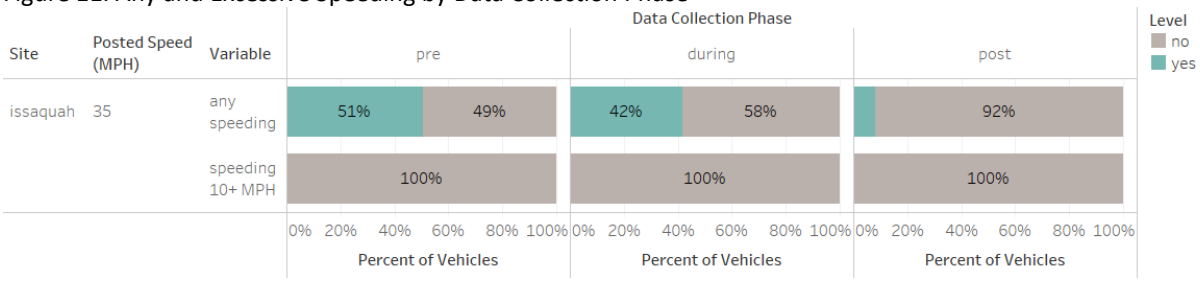


Changes in vehicle speed

Figure 10 summarizes changes in average and 85th percentile speeds by data collection phase. There was no difference in mean speed (35 MPH) pre and during sign deployment; at post deployment the mean speed decreased to 31 MPH. Relative to pre sign deployment, the minimum measured speed decreased from 17 MPH to 13 MPH during and increased to 15 MPH post deployment. The maximum measured speed decreased steady from 53 MPH at pre to 51 MPH during to 40 MPH at post deployment. Among 85th percentile speed, there was also an incremental decrease across the data collection phases: 39 MPH pre, 38 MPH during, and 34 MPH post deployment of smart signs.

No vehicles traveling past the temporary sensors at the Issaquah site had measured speeds of ≥10 MPH above the posted roadway limit of 35 MPH in any of the data collection phases (Figure 11). At pre deployment about half of the vehicles (51%) had measured speeds above the roadway limit of 35 MPH, the percentage of vehicles traveling at any speed above the posted roadway limit decreased substantially during (42%) and post (8%) sign deployment (Figure 11).

Figure 11. Any and Excessive Speeding by Data Collection Phase



At the Issaquah site, there was a steady decrease in the percentage of vehicles traveling both 5-9 MPH or 1-4 MPH above the posted roadway limit during and post, compared to pre, sign deployment (Figure 12). Offsetting this decrease was an increase in the percent of vehicles measured to be traveling at or below the posted limit of 35 MPH – from 49% at pre to 58% during and 92% at post sign implementation.

Figure 12. Speeding Categories by Data Collection Phase

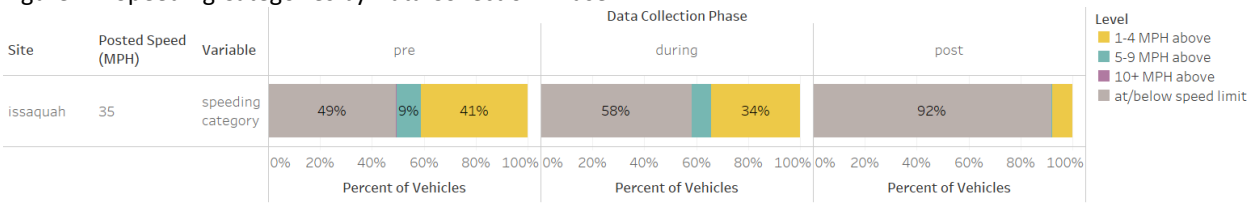


Table 2 below shows the absolute, as percentage point changes from pre deployment levels in percent of vehicles speeding defined as two or four categories. Of note, there were very few vehicles traveling ≥ 10 MPH above the posted limit of 35 MPH pre deployment. Reductions during and post deployment can result in large percent change values relative to pre deployment levels as a result.

Table 2. Percentage Point Changes in Speeding by Data Collection Phase

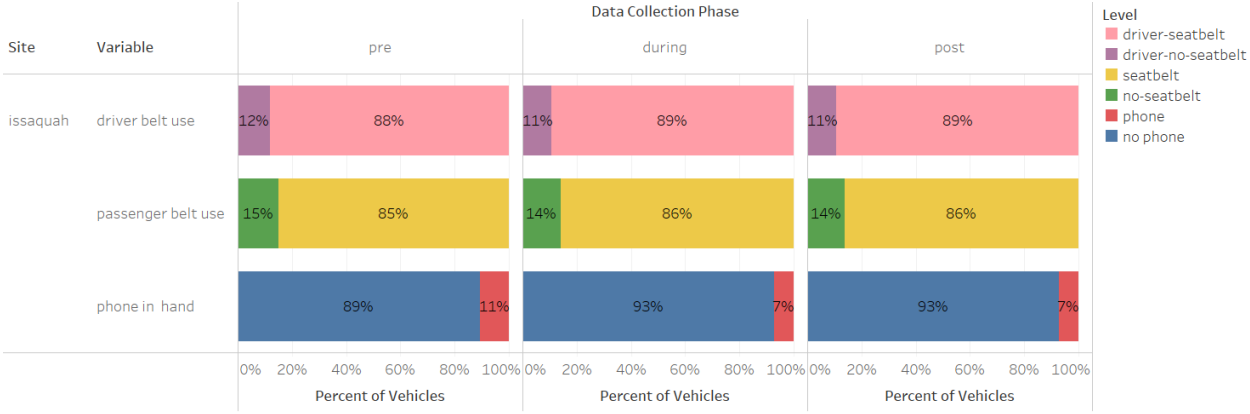
Site	Posted Speed (MPH)	Variable	Level	Percent of Vehicles			Percentage Point Difference from Pre		
				pre	during	post	pre	during	post
issaquah	35	speeding category	1-4 MPH above	41.2%	34.2%	7.7%	0.0%	-6.9%	-33.4%
			5-9 MPH above	9.3%	7.4%	0.4%	0.0%	-1.9%	-8.8%
			>= 10+ MPH	0.2%	0.2%	0.0%	0.0%	-0.1%	-0.2%
			at/below speed limit	49.3%	58.2%	91.8%	0.0%	8.9%	42.5%

Changes in safe driving behaviors

Figure 13 summarizes seatbelt and phone use by data collection phase. Like other sites, there were minimal changes in the percentage of vehicles with driver seat belt use detected at pre (88%), during (89%), or post (89%) implementation of smart signs. Front passenger seat belt use was lower, at 85% pre; and 86% for during and post implementation. For context, the percentages of seat belt usage detected was five to six percentage points lower than the WSTC provided county-level seat belt use rate for 2023 of 94% from the WTSC Statewide Survey and 95.5% from a statewide observational study.

There were small increases in the percent of vehicles where phone in hand was not detected for the driver during and post (93% for both), compared to pre (89%), deployment of smart sign.

Figure 13. Seatbelt and Phone Use by Data Collection Phase



The observed percentage point difference, from pre deployment levels, was 3.5% or less during and post sign deployment (Table 3).

Table 3. Percentage Point Changes in Seatbelt Use and Phone in Hand by Data Collection Phase

			Percent of Vehicles			Percentage Point Difference from Pre		
Site	Variable	Level	pre	during	post	pre	during	post
issaquah	driver belt use	driver-seatbelt	88.0%	89.3%	89.5%	0.0%	1.3%	1.5%
	passenger belt use	seatbelt	85.1%	85.9%	86.2%	0.0%	0.8%	1.2%
	phone in hand	no phone	89.2%	92.7%	92.7%	0.0%	3.5%	3.5%

Kenmore Data Summary

At the site in Kenmore, data was collected for a total of 45 days with 12 days of pre (July 24 – August 5, 2024), 24 days during (August 6-29, 2024), and 8 days of post (August 30 – September 6, 2024) sign deployment. Figure 9 summarizes the vehicle count by data collection phase and duration in days. The duration of pre deployment data collection was less than the all- site average for all three data collection phases. The Kenmore site was among the group of sites with the shortest duration of post deployment data collection. The contractor noted the Kenmore site "had very low volume".

Figure 9. Vehicle County by Data Collection Phase and Duration in

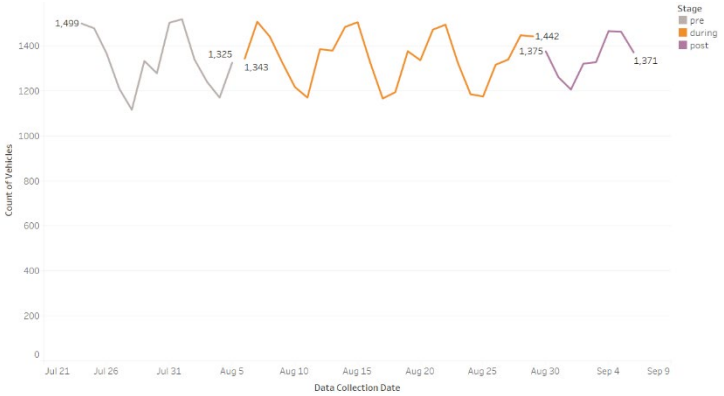
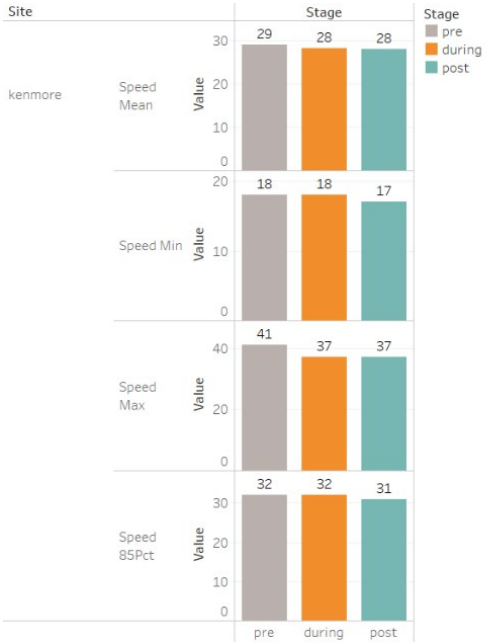


Figure 10. Average and 85th Percentile Speeds by Data Collection Phase



Changes in vehicle speed

Figure 10 summarizes changes in average and 85th percentile speeds by data collection phase. Compared to pre deployment, the average speed during and post deployment was 28 MPH, compared to 29 MPH. The 85th percentile speed was the same pre and during deployment at 32 MPH while at post deployment it was 31 MPH.

When compared to the posted roadway speed of 30 MPH, no vehicles traveling past the Kenmore site were traveling 10 MPH over the posted roadway speed (Figure 11). The percentage of vehicles traveling any speed above 30 MPH, decreased from 34% at pre deployment to 27% during and 24% post (Figure 11).

There was a shift in the percentage of vehicles traveling 1-4 MPH above the posted roadway limit to the percentage of vehicles traveling at or below the posted limit during and after the smart signs' deployment (Figure 12). Notably, the percentage of vehicles traveling at or below the speed limit increased from 66% at pre to 73% during operation of the signs to 76% at post sign deployment.

