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Designing Road Diet Evaluations: Lessons Learned from San Jose's Lincoln Avenue Road Diet

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M I N E T A   T R A N S P O R T A T I O N   I N S T I T U T E

Designing Road Diet Evaluations: Lessons Learned from San Jose's Lincoln Avenue Road Diet

MTI Report WP 12-14

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REPORT WP 12-14

DESIGNING ROAD DIET EVALUATIONS: LESSONS LEARNED FROM SAN JOSE'S LINCOLN AVENUE ROAD DIET

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16. Abstract

This report analyzes traffic impacts from the 2015 implementation of a pilot "road diet" on Lincoln Avenue, in the City of San Jose, California, comparing data on traffic volumes and speeds from before and after the road diet was implemented. The analysis looks at impacts on both the road diet location itself and on surrounding streets likely to have been impacted by traffic diverted off the road diet segment. The results within the road diet zone were as expected, with falling volumes and numbers of speeders. The all-day data aggregated by street type (e.g., neighborhood streets, major streets) showed limited overall negative impacts outside the road diet segment. These summary results do not tell the entire story, however. Individual locations, particularly among the neighborhood streets, saw more noticeable negative impacts. The report ends with recommendations for best practices in designing and conducting road diet evaluation studies.

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I. INTRODUCTION

This report analyzes traffic impacts from the 2015 implementation of a pilot “road diet” on Lincoln Avenue, in the City of San Jose, California. Road diets are street reconfiguration projects that reduce the number of travel lanes in a street, most often converting a four-lane, undivided roadway to a three-lane roadway with two through-travel lanes and a two-way center left-turn lane. For the study, we compared data on traffic volumes and speeds from before and after the road diet was implemented, looking not only at the impacts on the road diet segment itself, but also on surrounding streets that might have been impacted by traffic diverted off the road diet segment. Our analysis also compares impacts over different time periods: all day, during the am and pm peak periods, and by hour of the day.

When road diets work well, they are a relatively low-cost measure that improves safety, multi-modal accessibility, and quality of life in the neighborhood. Specific goals for many road diet projects include fewer crashes, improved facilities for pedestrians (who have to cross fewer lanes of traffic), and improved facilities for bicyclists (if new bicycle lanes are installed in the space freed up from the eliminated traffic lane).

Road diets are not without concerns, however. Travel times may increase along the slimmed road. Also, depending on the configuration of side streets, some traffic may switch to nearby side roads, thus increasing traffic volumes and speeds on roads potentially less suited to handle such traffic.

Despite growing interest in road diets among transportation planners and community members, there is limited empirical evidence on the effects of these roadway conversions. While some local governments and researchers have conducted evaluations on road diets, these vary widely in the metrics they evaluate and the quality of data collected.[1] For example, a number of studies evaluate only safety outcomes. Also, many studies look only at the impact on the road diet segment, omitting impacts on neighborhood streets. (For helpful summaries of the factors analyzed in many of the older studies, see Huang, et al, 2003 and Lyles, et al, 2012.[2]) Further, many road diet evaluations are not formally published and archived in a permanent, accessible location, making them difficult to access. In short, transportation planners have limited high-quality resources to review when they want to understand how road diets perform in practice.

This report contributes to the small but growing body of published road diet literature by analyzing the traffic effects of a road diet in San José, California, focusing on neighborhood-wide traffic volume and speed impacts. In the spring of 2015, the City of San José implemented a road diet pilot program along a one-mile stretch of Lincoln Avenue in the Willow Glen neighborhood of central San José. Lincoln runs through a predominantly residential neighborhood with a small neighborhood business district. The street, a four-lane, undivided roadway, has become a popular route for commuters avoiding the more congested nearby freeways and expressways. Close to 20,000 vehicles per day travel along this route, often above posted speed limits, posing a risk to pedestrians and bicyclists.

This study analyzes before-and-after traffic volume and speed data that was collected at 45 different locations on Lincoln Avenue, intersecting streets, and nearby parallel streets. The City of San Jose collected the data in February 2015, several weeks prior to the beginning of the road diet pilot, and later in February 2016, one year after the project began.

The traffic data was used to answer the following research questions specific to the Lincoln Avenue road diet:

1. How did the road diet impact all-day counts of traffic volumes and speeders for each street type? The street types analyzed were Lincoln Avenue road diet locations, Lincoln Avenue locations outside the road diet, major streets, and neighborhood streets.

2. How did the road diet impacts vary by street type when looking at all-day counts versus data for peak hours and data by hour of the day?

3. Did individual locations see speeding and volume increases noticeably greater than the street-type averages, such that additional traffic calming measures might be warranted?

An additional objective of the research project was to recommend best practices in designing road diet evaluations that look at speeding and traffic volume impacts.

As part of the City of San Jose's analysis of the Lincoln Avenue road diet, a detailed report was prepared (City of San Jose, 2016). The current MTI report provides an independent third-party review of the traffic volume and speed data collected, as well as more detailed analysis of the hourly traffic patterns.

The remainder of the report is organized as follows: Chapter 2 describes the history of the Lincoln Avenue road diet effort, Chapter 3 explains the study methods, and Chapter 4 presents detailed study findings. In conclusion, Chapter 5 summarizes the findings and offers recommendations for designing future road diet evaluations. Appendices present detailed data about each of the 45 data collection locations.

II. HISTORY OF THE LINCOLN AVENUE ROAD DIET PROJECT

Lincoln Avenue is a major north-south street that runs through the Willow Glen neighborhood in San José, California. Figure 1 shows the road diet location within the City of San Jose.

Willow Glen is a relatively affluent neighborhood with approximately 27,000 residents.[3] The city's only Community Benefit Improvement District is located in Willow Glen, focused on the vibrant neighborhood business district located along Lincoln Avenue between Minnesota Avenue in the south to approximately Lester Avenue in the north.

During the fall of 2014, the Willow Glen Business Association (WGBA), the Willow Glen Neighborhood Association (WGNA), and the City of San José discussed the possibility of implementing a four-lane to three-lane conversion of Lincoln Avenue in the stretch running through the Willow Glen Business District. Many residents were interested in such a road diet as a way to slow traffic and improve safety.

The street, a four-lane, undivided roadway, had become a popular route for commuters avoiding the more congested nearby freeways and expressways. Close to 20,000 vehicles per day traveled along this route, often above posted speed limits, posing a risk to pedestrians and bicyclists.

In anticipation of planned pavement work on Lincoln Avenue in 2015, city staff proposed and city council approved a pilot study to evaluate the potential impacts of a road diet along an approximately one-mile stretch of Lincoln Avenue from Minnesota Avenue to Coe Avenue. The intent of the pilot was to install temporary road markings and evaluate the effectiveness of the road diet prior to the major repavement effort, at which point the road diet could be made permanent if the pilot performed well.