Figure 11. Any and Excessive Speeding by Data Collection Phase

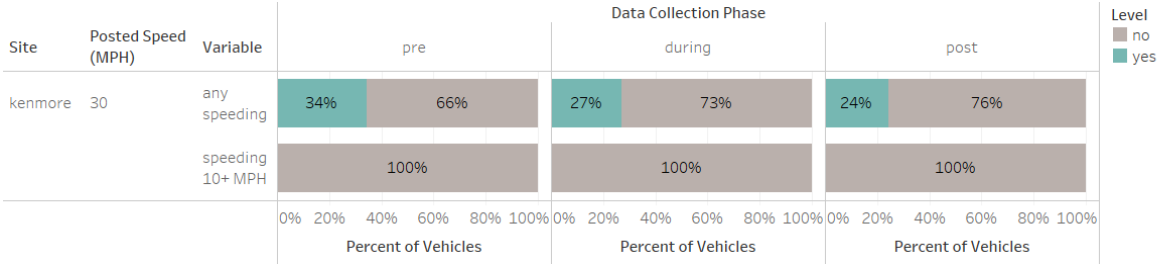


Figure 12. Speeding Categories by Data Collection Phase

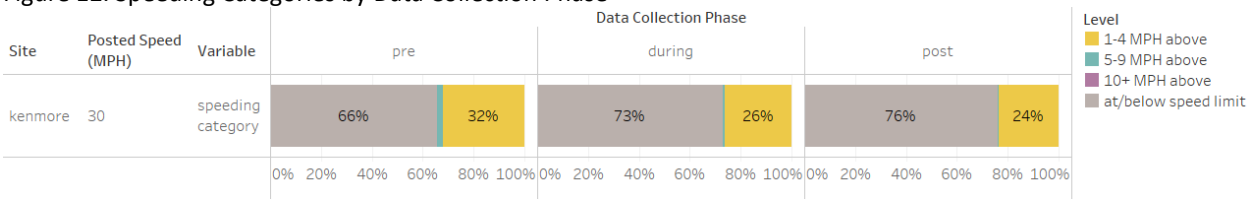


Table 2 below shows the absolute, as percentage point changes from pre deployment levels in percent of vehicles speeding defined as two or four categories. Of note, there were very few vehicles traveling ≥ 10 MPH above the posted limit of 30 MPH pre deployment. Further reductions during and post deployment periods can result in large percent change values relative to pre deployment levels as a result.

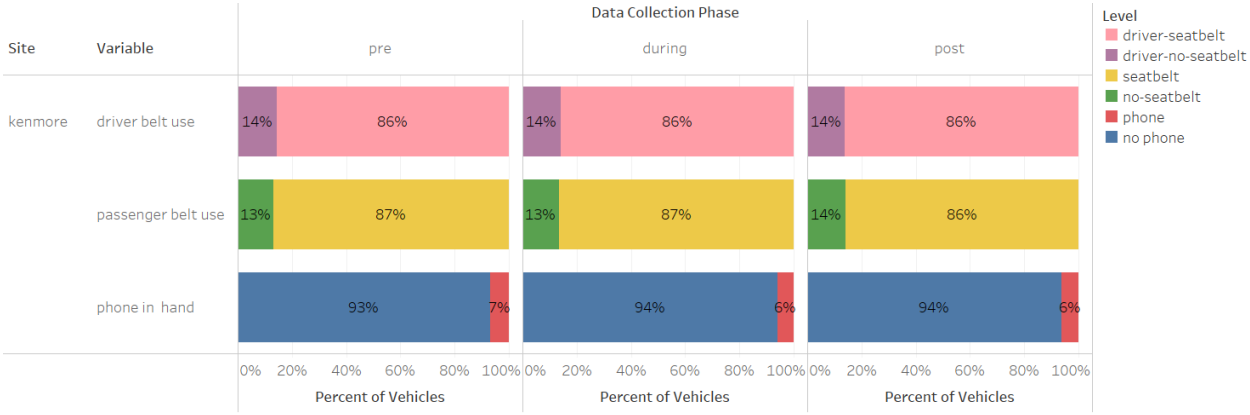
Table 2. Percentage Point Changes in Speeding by Data Collection Phase

			Percent of Vehicles			Percentage Point Difference from Pre		
Site	Variable	Level	pre	during	post	pre	during	post
kenmore	any speeding	yes	34.3%	27.2%	24.1%	0.0%	-7.1%	-10.1%
	speeding 10+ MPH	yes	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	speeding category	1-4 MPH above	32.0%	26.3%	23.7%	0.0%	-5.7%	-8.3%
		5-9 MPH above	2.3%	0.9%	0.4%	0.0%	-1.4%	-1.8%
		>= 10+ MPH	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
		at/below speed limit	65.7%	72.8%	75.9%	0.0%	7.1%	10.1%

Changes in safe driving behaviors

Figure 13 summarizes seatbelt and phone use by phase. There were no differences in the percentage of vehicles with occupant seatbelt use across the data collection phases, with the percentage remaining at 86% for drivers and 86%-87% for front passengers. The percentage of seatbelt usage detected was less than the WSTC provided county-level seatbelt use rate for 2023 of 94% from the WTSC Statewide Survey and 95.5% from a statewide observational study. No phone in hand among drivers was detected among 93% of vehicles at pre and 94% of vehicles for both during and post sign deployments.

Figure 13. Seatbelt and Phone Use by Data Collection Phase



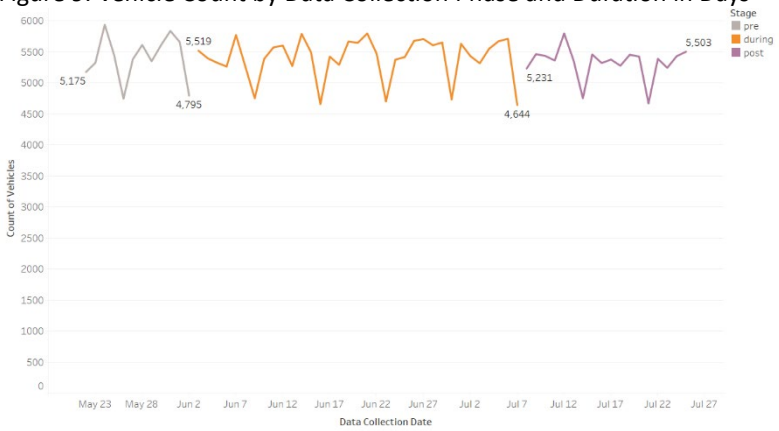
As a result, the observed percentage point difference from pre signage deployment levels was 1% or less during and post deployment (Table 3).

Table 3. Percentage Point Changes in Seatbelt Use and Phone in Hand by Data Collection Phase

			Percent of Vehicles			Percentage Point Difference from Pre		
Site	Variable	Level	pre	during	post	pre	during	post
kenmore	driver belt use	driver-seatbelt	85.5%	85.9%	86.1%	0.0%	0.4%	0.6%
	passenger belt use	seatbelt	86.9%	86.5%	86.0%	0.0%	-0.3%	-0.8%
	phone in hand	no phone	93.0%	94.1%	93.9%	0.0%	1.1%	0.9%

Maple-Valley Data Summary

Figure 9. Vehicle Count by Data Collection Phase and Duration in Days



The Maple-Valley location had a total of 64 days of data collection, spanning a period of May 22-June 2, 2024 (12 days pre); June 3 – July 7, 2024 (34 days during); and July 8 – July 25, 2025 (18 days post). Figure 9 summarizes the vehicle count by data collection phase and duration in days. This site had one of the longer periods of sign deployment data collection at 34 days but less than the all-site average duration of data collection at pre sign deployment (15.5 days). The duration of data collection during and post sign implementation at the Maple-Valley site exceeded the all-site average for these respective phases (27.1 days and 14.3 days, respectively). On May 29, 2024, a community partner mentioned that the sign was showing speed only to which the contractor clarified that the system was in pre-deployment mode and the other functionality was not turned on. The same community partner reported the sign was working for buckle up but not phone down on June 6, 2024. The contractor observed the sign for two hours on June 10, 2024, and reported the sign was working as expected. The contractor noted data for June 8, 2024, was removed due to a parade which resulted in the overall data not making sense.

Changes in vehicle speed

Figure 10. Average and 85th Percentile Speeds by Data Collection Phase

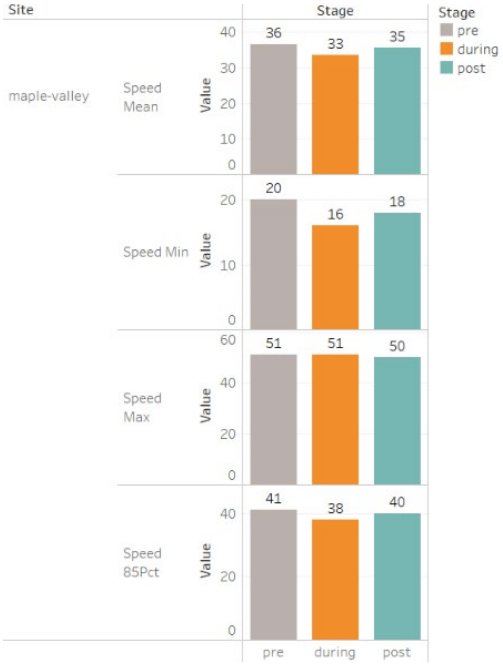
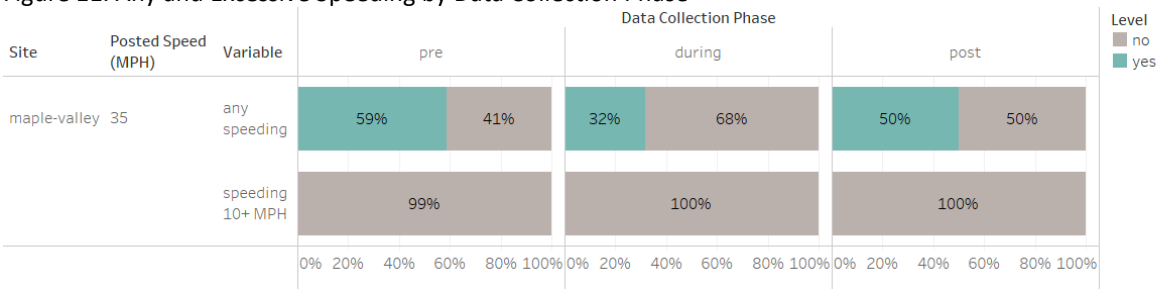


Figure 10 summarizes changes in average and 85th percentile speeds by data collection phase. The average speed of vehicles traveling past the Maple-Valley location decreased from 36 MPH at pre to 33 MPH during sign deployment and increased to 35 MPH following removal of the smart sign. Relative to pre deployment, minimum measured vehicle also decreased during sign deployment and increased slightly post sign deployment. The maximum measure speed remained consistent across the data collection phases: 51 MPH at both pre and during, 50 MPH post deployment. The 85th percentile speed also decreased from 41 MPH at pre to 38 MPH during and increased to 40 MPH at post.

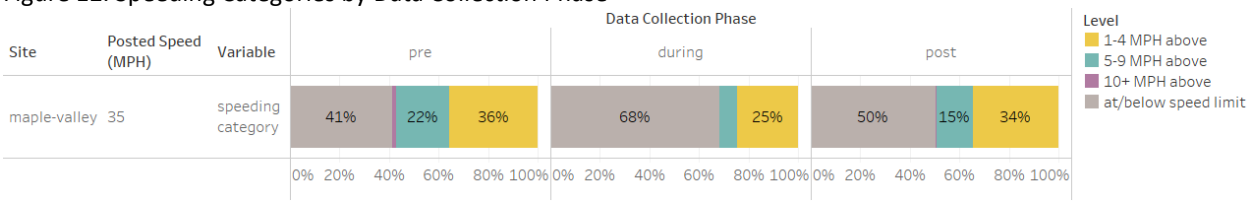
In reference to the posted roadway limit of 35 MPH, vehicles passing by the location were not traveling ≥10 MPH above the roadway limit at any of the data collection phases (Figure 11). The percent of vehicles traveling 5-9 MPH above the roadway limit decreased from 22% at pre to 7% during and increased to 15% at post sign deployment.

Figure 11. Any and Excessive Speeding by Data Collection Phase



There was a notable increase in the percent of vehicles traveling at speeds at or below the roadway posted limit during sign deployment (Figure 12), however this behavior did not appear to be sustained when the sign was removed as only 50% of vehicles passing by the Maple-Valley site were traveling at or below the roadway limit of 35 MPH at post deployment. This equates to a precent change from pre deployment levels of 64.6% and 21.3% during and post implementation respectively.

Figure 12. Speeding Categories by Data Collection Phase



Of note, there were very few vehicles traveling ≥ 10 MPH above the posted limit of 35 MPH pre deployment (Table 2). Further reductions during and post deployment periods can result in large percent change values relative to pre deployment levels as a result.

Table 2. Percentage Point Changes in Speeding by Data Collection Phase

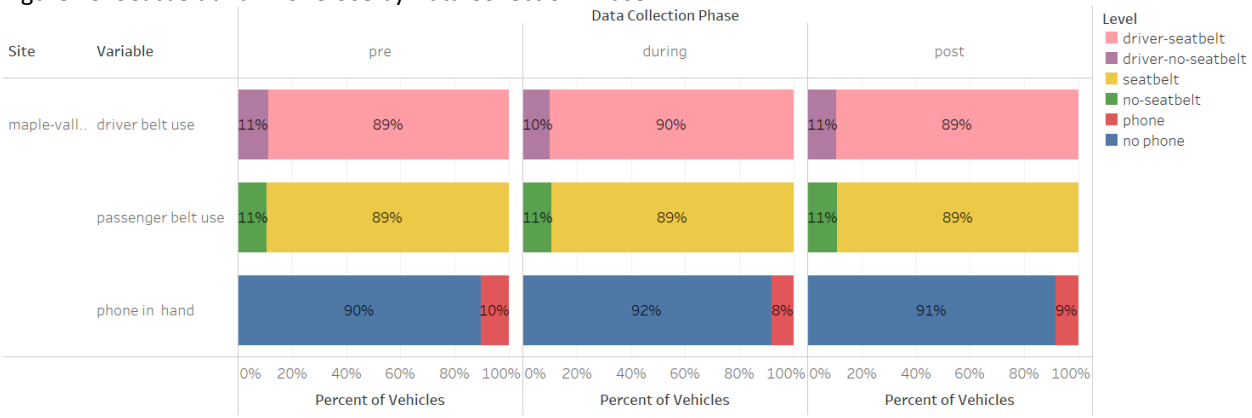
Site	Variable	Level	Percent of Vehicles			Percentage Point Difference from Pre		
			pre	during	post	pre	during	post
maple-valley	any speeding	yes	58.6%	31.9%	49.8%	0.0%	-26.7%	-8.8%
	speeding 10+ MPH	yes	0.5%	0.1%	0.2%	0.0%	-0.4%	-0.3%
	speeding category	1-4 MPH above	35.8%	24.5%	34.5%	0.0%	-11.2%	-1.3%
		5-9 MPH above	21.6%	7.1%	14.8%	0.0%	-14.5%	-6.8%
		>= 10+ MPH	1.2%	0.2%	0.5%	0.0%	-1.0%	-0.7%
		at/below speed limit	41.4%	68.1%	50.2%	0.0%	26.7%	8.8%

Changes in safe driving behaviors

Figure 13 summarizes seatbelt and phone use by data collection phase. Among vehicles travelling past the Maple-Valley location where seatbelt use was detected, the percentage of belted drivers was not substantially different across the three data collection phases. Likewise, among vehicles with a front passenger, the percentage of vehicles with a belted passenger remained constant at 89% across the all

the data collection phases. As a point of reference, the percentages of seat belt usage detected was less than the WSTC provided county-level seat belt use rate for 2023 of 94% from the WTSC Statewide Survey and 95.5% from a statewide observational study.

Figure 13. Seatbelt and Phone Use by Data Collection Phase



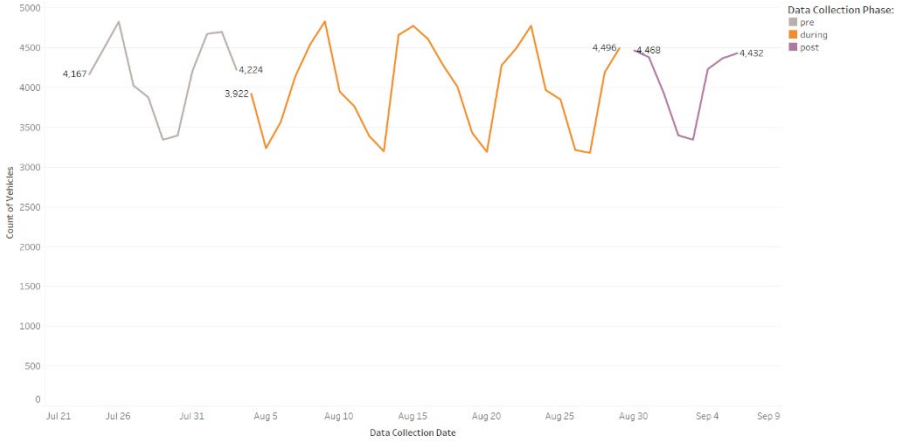
The percent of vehicles where no phone in hand was detected among drivers fluctuated between 90% at pre to 92% during sign deployment, to 91% after the sign was removed. The observed percentage point difference from pre signage deployment level was 2.3% or less during and post deployment (Table 3).

Table 3. Percentage Point Changes in Seatbelt Use and Phone in Hand by Data Collection Phase

			Percent of Vehicles			Percentage Point Difference from Pre		
Site	Variable	Level	pre	during	post	pre	during	post
maple-valley	driver belt use	driver-seatbelt	88.6%	90.0%	89.4%	0.0%	1.4%	0.8%
	passenger belt use	seatbelt	89.3%	89.5%	89.1%	0.0%	0.1%	-0.2%
	phone in hand	no phone	89.5%	91.9%	91.4%	0.0%	2.3%	1.9%

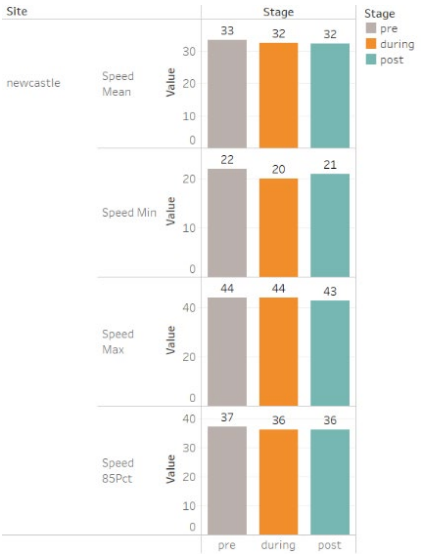
Newcastle Data Summary

Figure 9. Vehicle County by Data Collection Phase and Duration in Days



Data collection at the Newcastle site spanned a total of 45 days, ranging from July 24 – August 3, 2024 (11 days) pre sign deployment to Aug 4 – Aug 29, 2024 (25 days) during operation of sign, and Aug 30 – Sept 6, 2024 (8 days) after sign was removed. Figure 9 summarizes the vehicle count by data collection phase and duration in days. The contractor noted that on Aug 8, 2024, the sign was moved down the street from the originally suggested location due to inadequate room for the sign at the original location owing to a narrow right of way.

Figure 10. Average and 85th Percentile Speeds by Data Collection Phase

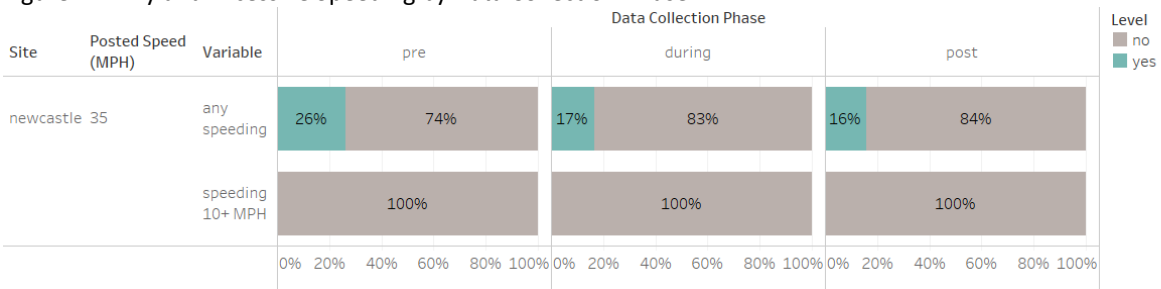


Changes in vehicle speed

Figure 10 summarizes changes in average and 85th percentile speeds by data collection phase. Both average speed and 85th percentile speed decreased by one MPH comparing during and after to before sign deployment. The mean speed was 33 MPH pre and 32 MPH for both during and post sign deployment. Likewise, the 85th percentile speed was 37 MPH during and 36 MPH both during and post sign deployment. There were small fluctuations in the measured minimum speed with a decrease from 22 MPH at pre to 20 MPH during and increased to 21 MPH post sign deployment. The maximum measured speed remained stable at 44 MPH for both pre and during deployment and 43 MPH at post deployment.

When considering the posted roadway speed limit of 35 MPH, no vehicles were measured traveling at speeds ≥ 10 MPH above the posted limited in any of the data collection phases (Figure 11). The percent of vehicles traveling at any speed above the roadway posted limit steadily decreased from 26% at pre to 17% during and 16% post sign deployment (Figure 11).

Figure 11. Any and Excessive Speeding by Data Collection Phase



Relative to the posted roadway speed of 35 MPH, the percent of vehicles traveling 1-4 MPH above the posted roadway limit decreased from 26% at pre to 16% both during and post sign deployment (Figure 12). This shift was coupled with an increase in the percent of vehicles traveling at or below the posted roadway limit: 74% at pre to 83% during and 84% post sign deployment.

Figure 12. Speeding Categories by Data Collection Phase

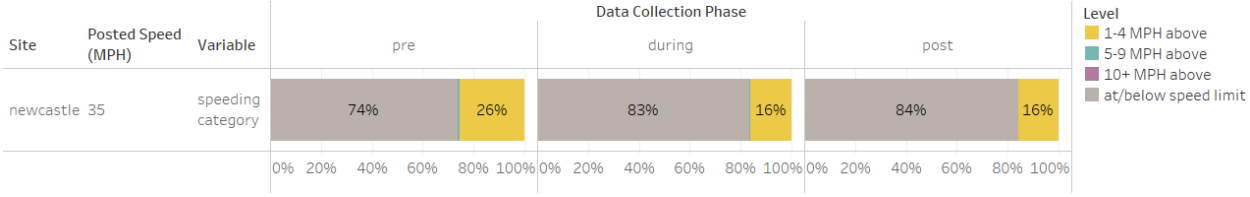


Table 2 below shows the absolute, as percentage point, changes from pre deployment levels in percent of vehicles speeding defined as two or four categories. Of note, there were no vehicles traveling ≥ 10 MPH above the posted limit of 35 MPH at the Newcastle site in any of the data collection phases. There was a very small number of vehicles traveling at speeds of 5-9 MPH over the posted limit of 35 MPH at pre deployment and further reductions during and post deployment periods can result in large percent change values relative to pre deployment levels. However, the absolute difference was half a percentage point.

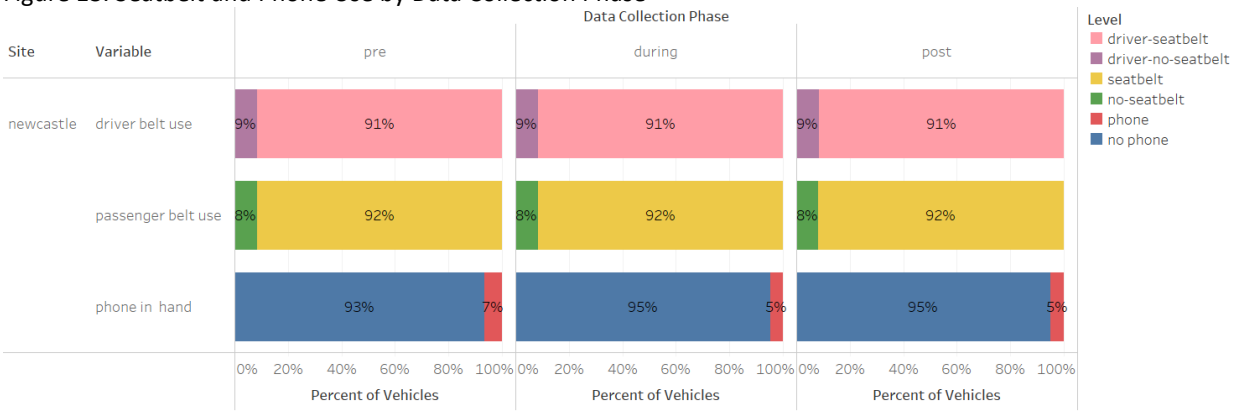
Table 2. Percentage Point Changes in Speeding by Data Collection Phase

Site	Variable	Level	Percent of Vehicles			Percentage Point Difference from Pre		
			pre	during	post	pre	during	post
newcastle	any speeding	yes	26.2%	16.5%	16.0%	0.0%	-9.7%	-10.3%
	speeding 10+ MPH	yes	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	speeding category	1-4 MPH above	25.6%	16.4%	15.9%	0.0%	-9.2%	-9.8%
		5-9 MPH above	0.6%	0.1%	0.1%	0.0%	-0.5%	-0.5%
		>= 10+ MPH	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
		at/below speed limit	73.8%	83.5%	84.0%	0.0%	9.7%	10.3%

Changes in safe driving behaviors

Figure 13 summarizes seatbelt and phone use by data collection phase. Driver and passenger seatbelt use did not change across the three data collection periods, remaining at 91% for drivers and 92% for front passengers. The percentages of seatbelt usage detected was less than the WSTC provided county-level seat belt use rate for 2023 of 94% from the WTSC Statewide Survey and 95.5% from a statewide observational study.