The original pilot study was scheduled for a three-month period from February to April 2015, and later extended to a full year, until February 2016. Because the project faced considerable controversy and the outcome of pilot evaluation was of great community interest, the city designed a very extensive evaluation project. Indeed, the data collection for the Lincoln Avenue road diet ended up being the most extensive such data collection effort ever undertaken by San José's Department of Transportation.

City staff designed the road diet to reduce through traffic lanes from four to three. Prior to the road diet, Lincoln had two travel lanes in each direction; after the road diet, Lincoln had one through travel lane in each direction, plus a two-way center turn lane. The city used the space freed up from the fourth travel lane to create marked bicycle lanes on each side of the road (Figure 2).

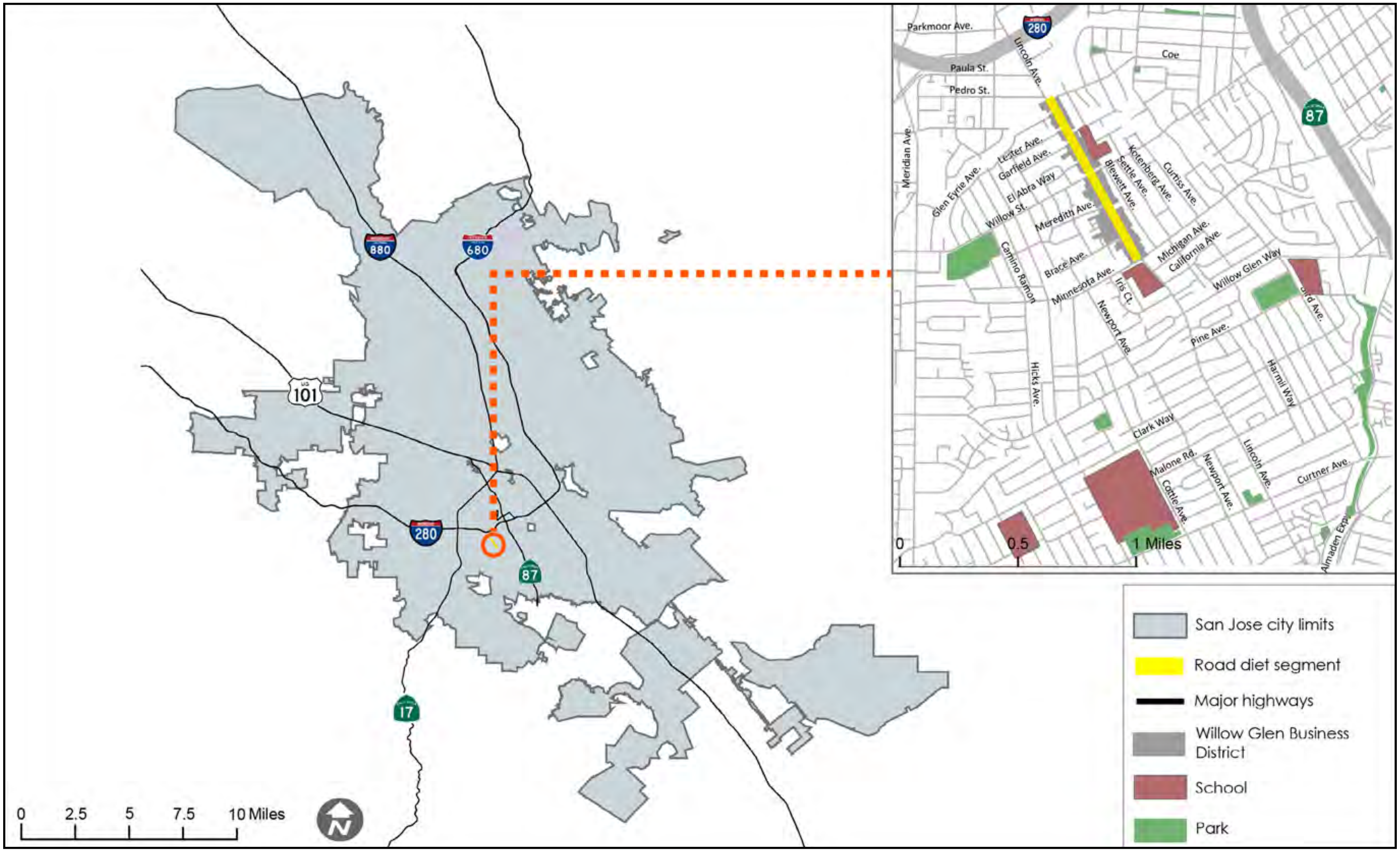


Figure 1. Location of the Lincoln Avenue Road Diet in the City of San Jose

Source: Map created by Nicholas Danty using shapefiles from the City of San Jose Community Development Department and Santa Clara County Department of Planning and Development.

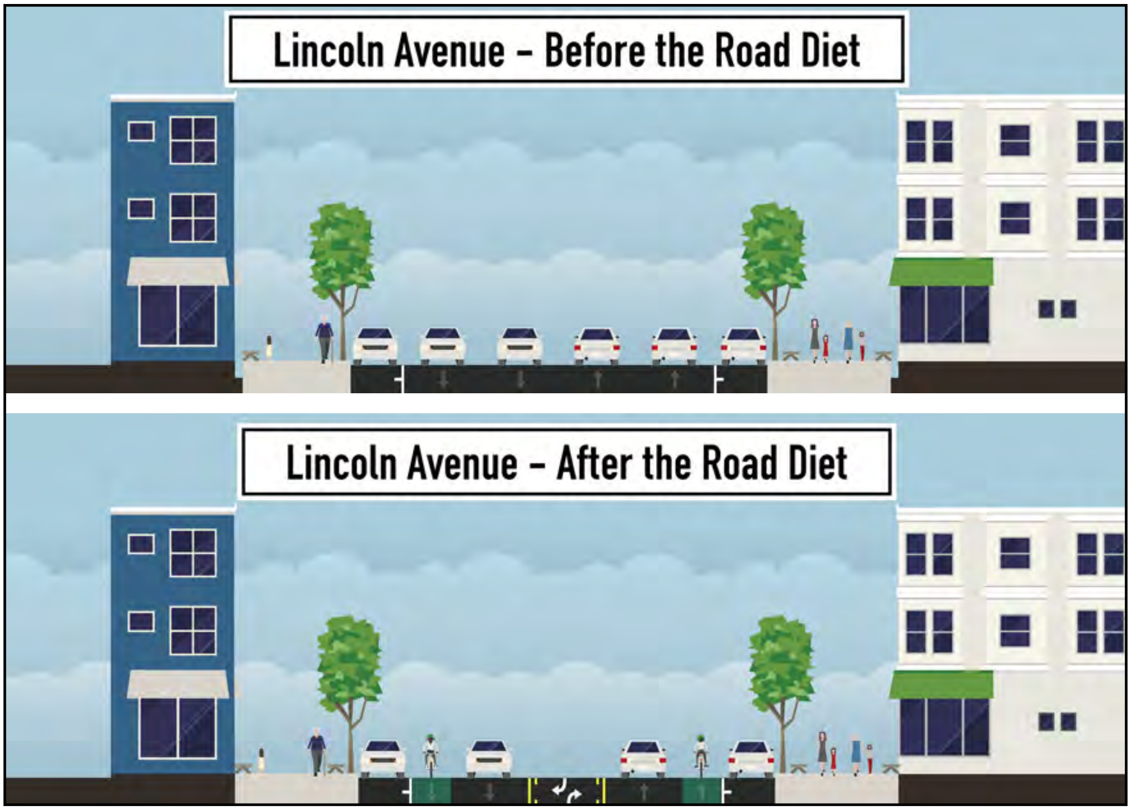


Figure 2. Illustration of a 4-Lane to 3-Lane Road Diet

Source: Created by Bahar Vaezi using Streetmix.net

The pilot began in late February 2015 and garnered considerable attention, both in terms of support and opposition for the new configuration. Two competing change.org petitions were established. The "Remove the Road Diet from Lincoln Ave." petition eventually garnered a total of 816 supporters,[4] while the "Make the Lincoln Avenue Road Diet Permanent in Willow Glen" petition received 1,448 supporters. [5] The two sides also took to social media, engaging in spirited discussion on several community Facebook sites. The WGBA surveyed local businesses, while the WGNA surveyed surrounding residents.

In April 2015, the city collected traffic data and reported back the results.[6] After reviewing the report and community feedback, the WGNA came out officially in support of the road diet,[7] while the WGBA officially declared its opposition.[8] The lack of a clear consensus, plus additional controversy within the community, led councilmember Pierluigi Oliverio to request that the road diet pilot be extended to a full year, until February 2016. The city council approved this extension and also directed the Department of Transportation to make additional changes to the configuration, to help alleviate some of the traffic concerns expressed by community members during the original three-month trial.[9]

The Department of Transportation collected additional traffic data in February 2016 and issued an extensive evaluation a few months later.[10] After reviewing that evaluation, in June of 2016 the San José City Council voted unanimously to make the road diet permanent. According to Major Sam Liccardo, Lincoln Avenue "has been the most studied city road in our history."[11]

III. STUDY METHODS

This study compares traffic volume and speed data collected in February 2015, before the road diet implementation, and one year later, in February 2016. This chapter describes the city's traffic data collection process and the analytic methods used in this report.

DATA COLLECTION

We obtained the data for this research from the City of San José's Department of Transportation. The city contracted with a consultant, Traffic Data Service, to conduct the data collection. The consultant recorded traffic volumes and speeds using portable, pneumatic road tubes placed at 45 locations in the Willow Glen neighborhood (see Figure 3). The locations were distributed throughout the neighborhood as follows:

- **Lincoln Avenue road diet segment**: 2 locations within the road diet implementation zone
- **Lincoln Avenue non-road diet segment**: 4 locations along Lincoln Avenue outside the road diet area
- **Major streets**: 16 locations along all major roads within the Willow Glen area. Major roads were those identified as main arterials running north-south or east-west through the community. Most experience average daily traffic (ADT) of 10,000 or more vehicles, although there were some exceptions, including Parkmoor (~7,000 ADT), Coe (~6,000 ADT), Pine (~4,600-7,800 ADT), and Almaden (~6,500 ADT).
- **Neighborhood streets**: 23 locations along neighborhood streets thought most likely to be impacted by the road diet because they were close to Lincoln Avenue or likely to serve as an alternate route. All streets have 25 mph or lower speed limits and ADT of less than 5,500. In many cases, ADT is less than 1,000.