Figure 13. Seatbelt and Phone Use by Data Collection Phase



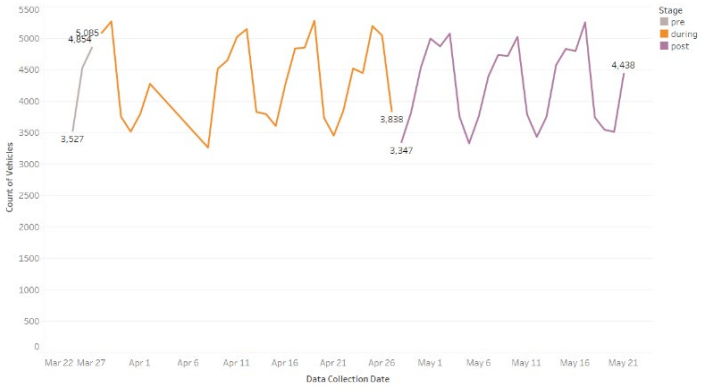
The percentage of vehicles where phone in hand was not detected for the driver ranged between 93% at pre, to 95% at both during and post sign deployment. As a result, the observed percentage point difference from pre signage deployment was 2% or less during and post deployment (Table 3).

Table 3. Percentage Point Changes in Seatbelt Use and Phone in Hand by Data Collection Phase

			Percent of Vehicles			Percentage Point Difference from Pre		
Site	Variable	Level	pre	during	post	pre	during	post
newcastle	driver belt use	driver-seatbelt	91.4%	91.5%	91.4%	0.0%	0.1%	0.0%
	passenger belt use	seatbelt	91.6%	91.5%	91.9%	0.0%	-0.1%	0.3%
	phone in hand	no phone	93.4%	95.4%	94.8%	0.0%	2.0%	1.4%

Pacific Data Summary

Figure 9. Vehicle Count by Data Collection Phase and Duration in Days



There were 53 days of data collection at the Pacific location spanning the period: March 25-March 27 (three days pre deployment), March 28 –April 27, 2024 (26 days during deployment), and April 28 – May 21, 2024 (24 days post deployment). Figure 9 summarizes the vehicle count by data collection phase and duration in days. This site had the shortest duration of data collection, three weekdays, before the smart sign was activated. Although the length of data collection during sign deployment was lower than the all-site average of 27.1 days, the duration of data collection post deployment was the longest among the 12 sites and exceed the all-site average of 14.3 days. The contractor noted that data records were lost between April 3-April 8, 2024. Target Zero Program staff noted and relayed to contractor that sign was not triggering for phone or seatbelt use on afternoon of April 5, 2024.

Of note, the proposed location for the feedback sign was heading south towards the elementary school; however, due to equipment and technology needs the contractor placed the driver feedback sign facing northbound.

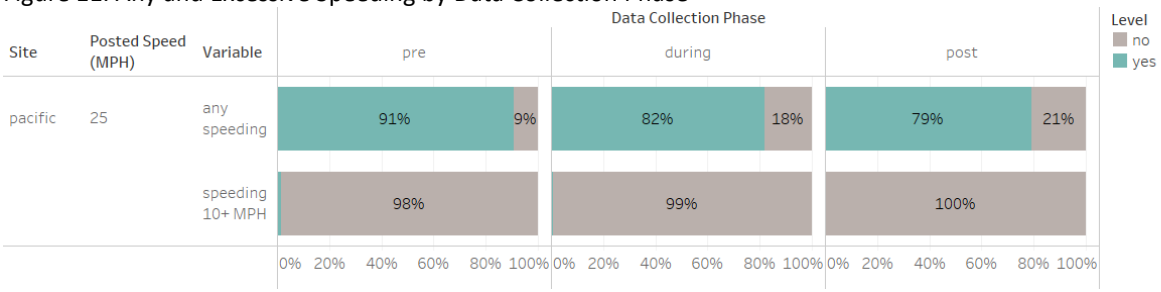
Changes in vehicle speed

Figure 10 summarizes changes in average and 85th percentile speeds by data collection phase. Across the three data collection phases, both mean and 85th percentile speed decreased by one MPH in the during and post sign deployment phases compared to pre sign deployment. At the Pacific site, measured vehicle minimum speed decreased from 17 MPH to 15 MPH during and remained at 15 MPH post deployment. Maximum measured vehicle speed fluctuated between 43 MPH pre, to 40 MPH during and 41 MPH post sign deployment.

Figure 10. Average and 85th Percentile Speeds by Data Collection Phase

When compared to the posted roadway speed limit of 25 MPH, most motorists were not traveling ≥10 MPH above the posted limit in any of the data collection phases (Figure 11). Specifically, at pre sign deployment, 98% of vehicles passing through the Pacific site were not traveling ≥10 MPH above the posted limit, while during and post sign deployments the percentage increased to 99% and 100% of vehicles, respectively. The percent of vehicles traveling any speed above the 25 MPH posted limit steadily decreased across the data collection phases: 91% at pre, 82% during, and 79% post deployment of the dynamic feedback sign (Figure 11).

Figure 11. Any and Excessive Speeding by Data Collection Phase



There was a shift in the percent of vehicle speeds from the category of 5-9 MPH above the posted roadway limit to 1-4 MPH above the posted limited comparing during and post to pre deployment (Figure 12). There were small gains in the proportion of vehicles traveling at or below the speed limit across the data collection time periods, doubling from 9% at pre to 18% during the period the sign was in operation to 21% after the sign was removed.

Figure 12. Speeding Categories by Data Collection Phase

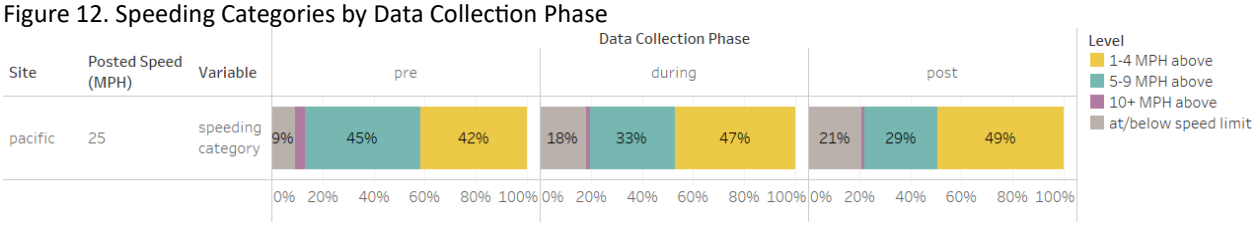


Table 2 below shows the absolute, as percentage point, changes from pre deployment levels in percent of vehicles speeding defined as two or four categories. Of note, there were a small number of vehicles traveling ≥ 10 MPH above the posted limit of 25 MPH pre sign deployment. Further reductions in the during and post deployment periods can result in large percent change values relative to pre deployment levels.

Table 2. Percentage Point Changes in Speeding by Data Collection Phase

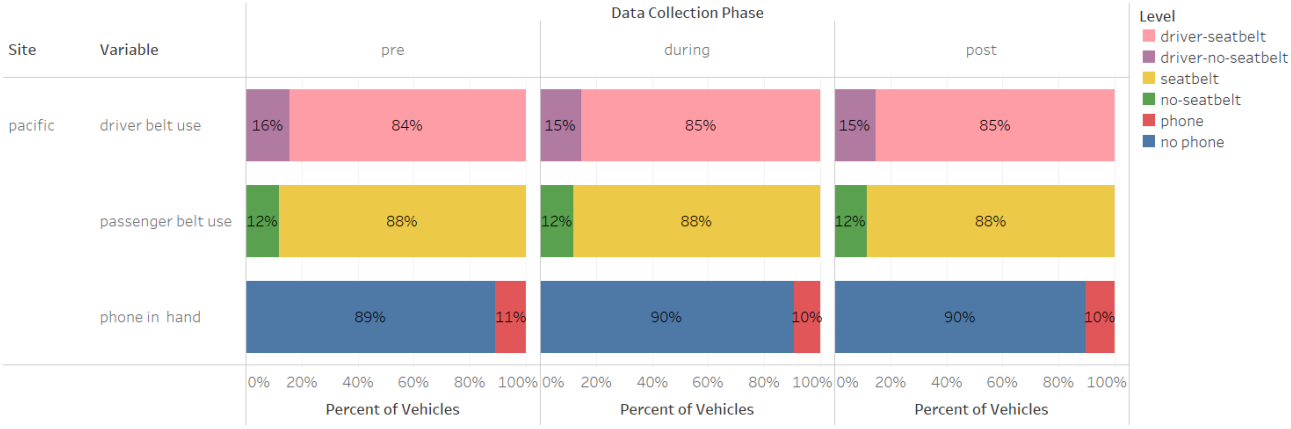
Site	Variable	Level	Percent of Vehicles			Percentage Point Difference from Pre		
			pre	during	post	pre	during	post
pacific	any speeding	yes	90.8%	81.7%	79.1%	0.0%	-9.1%	-11.7%
	speeding 10+ MPH	yes	1.7%	0.6%	0.3%	0.0%	-1.1%	-1.3%
	speeding category	1-4 MPH above	41.7%	47.2%	49.4%	0.0%	5.5%	7.7%
		5-9 MPH above	45.0%	33.0%	28.8%	0.0%	-12.1%	-16.3%
		>= 10+ MPH	4.1%	1.5%	1.0%	0.0%	-2.5%	-3.1%
		at/below speed limit	9.2%	18.3%	20.9%	0.0%	9.1%	11.7%

Changes in driver safe behaviors

Figure 13 summarizes seatbelt and phone use by data collection phase. The percent of vehicles with driver seatbelt use, among detected vehicles, remained consistent across the data collection phases at 84% pre and 85% during and post sign deployment. Front passenger seat belt use was also constant at 88% across all phases of data collection. The percentages of seat belt usage detected was less than the

WSTC provided county-level seatbelt use rate for 2023 of 94% from the WTSC Statewide Survey and 95.5% from a statewide observational study.

Figure 13. Seatbelt and Phone Use by Data Collection Phase



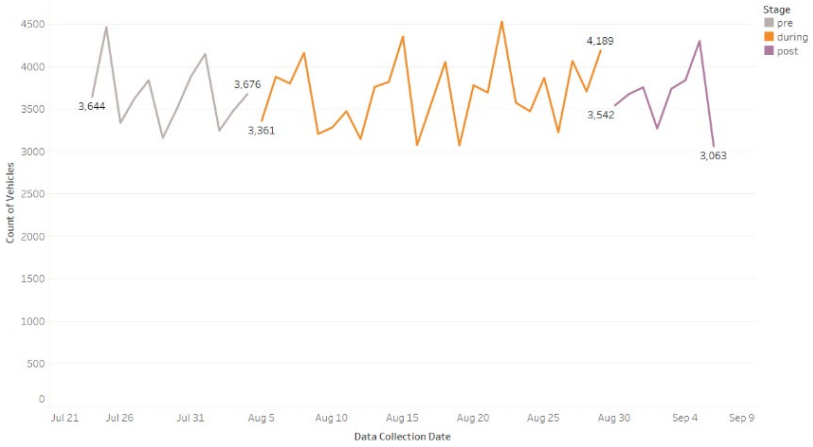
Phone in hand of driver was not detected among a similar percentage of vehicles across all data collection phases: 89% pre and 90% for both during and post sign deployment. As a result, the observed percentage point difference from pre signage deployment level was 1.6% or less during and post deployment (Table 3).

Table 3. Percentage Point Changes in Seatbelt Use and Phone in Hand by Data Collection Phase

			Percent of Vehicles			Percentage Point Difference from Pre		
Site	Variable	Level	pre	during	post	pre	during	post
pacific	driver belt use	driver-seatbelt	84.3%	85.3%	85.3%	0.0%	1.0%	1.0%
	passenger belt use	seatbelt	88.0%	88.1%	88.4%	0.0%	0.2%	0.4%
	phone in hand	no phone	88.9%	90.5%	89.7%	0.0%	1.6%	0.8%

Seattle – Rainier Ave S. Data Summary

Figure 9. Vehicle Count by Data Collection Phase and Duration in Days

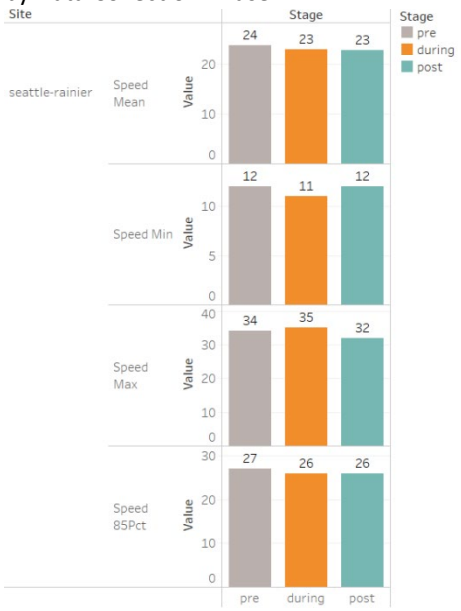


Data collection at the Seattle-Rainier Ave S. location lasted 45 days covering the period: July 24 – August 4, 2024 (12 days pre deployment); Aug 5 – Aug 29, 2024 (25 days during deployment), and Aug 30 – Sept 6, 2024 (8 days post deployment). Figure 9 summarizes the vehicle count by data collection phase and duration in days. The length of data collection for each phase was less than the all-sites average: 15.5 days pre, 27.1 days during, and 14.3 days post. Additionally, the Seattle-Rainier Ave S. location was among the group of sites including Kenmore, Newcastle, and Skyway-Renton Ave S., with the shortest duration of post deployment data collection.

Changes in vehicle speed

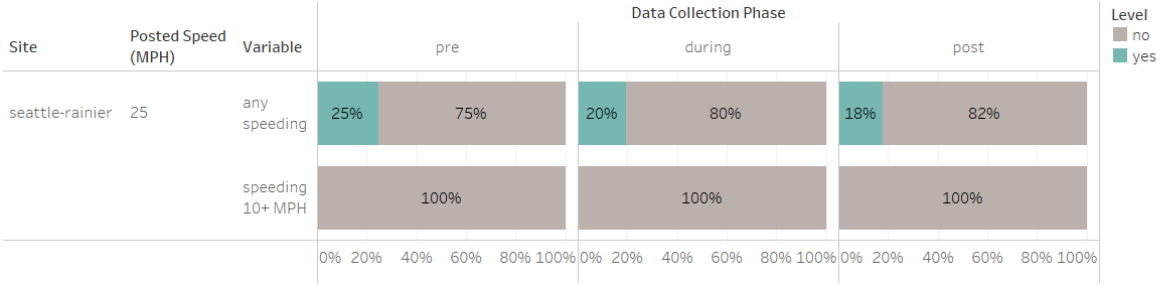
Figure 10 summarizes changes in average and 85th percentile speeds by data collection phase. Changes in average speed and 85th percentile speed decreased by one MPH during post, compared to pre sign deployment for vehicles traveling through the Seattle-Rainier Ave S. location. Mean speed at pre was 24 MPH compared to 23 MPH, for each of the during and post deployment phases. The 85th percentile speed decreased from 27 MPH pre to 26 MPH for both during and post data collection phases. Measured minimum vehicle speed fluctuated between 12 MPH pre to 11 MPH during and back to 12 MPH post deployment. Maximum vehicle speed measured was 34 MPH pre, 35 MPH during, and 32 MPH post deployment.

Figure 10. Average and 85th Percentile Speeds by Data Collection Phase



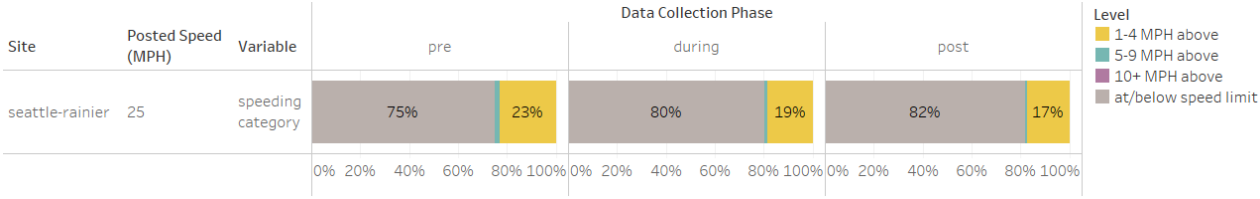
Compared to the posted roadway limit of 25 MPH no vehicles were measured traveling ≥10 MPH above the posted roadway limit (Figure 11). However, 25% of vehicles at pre sign deployment were traveling at any speed above the posted 25 MPH posted roadway limit compared to 20% during and 18% post sign deployment (Figure 11).

Figure 11. Any and Excessive Speeding by Data Collection Phase



There were shifts in speeding categories with gains in the percent of vehicles traveling at or below the posted roadway limit: 75% pre, 80% during, and 82% post deployment of smart sign (Figure 12).

Figure 12. Speeding Categories by Data Collection Phase



There was a reduction in the precent of vehicles traveling 1-4 MPH above the posted roadway limit of 25 MPH during and post sign deployment with 23% of vehicles measured at pre compared to 19% and 17% of vehicles during and post, respectively.

Table 2 below shows the absolute, as percentage point, changes from pre deployment levels in percent of vehicles speeding defined as two or four categories. Of note, there were no vehicles traveling ≥ 10 MPH above the posted limit of 25 MPH at the Seattle-Rainier Ave S. site in any of the data collection phases. There was a very small number of vehicles traveling at speeds of 5-9 MPH over the posted limit of 25 MPH pre deployment, and further reductions during and post deployment periods can result in large percent change values relative to pre deployment levels. The absolute difference was around 1 percentage point.

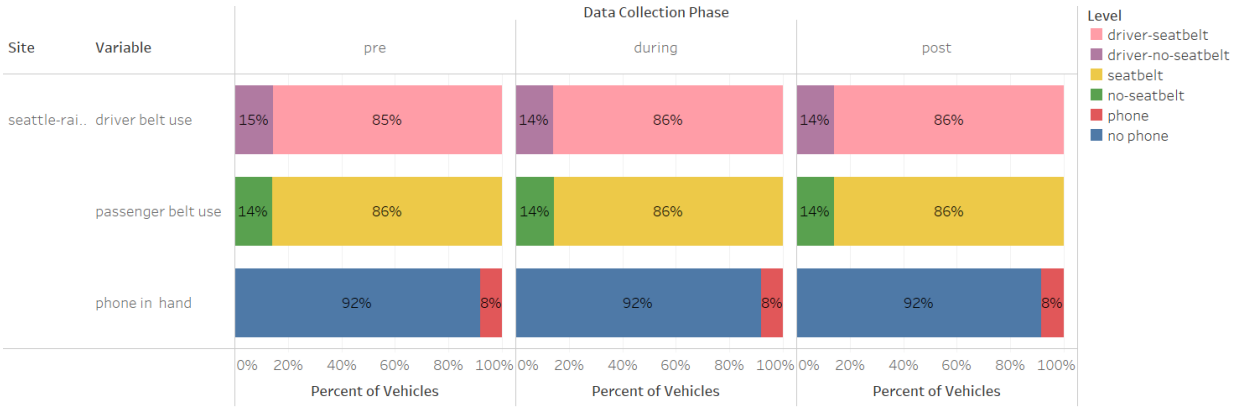
Table 2. Percentage Point Changes in Speeding by Data Collection Phase

Site	Variable	Level	Percent of Vehicles			Percentage Point Difference from Pre		
			pre	during	post	pre	during	post
seattle-rainier	any speeding	yes	24.8%	19.5%	18.0%	0.0%	-5.3%	-6.9%
	speeding 10+ MPH	yes	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	speeding category	1-4 MPH above	23.2%	18.7%	17.4%	0.0%	-4.5%	-5.7%
		5-9 MPH above	1.7%	0.8%	0.5%	0.0%	-0.9%	-1.2%
		>= 10+ MPH	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
		at/below speed limit	75.2%	80.5%	82.0%	0.0%	5.3%	6.9%

Changers in driver safe behaviors

There was marginal increase in the percent of vehicles with a belted driver across the data collection phases: 85% pre compared to 86% each during and post sign deployment (Figure 13). Among vehicles with a front passenger, the percent of seatbelt use by the front passenger was constant across the three data collection phases at 86%. The percentages of seatbelt usage detected was less than the WSTC provided King County wide seat belt use rate for 2023 of 94% from the WTSC Statewide Survey and 95.5% from a statewide observational study.

Figure 13. Seatbelt and Phone Use by Data Collection Phase



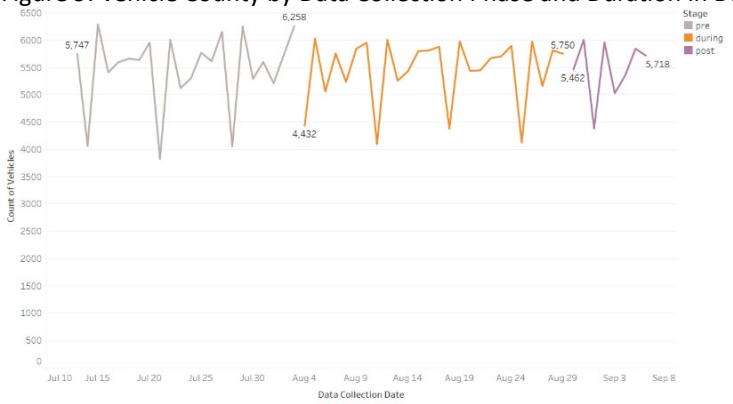
The percent of vehicles where driver phone in hand was not detected also remained constant at 92% across the data collection periods for vehicles traveling through the Seattle-Rainier Ave S. site. As a result, the observed percentage point difference from pre signage deployment level was less than 1% (Table 3).

Table 3. Percentage Point Changes in Seatbelt Use and Phone in Hand by Data Collection Phase

			Percent of Vehicles			Percentage Point Difference from Pre		
Site	Variable	Level	pre	during	post	pre	during	post
seattle-rainier	driver belt use	driver-seatbelt	85.4%	85.9%	85.9%	0.0%	0.4%	0.5%
	passenger belt use	seatbelt	85.9%	85.6%	86.0%	0.0%	-0.3%	0.1%
	phone in hand	no phone	91.8%	91.8%	91.7%	0.0%	0.0%	-0.1%

Skyway – Renton Ave S. Data Summary

Figure 9. Vehicle County by Data Collection Phase and Duration in Days



The Skyway-Renton Ave S. location had a total of 56 days of data collection covering the period: July 13 – August 3, 2024 (22 days pre deployment), August 4 – August 29, 2024 (26 days during deployment) and August 30 – September 6, 2024 (8 days post deployment). Figure 9 summarizes the vehicle count by data collection phase and duration in days. The duration of data collection was higher than the all-sites average for pre smart sign deployment but less than the all-sites average for data collection length during deployment. The length of data collection post sign deployment tied with Kenmore, Newcastle, and Seattle-Rainier Ave S. sites for the short period of data collection at 8 days (compared to the all-sites average of 14.3 days).