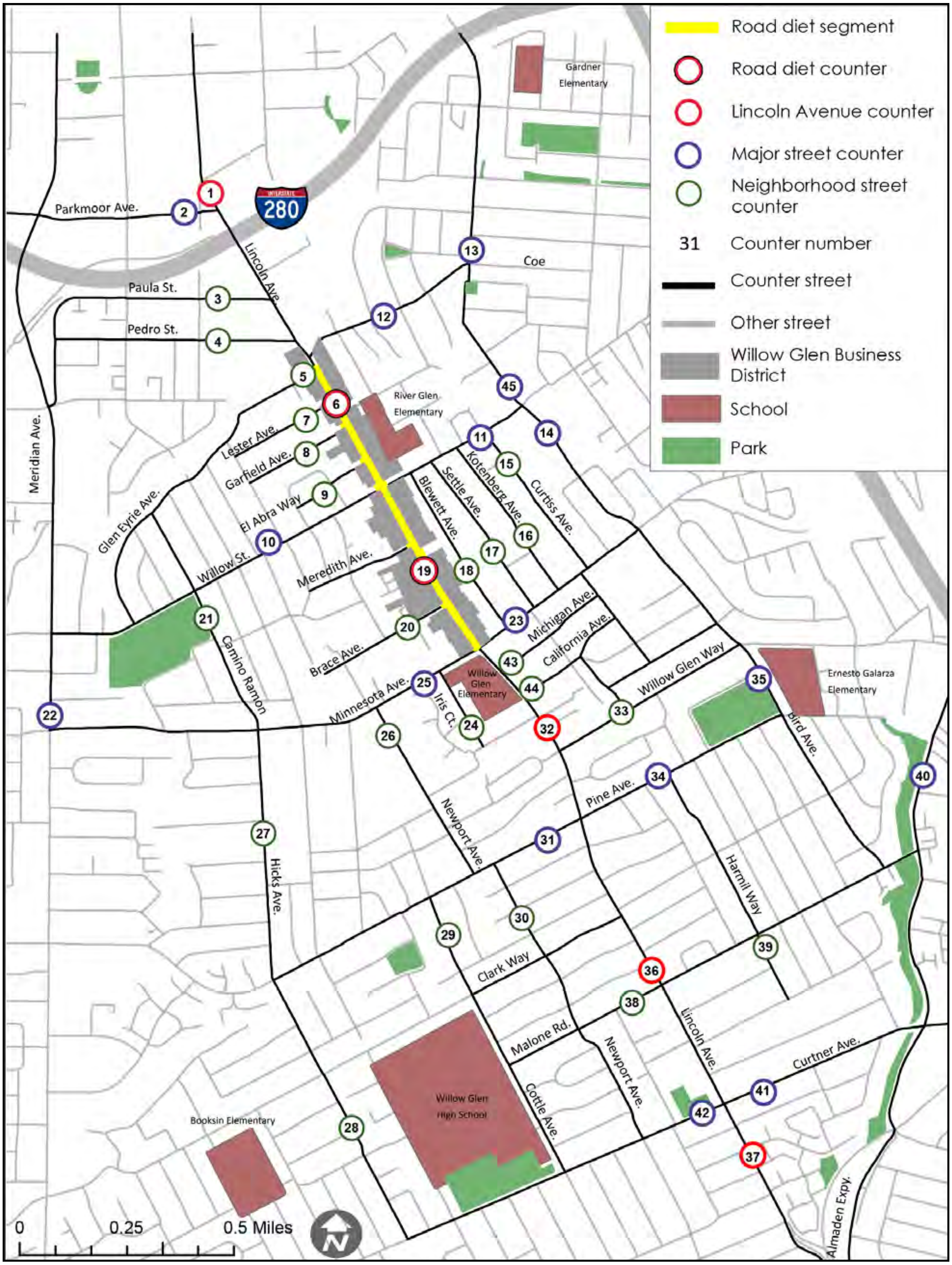


Figure 3. Location of the Data Collection Counters

Source: Map created by Nicholas Danty using shapefiles from the City of San Jose Community Development Department and Santa Clara County Department of Planning and Development.

Data was collected before the implementation of the road diet on February 4 and 5, 2015.[12] One year later, data was collected at the same 45 locations on February 10 and 11, 2016.[13] The dates selected were chosen to represent "typical" mid-week traffic conditions. The weather was similar in both the before and after data collection periods.[14]

The city provided summary reports for each location. For each day of data collection, we analyzed the following data for every data collection point:

- Vehicle counts, by hour and by speed "bins" (the speed bins used were 0-10 mph, 10-15 mph, 15-20 mph, 20-25 mph, 25-30 mph, 30-35 mph, 35-40 mph, 40-45 mph, 45-50 mph, 50-55 mph, 55-60 mph, and 60-100 mph)

- Total number of vehicles per day

- 85th percentile speed[15] for the entire data collection "before" period (two days) and "after" period (three days)

DATA ANALYSIS

The analytical approach taken here focuses on descriptive changes in traffic volumes and speeds across the four types of street location (i.e., Lincoln Avenue road diet segment, Lincoln Avenue non-road diet segment, major streets, and neighborhood streets), as well as at each of the 45 individual locations.

Our study approach differs from that in the City of San Jose Department of Transportation's 2016 report on the road diet project by covering fewer topics—only speeds and volumes—but doing so in greater depth for those issues. The city's report focused only on all-day speed and volume data, while this report also considers peak period and hour-by-hour data. In addition, the city's report looked only at results for individual data collection locations, while this report also examines traffic impacts summarized across each street type. Finally, although the city's analysis of traffic volumes and speeds was narrower than that presented here, the city's report looked at many factors we did not analyze—the economic impacts to the Lincoln Avenue Business District, intersection level-of-service changes along Lincoln Avenue, pedestrian and bicycle counts, and vehicle travel times along Lincoln Avenue.

We initially planned to test whether the speed and volume impacts were statistically significant, but ultimately decided not to because of data limitations. The key challenge with statistical testing of the road diet pilot data was the small sample size, particularly for the road diet segment along Lincoln Ave. There were only two data collection locations within the road diet and only two days of data before-and-after that could be used for some type of matched pairs analysis, significantly limiting the ability to conduct hypothesis testing.

With a small sample size, there is low statistical power[16] and a greater likelihood of causing a Type II error. A Type II error occurs when a hypothesis test does not detect a statistically significant effect that is actually present. While some researchers suggest that testing can be performed on extremely small sample sizes, the effect size (e.g. the change in traffic volume or number of speeders) needs to be quite large for any significant impact to be detected, and the pilot project data presented few large effect sizes.[17]

To assess effect size for this project, we conducted a power analysis. This technique enables the researcher to identify the minimum change needed in order to detect a significant effect based on sample size and other key data parameters (e.g. mean and standard deviation). In most cases, the effect size needed to be able to detect a significant impact of the road diet, given the small sample size, was larger than the actual change that occurred, limiting the potential usefulness of hypothesis testing.

IV. FINDINGS

This chapter looks first at how the road diet impacted traffic volumes and at the impact on the number of speeders. In each section, we start with a look at the most aggregated data (all-day data averaged for all streets of each street type), then move to a more nuanced look at the impacts by time of day for each street type, and conclude by looking at specific locations that saw noticeable changes.

It is important to note a key limitation with this research, the lack of control locations. Ideally, data for the same time periods would have been collected for a similar set of streets located outside of the Willow Glen neighborhood, to serve as a control or counterfactual. Because of the lack of a counterfactual, it is impossible to determine with real confidence whether changes that occurred after the implementation of the Lincoln Avenue road diet were due to the road diet itself or due to some other, unknown reason. Was traffic behavior changing similarly on similar roads in other parts of the region during this time period? Or were the changes in Willow Glen unique and likely attributable to the road diet? These issues remain unanswered.

TRAFFIC VOLUME IMPACTS

We analyzed volume impacts in several ways. First, we looked at mean values for each street type, considering both at all-day volumes and also impacts by time of day (peak-hour volumes and volumes for each hour of the day). To conclude, we also looked at impacts at each of the 45 locations individually. This analysis was done to determine whether looking across street types, as an approach, obscures important findings about specific locations where traffic volumes diverge in meaningful ways from the broader pattern for a street type.

All-Day Impacts

Data in the first row of Table 1, which shows all-day traffic volumes before and after the road diet, suggests that the road diet did not divert traffic to other streets in the neighborhood. Although volumes fell noticeably at the Lincoln road diet collection points, traffic volumes for the other street types also fell or, in a few cases, remained essentially flat. This pattern held for both all-day vehicle counts and hourly traffic volumes for the two peak periods. Overall, total traffic volume in the Willow Glen area declined by 2% after the road diet, suggesting that some vehicles may have diverted completely out of the area to other surrounding neighborhoods or major highways.

Looking at the all-day volume counts, the decline was most significant at the Lincoln Avenue road diet locations (-6%) and neighborhood street locations (-5%). The other two street types, the Lincoln Avenue collection points outside the road diet and major street locations, saw much smaller changes: a 2% drop and essentially no change, respectively.