Changes in vehicle speed

Figure 10. Average and 85th Percentile Speeds by Data Collection Phase

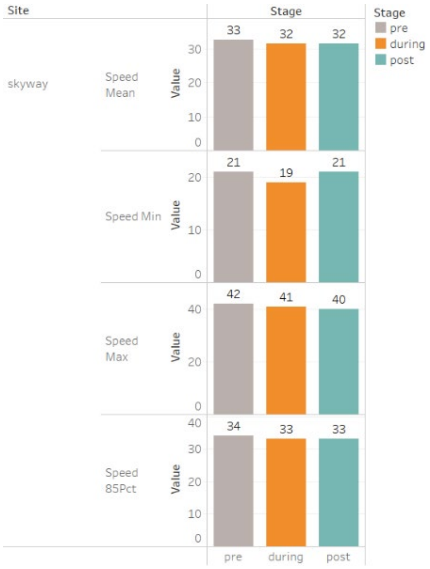
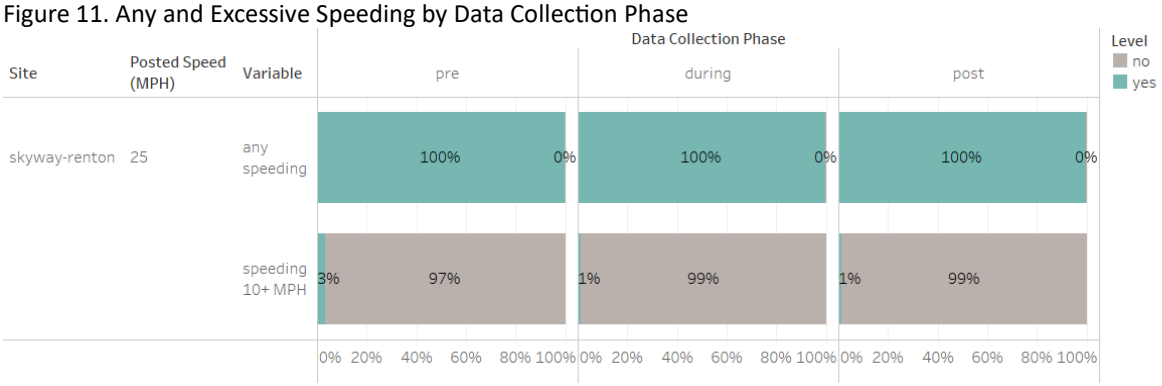


Figure 10 summarizes changes in average and 85th percentile speeds by data collection phase. At the Skyway-Renton Ave S. location, the mean and 85th percentile speed decreased marginally during and post deployment of the smart sign. Mean speed decreased from 33 MPH at pre to 32 MPH for both during and post deployment phases. Similarly, the 85th percentile speed decreased from 34 MPH to 33 MPH for both during and post sign deployment. Minimum measured vehicle speed fluctuated between 21 MPH pre, lowering to 19 MPH during and rising to 21 MPH post deployment. The measured maximum vehicle speed was similar across the data collection phases: 42 MPH at pre, 41 MPH during, and 40 MPH at post sign deployment.

In general, vehicles were traveling above the posted 25 MPH roadway limit across all three data collection phases at the Skyway-Renton Ave S. location, however, the percent of vehicles traveling ≥10 MPH above the posted limit was low: 3% at pre compared to 1% each during and post sign deployment (Figure 11).

Figure 11. Any and Excessive Speeding by Data Collection Phase



Although the percent of vehicles traveling 5-9 MPH above the roadway limit remained steady across the data collection phases, the percent of vehicles travelling 1-4 MPH above the posted roadway limit (yellow portion of the bars) increased from 5% at pre to 10% each during and post deployment (Figure 12).

Figure 12. Speeding Categories by Data Collection Phase

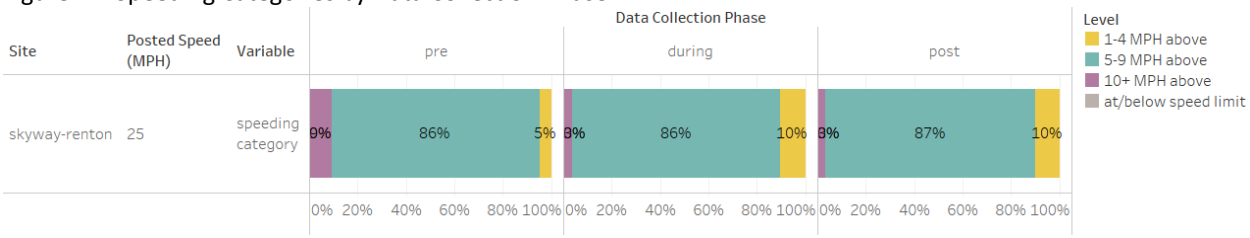


Table 2 shows the absolute, as percentage point changes from pre deployment levels in percent of vehicles speeding defined as two or four categories. Of note, there were a small percent of vehicles traveling ≥ 10 MPH above the posted limit of 25 MPH at the Skway-Renton Ave S. across the data collection phases. As a result, reductions during and post deployment periods can result in large percent change values relative to pre deployment levels. The largest absolute difference was 2 percentage points.

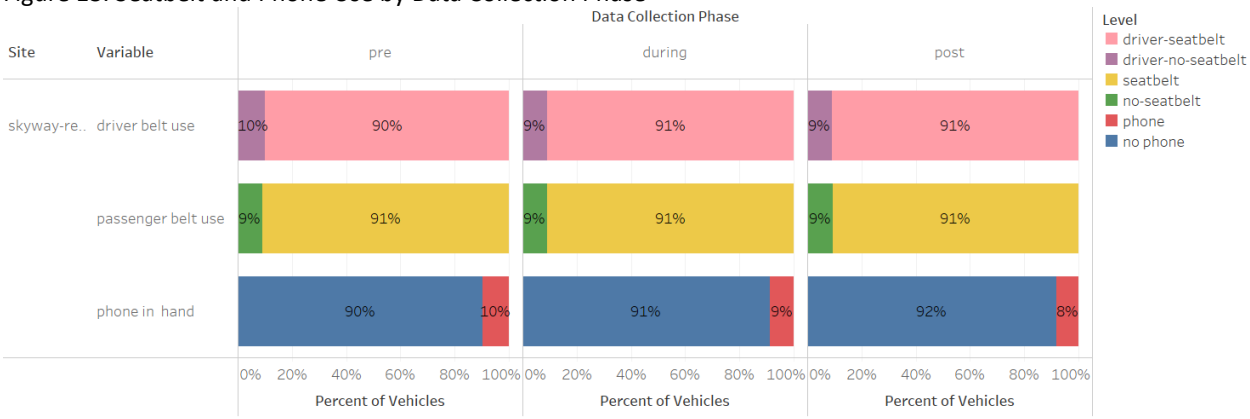
Table 2. Percentage Point Changes in Speeding by Data Collection Phase

			Percent of Vehicles			Percentage Point Difference from Pre		
Site	Variable	Level	pre	during	post	pre	during	post
skyway-renton	any speeding	yes	99.8%	99.7%	99.7%	0.0%	-0.2%	-0.1%
	speeding 10+ MPH	yes	3.2%	1.2%	1.2%	0.0%	-2.0%	-2.0%
	speeding category	1-4 MPH above	4.9%	10.2%	9.9%	0.0%	5.4%	5.0%
		5-9 MPH above	85.7%	86.2%	86.7%	0.0%	0.5%	1.0%
		>= 10+ MPH	9.2%	3.2%	3.1%	0.0%	-6.0%	-6.1%
		at/below speed limit	0.2%	0.3%	0.3%	0.0%	0.2%	0.1%

Changes in driver safe behaviors

Figure 13 summarizes seatbelt and phone use by data collection phase. Driver seatbelt use was not markedly changed during or post, compared to pre, sign deployment: 90% pre and 91% each during and post. Front passenger seat belt use was constant across the data collection phases at 91%. The percentages of seat belt usage detected was less than the WSTC provided county-level seat belt use rate for 2023 of 94% from the WTSC Statewide Survey and 95.5% from a statewide observational study.

Figure 13. Seatbelt and Phone Use by Data Collection Phase



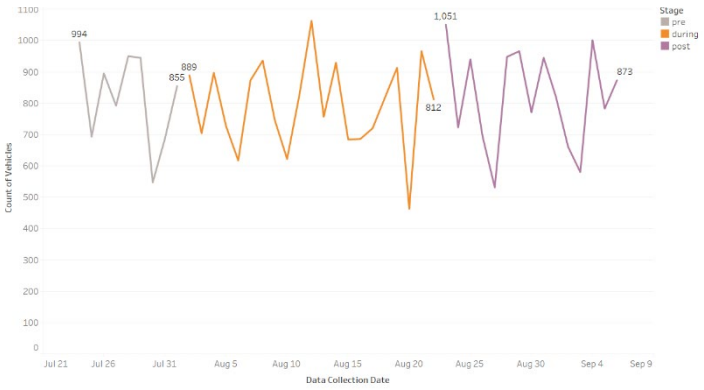
The percent of vehicles with driver no phone in hand detected was also consistent at 90% pre, 91% during and 92% post deployment of smart sign. As a result, the observed percentage point difference from pre signage deployment level was 1.5% for the during and post deployment phases (Table 3).

Table 3. Percentage Point Changes in Seatbelt Use and Phone in Hand by Data Collection Phase

			Percent of Vehicles			Percentage Point Difference from Pre		
Site	Variable	Level	pre	during	post	pre	during	post
skyway-renton	driver belt use	driver-seatbelt	90.1%	91.0%	90.9%	0.0%	0.8%	0.8%
	passenger belt use	seatbelt	90.9%	90.8%	90.6%	0.0%	-0.1%	-0.4%
	phone in hand	no phone	90.3%	91.3%	91.8%	0.0%	1.0%	1.5%

Skyway-Beacon Ave S. Data Summary

Figure 9. Vehicle Count by Data Collection Phase and Duration in Days



Data collection at the Skyway-Beacon Ave S. location spanned 45 days total over the period: July 24 – August 1, 2024 (9-day pre deployment), August 2 – August 22, 2024 (21 days during deployment) and August 23 – September 6, 2024 (15 days post deployment). Figure 9 summarizes the vehicle count by data collection phase and duration in days. Of all the sites, the Skyway-Beacon Ave S. location had the second shortest length of smart sign deployment and the third shortest duration of pre sign deployment data collection. For these two data collection phases the duration was less than the all-sites average of 27.1 days during and 15.5 days pre deployment. The length of data collection post deployment was marginally higher than the average for all site (15 days vs. 14.3 days). The contractor noted that the Skyway-Beacon Ave S. location had a longer straight away and more safe locations to put the sign. Additionally, the sign was near a school zone and cars were slowing down as they approach the school zone.

Changes in vehicle speed

Figure 10. Average and 85th Percentile Speeds by Data Collection Phase

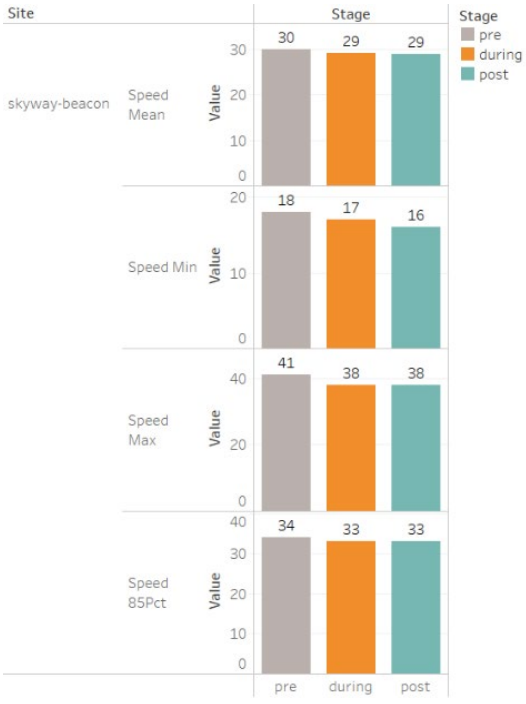
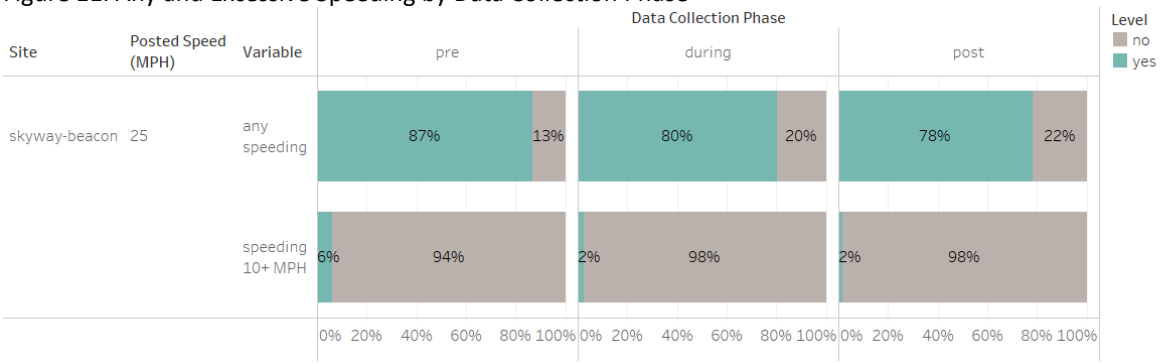


Figure 10 summarizes changes in average and 85th percentile speeds by data collection phase. The mean speed was similar across the three data collection phases with speeds of 29 MPH during and post sign deployment compared with 30 MPH pre deployment. There was also a similar pattern in 85th percentile speed with speeds of 33 MPH during and post sign deployment compared to 34 MPH pre deployment. There was a sequential decrease in measured minimum vehicle speed across data collection periods: 18 MPH pre, 17 MPH during and 16 MPH post deployment. Measured maximum vehicle speed at the Skyway-Beacon Ave S. location deceased from 41 MPH pre to 38 MPH during and remained at this speed post deployment.

Compared to the posted roadway limit of 25 MPH, 94% of vehicles during the pre-deployment phase were not traveling at speeds ≥10 MPH above the posted limit (Figure 11). The percent of vehicles not traveling ≥10 MPH above the roadway limit increased to 98% each during and post sign deployment phases from 94% during the pre. Alternatively, the percent of vehicles traveling any speed above the posted limit of 25 MPH decreased from 87% pre to 80% during and 78% post sign deployment (Figure 11).

Figure 11. Any and Excessive Speeding by Data Collection Phase



When looking at incremental categories of speeding, there were shifts in the percent of vehicles traveling 5-9 MPH above the roadway limit – from 34% pre to 33% each during and post deployment of smart signs (Figure 12). The proportion of vehicles traveling at or below the posted roadway limit of 25 MPH increased across the data collection phases from 13% pre to 20% during and 22% post deployment. Notably, the percent of vehicles traveling ≥10 MPH above the roadway limit decreased from 13% at pre to 7% during and 6% post sign deployment.

Figure 12. Speeding Categories by Data Collection Phase

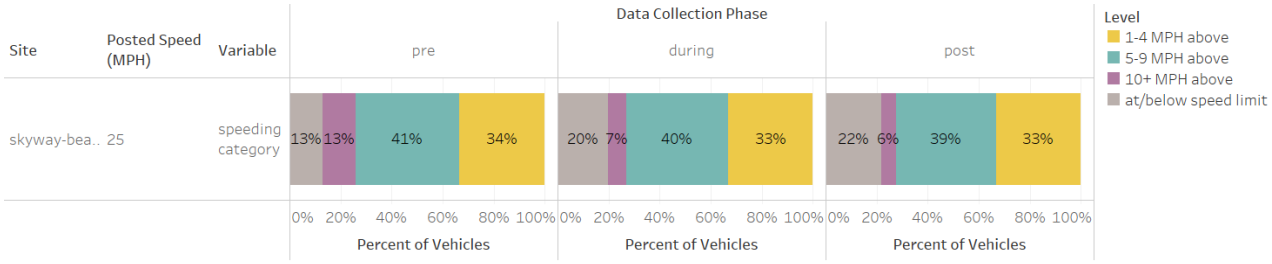


Table 2 below shows the absolute, as percentage point changes from pre deployment levels in percent of vehicles speeding defined as two or four categories. Of note, a small percent of vehicles traveled ≥ 10 MPH above the posted limit of 25 MPH at the Skyway-Beacon Ave S. site pre sign deployment. Further reductions during and post deployment periods can result in large percent change values relative to pre deployment levels. The absolute difference was a reduction of 5.7 and 7.0 percentage points respectively.

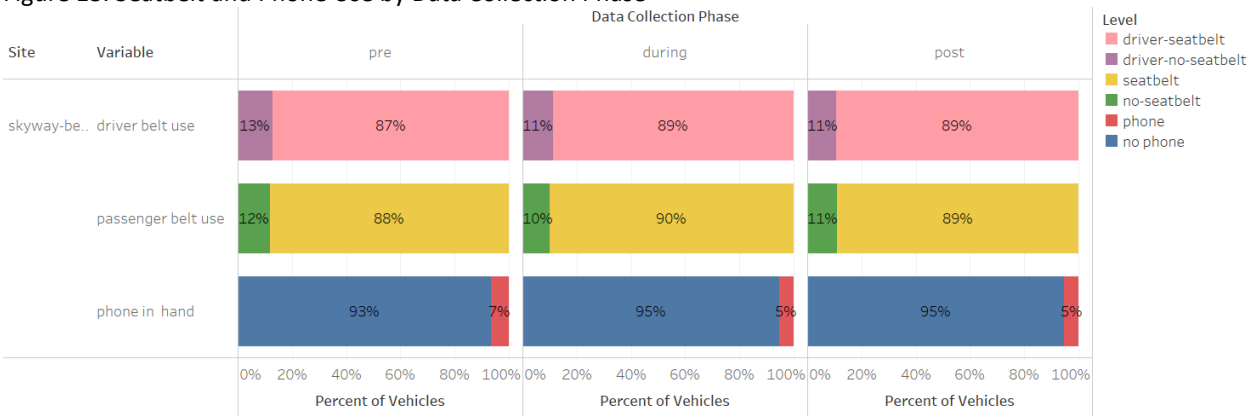
Table 2. Percentage Point Changes in Speeding by Data Collection Phase

			Percent of Vehicles			Percentage Point Difference from Pre		
Site	Variable	Level	pre	during	post	pre	during	post
skyway-beacon	any speeding	yes	86.9%	80.2%	78.2%	0.0%	-6.7%	-8.7%
	speeding 10+ MPH	yes	6.0%	2.4%	1.7%	0.0%	-3.6%	-4.3%
	speeding category	1-4 MPH above	33.5%	33.3%	33.2%	0.0%	-0.2%	-0.3%
		5-9 MPH above	40.5%	39.7%	39.1%	0.0%	-0.8%	-1.4%
		>= 10+ MPH	12.9%	7.2%	5.9%	0.0%	-5.7%	-7.0%
		at/below speed limit	13.1%	19.8%	21.8%	0.0%	6.7%	8.7%

Changes in driver safe behaviors

Figure 13 summarizes seatbelt and phone use by data collection phase. There were small increases in percent of vehicles where driver was belted ranging from 87% pre to 89% each during and post sign deployment phases. There were also some fluctuations in the percent of vehicles with a belted front passenger, among vehicles with a front passenger, ranging from 88% pre to 90% during and 89% post sign deployment. The percentages of seatbelt usage detected was less than the WSTC provided county-level seat belt use rate for 2023 of 94% from the WTSC Statewide Survey and 95.5% from a statewide observational study. The percent of vehicles with no phone detected in a driver's hand was slightly higher during and post sign deployment (both 95% versus 93% of vehicles pre deployment).

Figure 13. Seatbelt and Phone Use by Data Collection Phase



Given these small changes, the observed percentage point difference from pre signage deployment level was 2% or less during and post deployment (Table 3).

Table 3. Percentage Point Changes in Seatbelt Use and Phone in Hand by Data Collection Phase

			Percent of Vehicles			Percentage Point Difference from Pre		
Site	Variable	Level	pre	during	post	pre	during	post
skyway-beacon	driver belt use	driver-seatbelt	87.3%	88.6%	89.3%	0.0%	1.3%	2.0%
	passenger belt use	seatbelt	88.0%	89.9%	89.1%	0.0%	1.9%	1.1%
	phone in hand	no phone	93.4%	94.7%	94.5%	0.0%	1.2%	1.1%

Appendix A: Distracted Driving Signage Placement: Equity Criteria Matrix

Criteria	Location #1	Location #2	Location #3
Address/Intersection/To-From			
City/Unincorporated			
Traffic Volume (ADT)			
Posted Speed Limit (MPH)			
Mean Road Speed (MPH)			
Describe Road Features (short description)			
Road Features (curved, straight, hills, etc.)			
Impact Level (high (3), medium (2), low (1)) [see below definitions]			
Percent Below the Poverty Line (<25% (1), 25-50% (2), >50% (3))			
Percent on free and reduced lunches (<25% (1), 25-50% (2), >50% (3))			
Community Buy In (Yes (3), maybe (2), not sure (1))			
Percent English as a Second Language (<25% (1), 25-50% (2), >50% (3))			
Percent Communities of Color (<25% (1), 25-50% (2), >50% (3))			
Previous Fatalities on Roadway in Last 5 years (none (1), 1-3 (2), >3 (3))			
Previous Serious Injuries on Roadway in Last 5 Years (none (1), 1-5 (2), >5 (3))			
Community Identified as Concern (Yes (3), Somewhat (2), No (1))			
Lighting Conditions (adequate street lighting (1), limited street lighting (2), no streetlights (3))			
Roadway on/near tribal lands (Yes, add 2 points)			
General Comments			
Total Score =	0	0	0

High Impact: School Zone, entering business/main street districts, entering pedestrian zones, work zones, near public transit/stops
Medium Impact: secondary roads connecting neighborhoods, rural straight aways
Low impact: multi-lane roads
Top Score = 27

Appendix B: Additional Data

Data collection duration varied across the 12 sites and phases (Figure B1 bars left show duration by site, bars right vehicle volume detected).