Table 1. Traffic Volumes, Pre-and Post-Road Diet, by Street Type and Time Period

	Lincoln Avenue – road diet				Lincoln Avenue – no road diet				Major streets				Neighborhood streets			
Time period	Pre (#)	Post (#)	Change (#)	Change (%)	Pre (#)	Post (#)	Change (#)	Change (%)	Pre (#)	Post (#)	Change (#)	Change (%)	Pre (#)	Post (#)	Change (#)	Change (%)
Vehicles per day	15,722	14,761	-961	**-6%**	13,695	13,420	**-275**	**-2%**	12,107	12,058	**-48**	0%	1,939	1,850	**-89**	-5%
Vehicles per AM peak hour [a]	1,392	1,072	-320	**-23%**	1,312	1,147	**-164**	**-14%**	944	950	6	1%	187	187	0	0%
Vehicles per PM peak hour [a]	1,246	1,111	-134	**-12%**	1,171	1,053	**-118**	**-10%**	1,005	984	**-21**	-2%	156	147	**-9**	-6%

Note: Green font indicates a drop in volume.

[a] AM peak = 7 AM – 9 AM; PM peak = 4 PM – 7 PM

Impacts by Time of Day

Looking at hourly volumes during the peak hours, traffic fell noticeably more during the peak hours than it did for all-day counts on both types of Lincoln Avenue locations, though not for the major streets and neighborhood streets. (See the second and third rows of Table 1.) For example, traffic volumes during the morning peak hours dropped 23% at the Lincoln Avenue road diet locations, compared to an all-day drop of 6%. By contrast, the major streets saw tiny peak-hour volume changes (1% and 2% declines) that were similar to the all-day measure for those locations. Finally, the neighborhood streets saw no change in morning peak-hour volumes but 6% fewer vehicles in the afternoon peak-hour.

Figure 4 and Figure 5 allow one to look at variation over time in even more detail, showing the change in traffic volume by hour, pre- and post- the road diet, for all four road types. The line graphs in the left hand column show the magnitude of hourly volumes pre- and post-road diet, while the bar graphs in the middle and left-hand column show the *change* in volumes.

For the Lincoln Avenue road diet locations, Figure 4 reinforces the finding that volumes dropped more during the peak hours then at other times. However, one can see that volumes were actually higher post-diet during the evening hours, as well as at a few other hours scattered across the day.

The graphs for the neighborhood streets (Figure 5) show that traffic volumes fell consistently from the morning peak, through the mid-day, and into the evening peak, but actually rose late at night and early in the morning.

The variation for neighborhood streets between the mid-day drop and late-night/early-morning increase, a detail masked in the all-day and peak-hour data (Table 1), illustrates a key finding for this report: when evaluating a road diet, it is important to look at the data by time-of-day as well as aggregated across the whole data.

Similar to the overall ADT volume for the entire Willow Glen area, peak-period hourly traffic declined by 5% for both the AM and PM time periods.

Localized Impacts

Although evaluating the broad impacts of the road diet in traffic volumes across different street types is important for understanding global impacts, this approach can obscure important effects at individual locations. In this section we point out several locations where traffic volumes diverge from the broader pattern for a particular street type or otherwise indicate that the road diet may have produced an unanticipated impact. The discussion focuses on negative impacts such as noticeable increases in traffic volume, particularly on neighborhood streets.

The report presents the data by collection location in a variety of formats because each method of displaying the information highlights different aspects of the findings. Figure 6 and Figure 7 show the change in AM peak-hour and PM peak-hour volumes in map format.

Appendix A presents data in table format, with pre- and post-road diet all-day and peak-hour traffic volumes (and speeds). Finally, Appendix B presents a graphic representation of volume and speed data by hour.

Three neighborhood street locations (3, 16, and 44) experienced more than a 10% increase in ADT after the road diet. Nine neighborhood locations (3, 5, 9, 16, 18, 21, 27, 43, and 44) also experienced a double-digit percentage increase in hourly traffic during the AM peak period. As was pointed out earlier, though, large percentage changes do not always indicate major impact. In some of these neighborhood street locations, the actual increase in the number of vehicles was fairly small. For example, location 9 (El Abra) saw a 19% increase in AM peak hourly traffic, but that amounted to an increase of only 9 vehicles per hour.

Location 3, on Paula Avenue west of Lincoln, saw one of the largest percentage increases in ADT (12%) as well as one of the largest increases in traffic volume (+166 cars per day). This street provides a fairly direct connection between Lincoln and Meridian Avenues, so some drivers likely diverted off Lincoln onto Paula. While traffic volumes increased at a similar rate along Paula Ave. during the AM peak period, the PM peak period saw a small decline in traffic, suggesting that this street served as an alternative route for the morning commute but not in the afternoon.

A possible consequence of a road diet is that drivers seek out alternative routes that provide similar access. California Avenue east of Lincoln (location 44), a low-volume neighborhood street, seems to have been affected this way. For vehicles heading north on Lincoln in the morning, California provides an alternative route to Highway 87 that bypasses the Lincoln Avenue road diet segment. (Drivers take California to Minnesota, which connects to Highway 87.) California experienced a double-digit increase in ADT (up 17%, or 93 cars), as well as during peak periods. During the AM peak period, hourly traffic nearly doubled, from 45 to 80 cars per hour. Afternoon commute traffic along California was much lower compared to the morning, but there was still a 25% increase in PM peak hourly traffic (+9 cars per hour).

Traffic appears to have diverted onto arterials parallel to Lincoln, as well. Bird Avenue and Meridian Avenue are obvious alternatives to Lincoln, as they provide a parallel route and are major streets with higher speed limits than most neighborhood streets. Both streets can accommodate some additional traffic comfortably, so moderate traffic diversion to them would likely not create problems. Interestingly, Meridian Avenue (location 22) saw volume declines during both peak periods, as well as all day, while impacts along Bird Avenue (locations 13, 14, 35, and 45) were mixed.

Another parallel route which is a less desirable alternative from a traffic planning perspective as it is a single-lane, residential street with a 25 mph speed limit is Camino Ramon/Hicks Avenue (locations 21, 27, & 28). While all-day traffic volume increased only slightly along Camino Ramon (2%) and actually declined along Hicks Avenue, morning peak period hourly traffic increased 11% for Camino Ramon and 13% for location 27 along Hicks Avenue. Afternoon peak periods did not experience a similar negative impact.

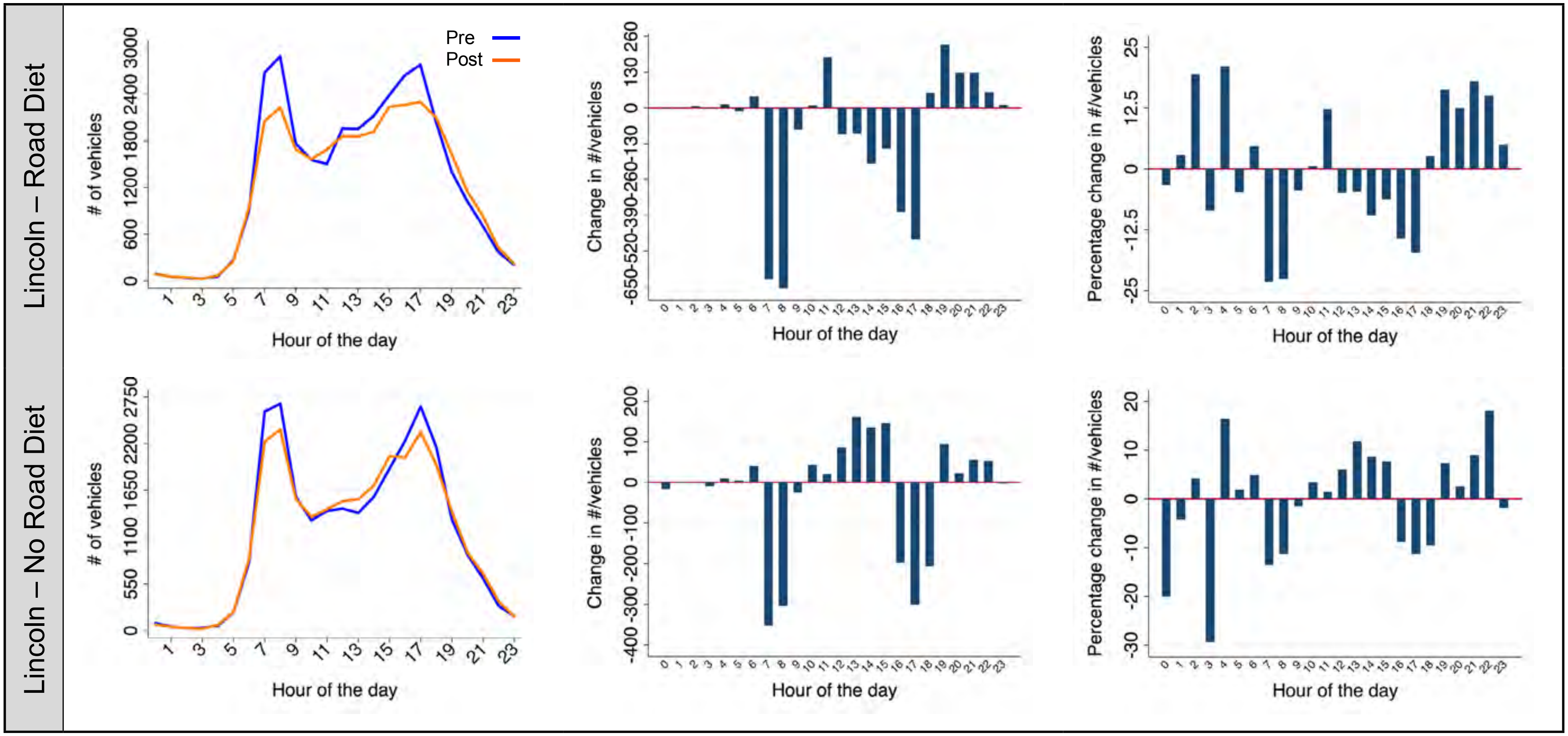


Figure 4. Number of Vehicles, Pre-and Post-Road Diet, by Hour of the Day, for Lincoln Avenue Locations

Note: Y-axis scales differ for each graph.