Figure B1. Duration of Data Collection and Vehicle Count by Site and Phase – King County, WA, Mar 14 – Sept 6, 2024

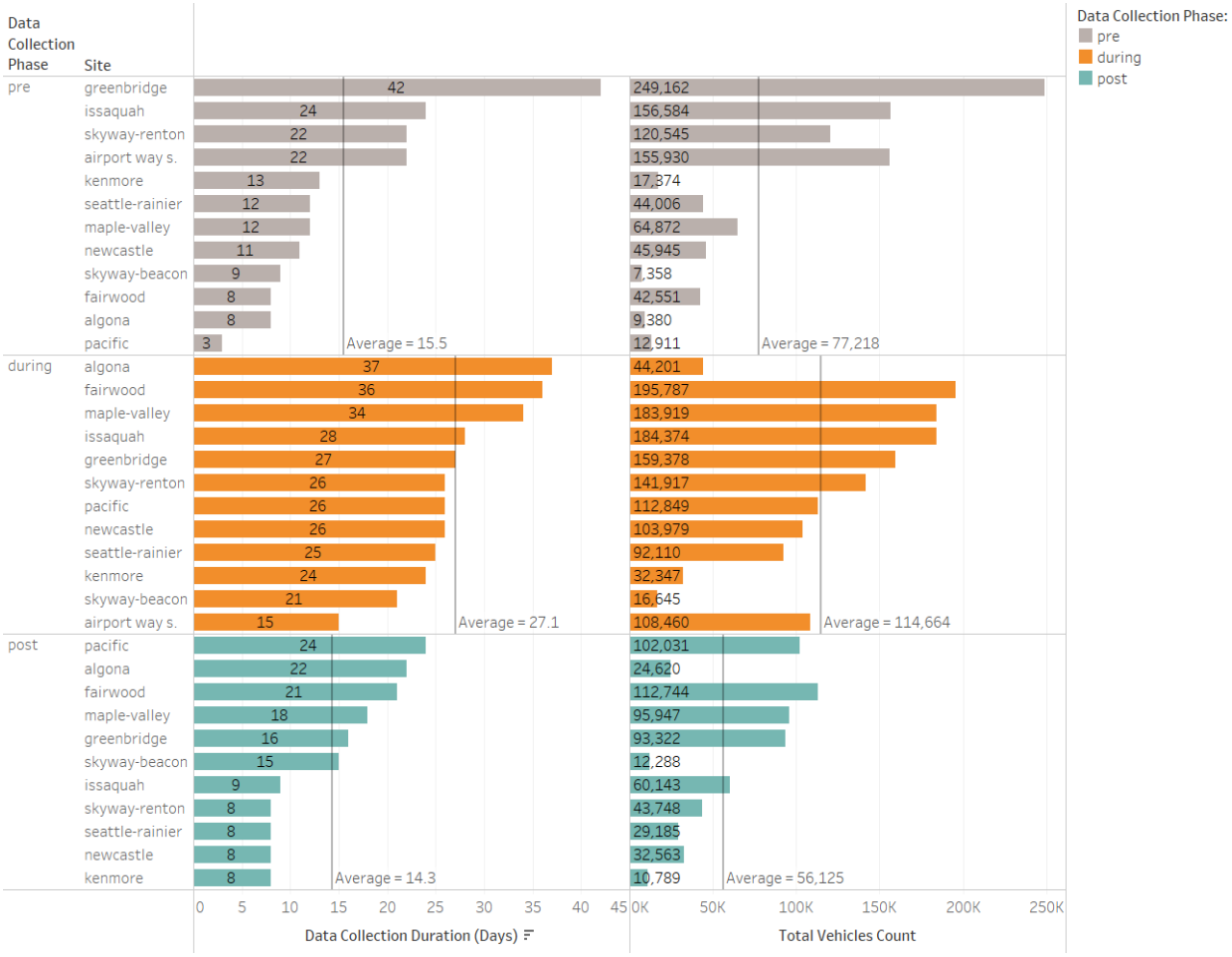


Figure B2. Data Collection Days by Phase and Site Location – King County, WA, Mar 14 – Sept 6, 2024

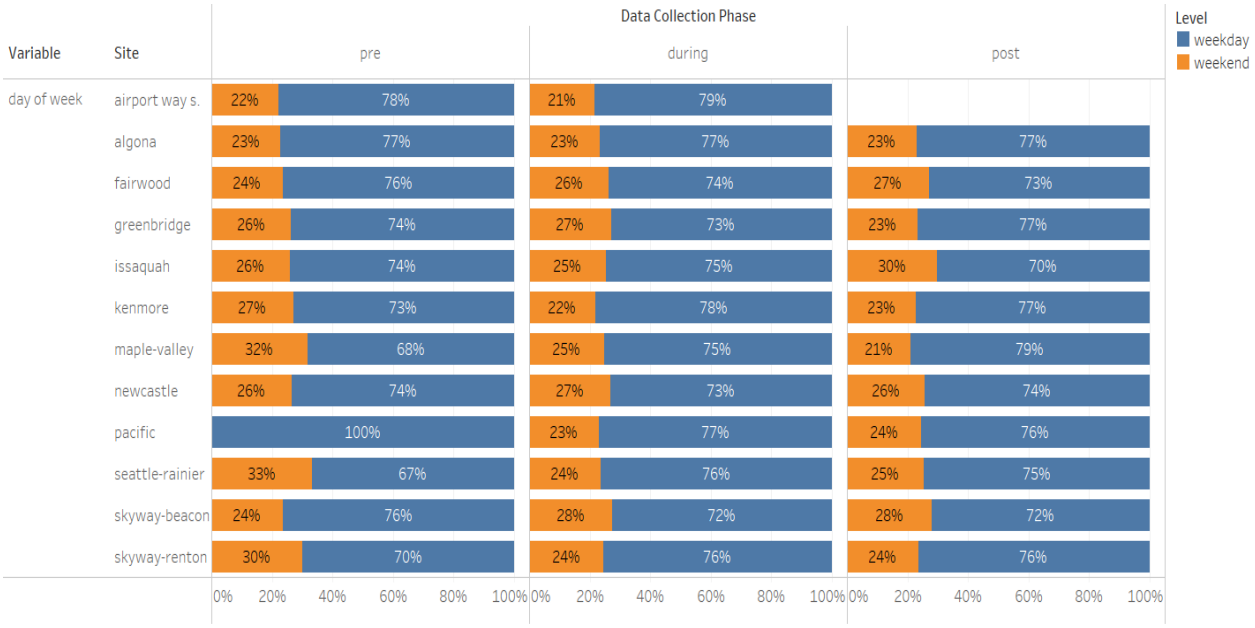
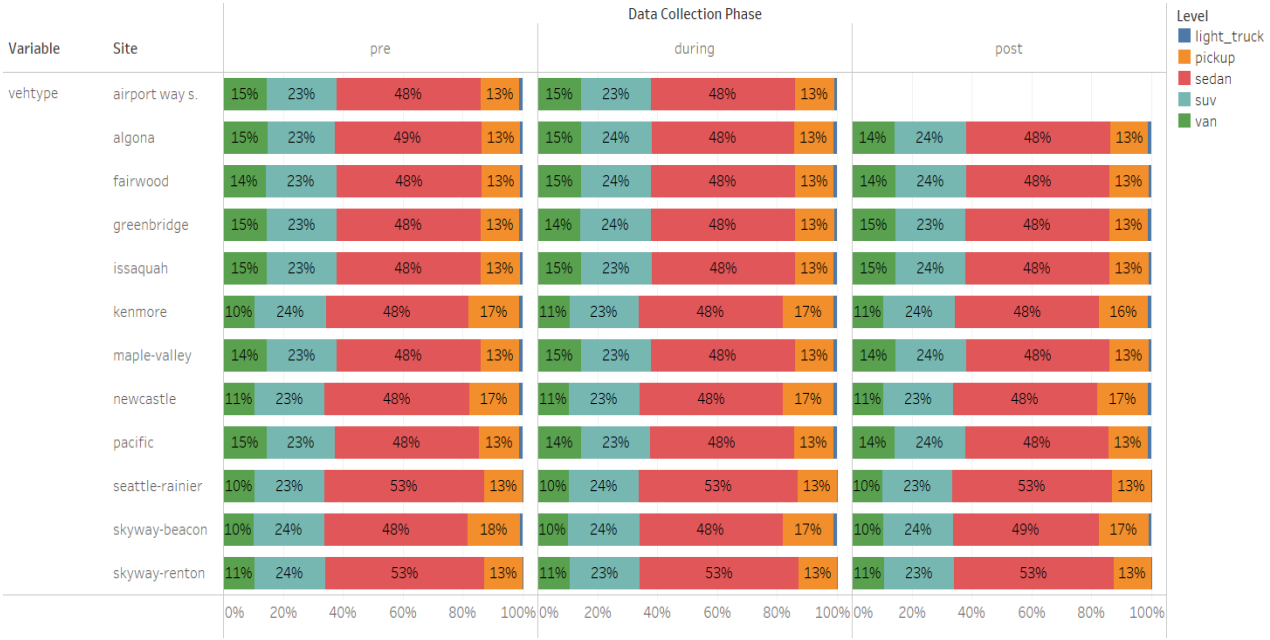


Figure B3. Site-Specific Vehicle Volume by Day of Week and Data Collection Phase – King County, WA

Figure B4. Vehicle Types by Site and Data Collection Phase – King County, WA, Mar 14 – Sept 6, 2024



The following tables corresponds to Figure 6-8 respectively in the report.

Table B1. Percentage Point Change in Driver Seat Belt Use by Site and Data Collection Phase

Variable	Level	Site	Percent of Vehicles			Percentage Point Difference from Pre		
			pre	during	post	pre	during	post
driver belt use	driver-seatbelt	airport way s.	86%	86%		0%	0%	-86%
		algona	89%	90%	90%	0%	0%	1%
		fairwood	89%	90%	90%	0%	1%	1%
		greenbridge	88%	88%	88%	0%	0%	0%
		issaquah	88%	89%	89%	0%	1%	2%
		kenmore	86%	86%	86%	0%	0%	1%
		maple-valley	89%	90%	89%	0%	1%	1%
		newcastle	91%	91%	91%	0%	0%	0%
		pacific	84%	85%	85%	0%	1%	1%
		seattle-rainier	85%	86%	86%	0%	0%	0%
		skyway-beacon	87%	89%	89%	0%	1%	2%
		skyway-renton	90%	91%	91%	0%	1%	1%

Table B2. Percentage Point Change in Front Passenger Belted by Site and Data Collection Phase

Variable	Level	Site	Percent of Vehicles			Percentage Point Difference from Pre		
			pre	during	post	pre	during	post
passenger belt use	seatbelt	airport way s.	87%	87%		0%	0%	-87%
		algona	91%	89%	90%	0%	-1%	-1%
		fairwood	89%	89%	89%	0%	0%	0%
		greenbridge	91%	91%	91%	0%	0%	0%
		issaquah	85%	86%	86%	0%	1%	1%
		kenmore	87%	87%	86%	0%	0%	-1%
		maple-valley	89%	89%	89%	0%	0%	0%
		newcastle	92%	92%	92%	0%	0%	0%
		pacific	88%	88%	88%	0%	0%	0%
		seattle-rainier	86%	86%	86%	0%	0%	0%
		skyway-beacon	88%	90%	89%	0%	2%	1%
		skyway-renton	91%	91%	91%	0%	0%	0%

Table B3. Percentage Point Change in Driver no Phone in Hand by Site and Data Collection Phase

Variable	Level	Site	Percent of Vehicles			Percentage Point Difference from Pre		
			pre	during	post	pre	during	post
phone in hand	no phone	airport way s.	88%	90%		0%	2%	-88%
		algona	90%	91%	90%	0%	1%	0%
		fairwood	90%	91%	90%	0%	1%	0%
		greenbridge	90%	91%	91%	0%	1%	1%
		issaquah	89%	93%	93%	0%	3%	4%
		kenmore	93%	94%	94%	0%	1%	1%
		maple-valley	90%	92%	91%	0%	2%	2%
		newcastle	93%	95%	95%	0%	2%	1%
		pacific	89%	90%	90%	0%	2%	1%
		seattle-rainier	92%	92%	92%	0%	0%	0%
		skyway-beacon	93%	95%	95%	0%	1%	1%
		skyway-renton	90%	91%	92%	0%	1%	1%

Endnotes

[1] See for example Distracted driving survey observation results, April 2024, Washington Traffic Commission. https://wtsc.wa.gov/wp-content/uploads/2024/04/10_Distracted-Driver-Observation-Survey-2023.pdf

[2] WA Traffic Safety Commission Fatalities Data Dashboard. See https://wtsc.wa.gov/dashboards/fatalities-dashboard/

[3] See Safe System Approach for Speed Management for more details. https://highways.dot.gov/sites/fhwa.dot.gov/files/Safe_System_Approach_for_Speed_Management.pdf

[4] WTSC Region 7&8 WA Traffic Infographic. See https://wtsc.wa.gov/wp-content/uploads/2024/10/Region-7-8-WA-Traffic-Infographic-DRAFT.pdf

[5] WA Traffic Safety Commission. *Seat Belt Use in Washington State*. 2023. See https://wtsc.wa.gov/wp-content/uploads/2024/03/Seat-Belt-Use-in-WA-State-2023_Feb2024.pdf