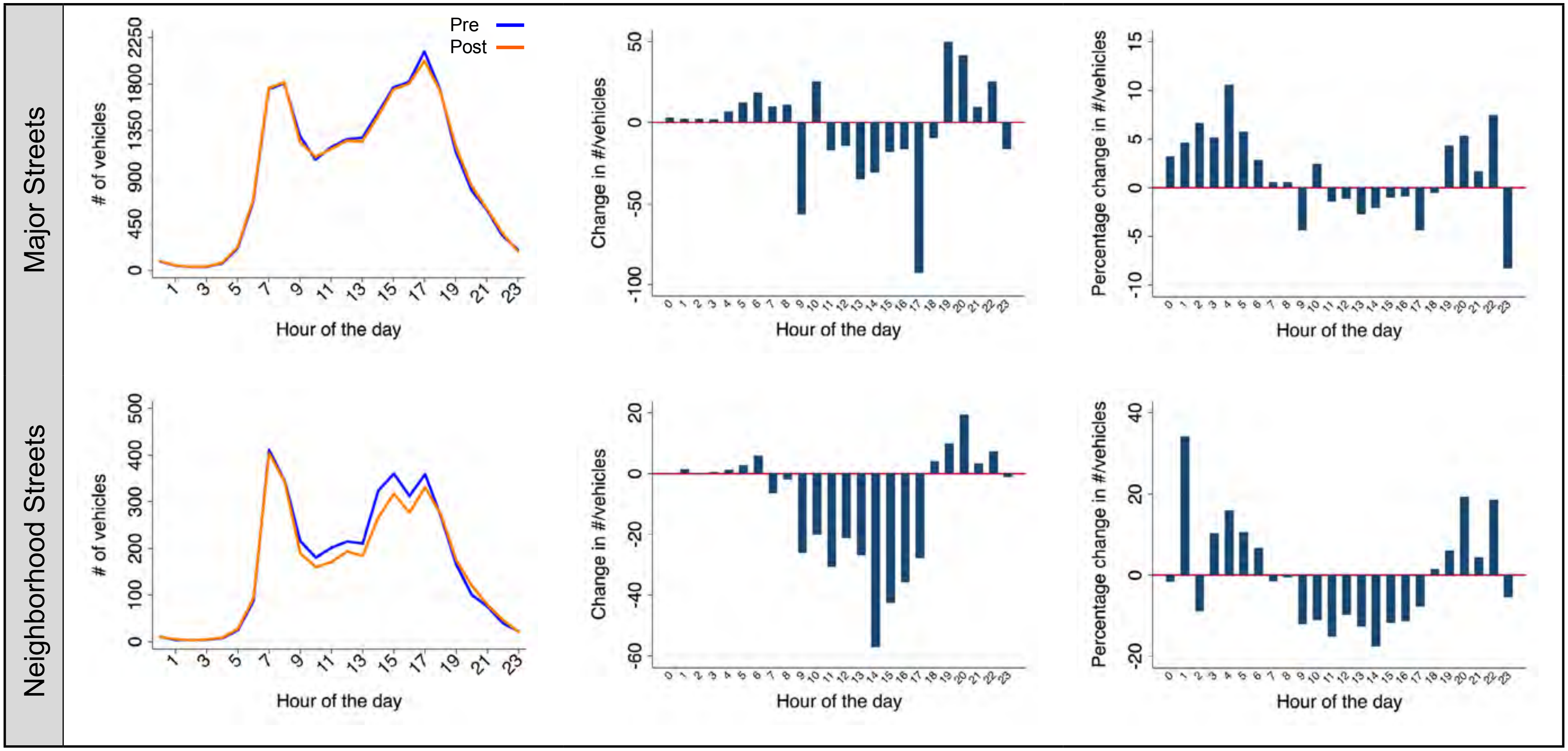


Figure 5. Number of Vehicles, Pre-and Post-Road Diet, by Hour of the Day, for Major and Neighborhood Street Locations

Note: Y-axis scales differ for each graph.

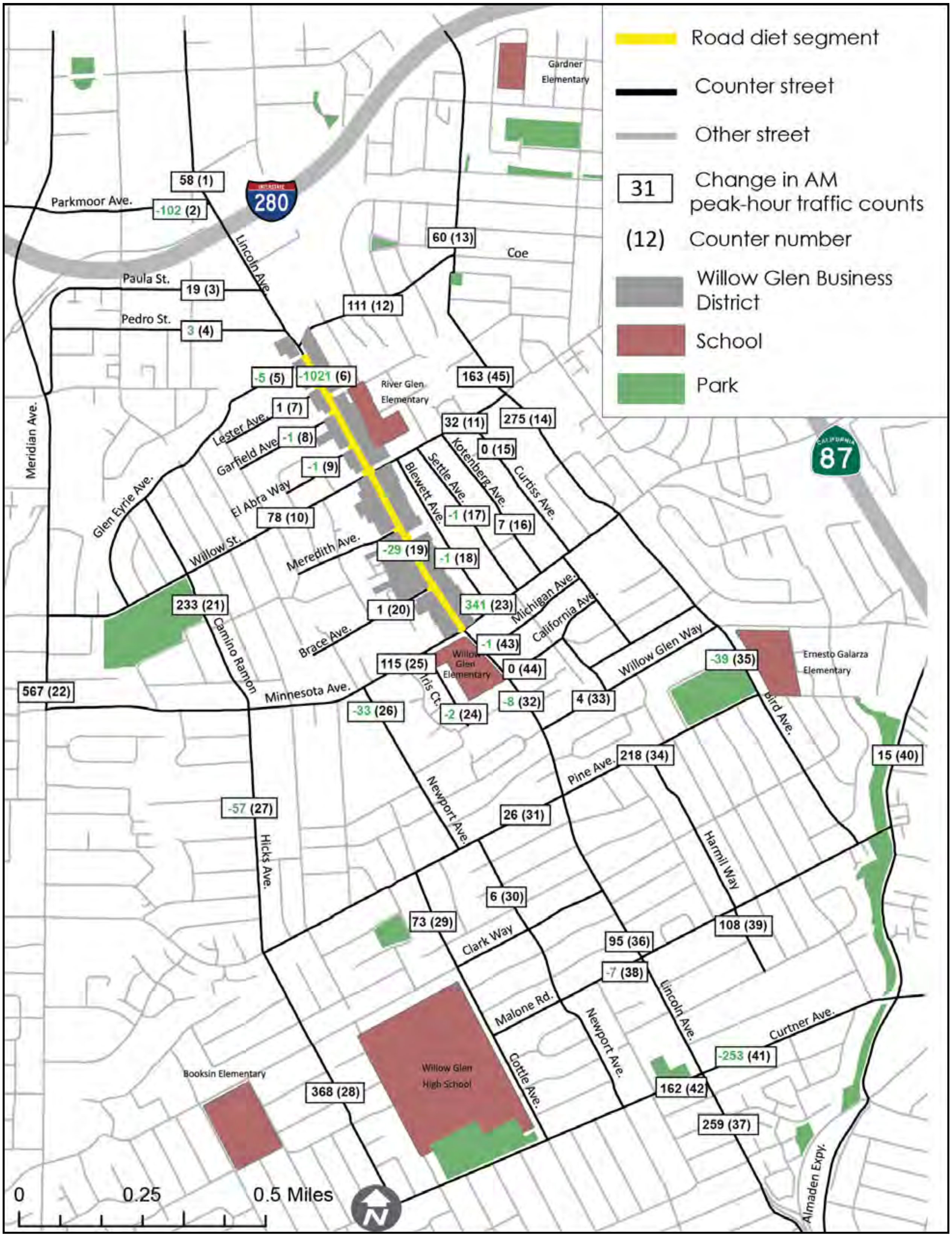


Figure 6. Change in AM Peak-Hour Traffic Counts, Pre- and Post-Road Diet, by Counter Location

Source: Map created by Nicholas Danty using shapefiles from the City of San Jose Community Development Department and Santa Clara County Department of Planning and Development.

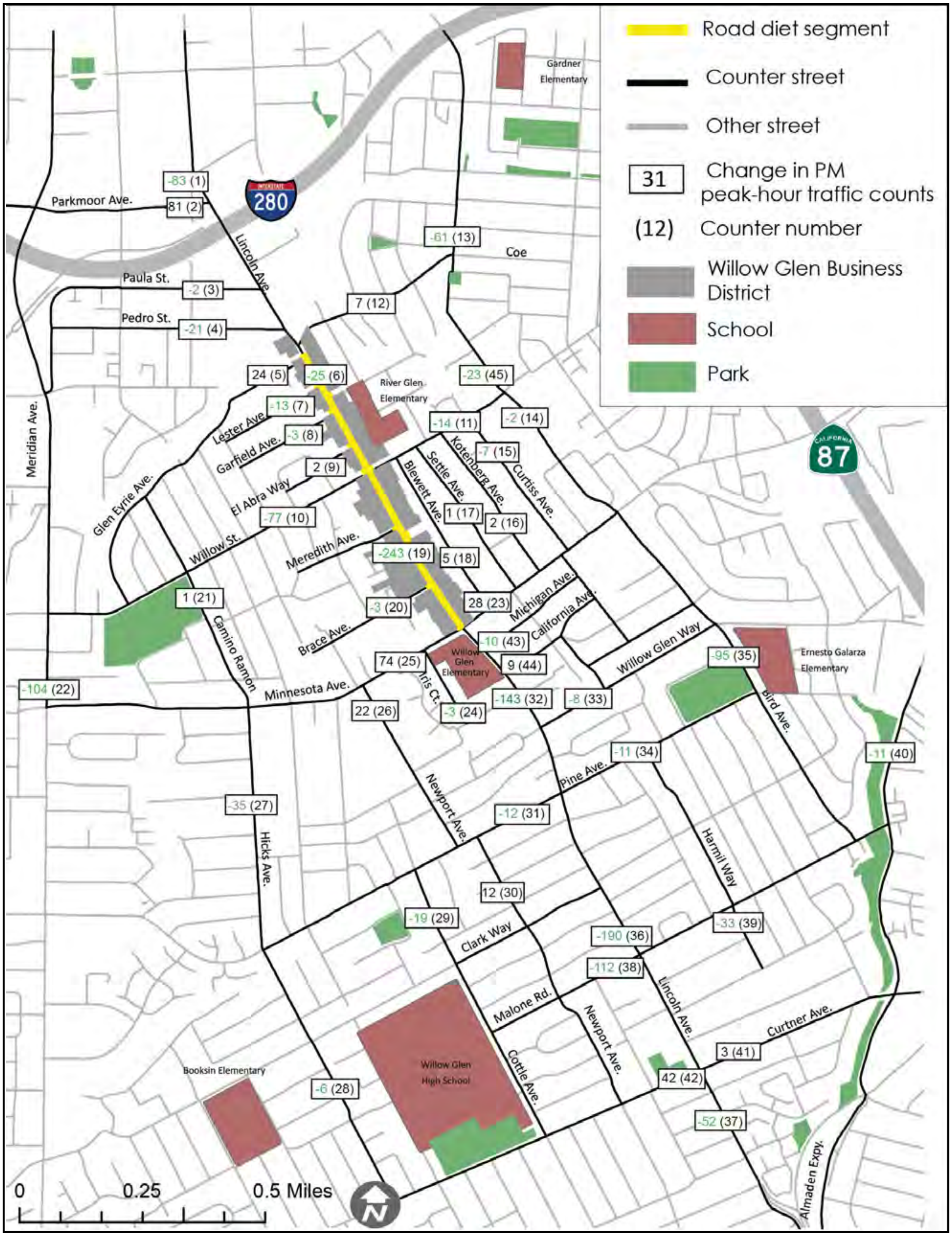


Figure 7. Change in PM Peak-Hour Traffic Counts, Pre- and Post-Road Diet, by Counter Location

Source: Map created by Nicholas Danty using shapefiles from the City of San Jose Community Development Department and Santa Clara County Department of Planning and Development.

TRAFFIC SPEED IMPACTS

We investigated the road diet's impact on speeding by looking at two measures of "speeders," the number of vehicles traveling 5 mph or more over the speed limit and the number of vehicles traveling 10 mph or more over the speed limit. These metrics were chosen as a clear way to look at the number of problem drivers per se – the people traveling too fast for safety.

All-Day Impacts

Looking at all-day effects (Table 2), the road diet successfully reduced the number of speeders along the road diet segment, especially the number of 10+ mph speeders. The number of 5 mph+ over speeders dropped by 1,625 vehicles per day, or 44%, and the number of 10 mph+ speeders by 525, a 60% drop.

In contrast to the road diet locations, the three other street types all saw the number of speeders increase, with the increases being fairly large—double digits—in percentage terms. The change was most pronounced on the major streets. The number of 5 mph+ over speeders went up 24%, an increase of 375 vehicles over the day. For the 10+ mph speeders, the percentage increase was even greater (43%), though the number of additional speeding vehicles was lower (111 vehicles).

Impacts by Time of Day

For almost every street type, the percentage change in the number of speeders was greater during the peak hours than for the all-day counts, and the change was usually more extreme in the AM peak than the PM peak (Table 2 and Figure 8 through Figure 11). The only exception to this pattern was for the neighborhood streets, where the percent increase in PM-peak-hour speeders was lower than the all-day increase.

Table 2. Speeders Traveling 5 or 10 MPH above the Speed Limit, Pre-and Post-Road Diet, by Street Type and Time Period

	Lincoln Avenue – road diet				Lincoln Avenue – no road diet				Major streets				Neighborhood streets			
Time period	Pre (#)	Post (#)	Change (#)	Change (%)	Pre (#)	Post (#)	Change (#)	Change (%)	Pre (#)	Post (#)	Change (#)	Change (%)	Pre (#)	Post (#)	Change (#)	Change (%)
Vehicles 5+ mph over																
All day	3,683	2,058	**-1,625**	**-44%**	1,532	1,897	365	24%	1,571	1,946	375	24%	461	536	75	16%
AM peak hour[a]																
# of vehicles	421	190	**-231**	**-55%**	119	143	25	21%	117	157	40	34%	45	60	15	34%
% of vehicles/hour[b]	30%	18%	--[c]	--[c]	9%	12%	--[c]	--[c]	12%	17%	--[c]	--[c]	24%	32%	--[c]	--[c]
PM peak hour[a]																
# of vehicles	266	98	**-168**	**-63%**	144	182	37	26%	131	171	40	31%	54	60	6	12%
% of all vehicles	21%	9%	--[c]	--[c]	12%	17%	--[c]	--[c]	13%	17%	--[c]	--[c]	35%	41%	--[c]	--[c]
Vehicles 10+ mph over																
All day	877	352	**-525**	**-60%**	270	371	101	38%	257	367	111	43%	86	117	31	36%
AM peak hour[a]																
# of vehicles	97	29	**-68**	**-70%**	16	27	10	63%	17	27	10	59%	8	12	4	53%
% of vehicles/hour[b]	7%	3%	--[c]	--[c]	1%	2%	--[c]	--[c]	2%	3%	--[c]	--[c]	4%	6%	--[c]	--[c]
PM peak hour[a]																
# of vehicles	51	10	**-42**	**-82%**	24	34	10	42%	17	26	9	53%	9	11	2	28%
% of all vehicles	4%	1%	--[c]	--[c]	2%	3%	--[c]	--[c]	2%	3%	--[c]	--[c]	6%	8%	--[c]	--[c]

Note: Green font indicates a drop in volume.

[a] AM peak = 7 AM – 9 AM; PM peak = 4 PM – 7 PM.

[b] This measure is calculated as the percent of all vehicles travelling during the peak hour that are going 5 mph+ over. Table 1 shows the number of vehicles per peak hour, used in the calculation here.

[c] Not applicable.

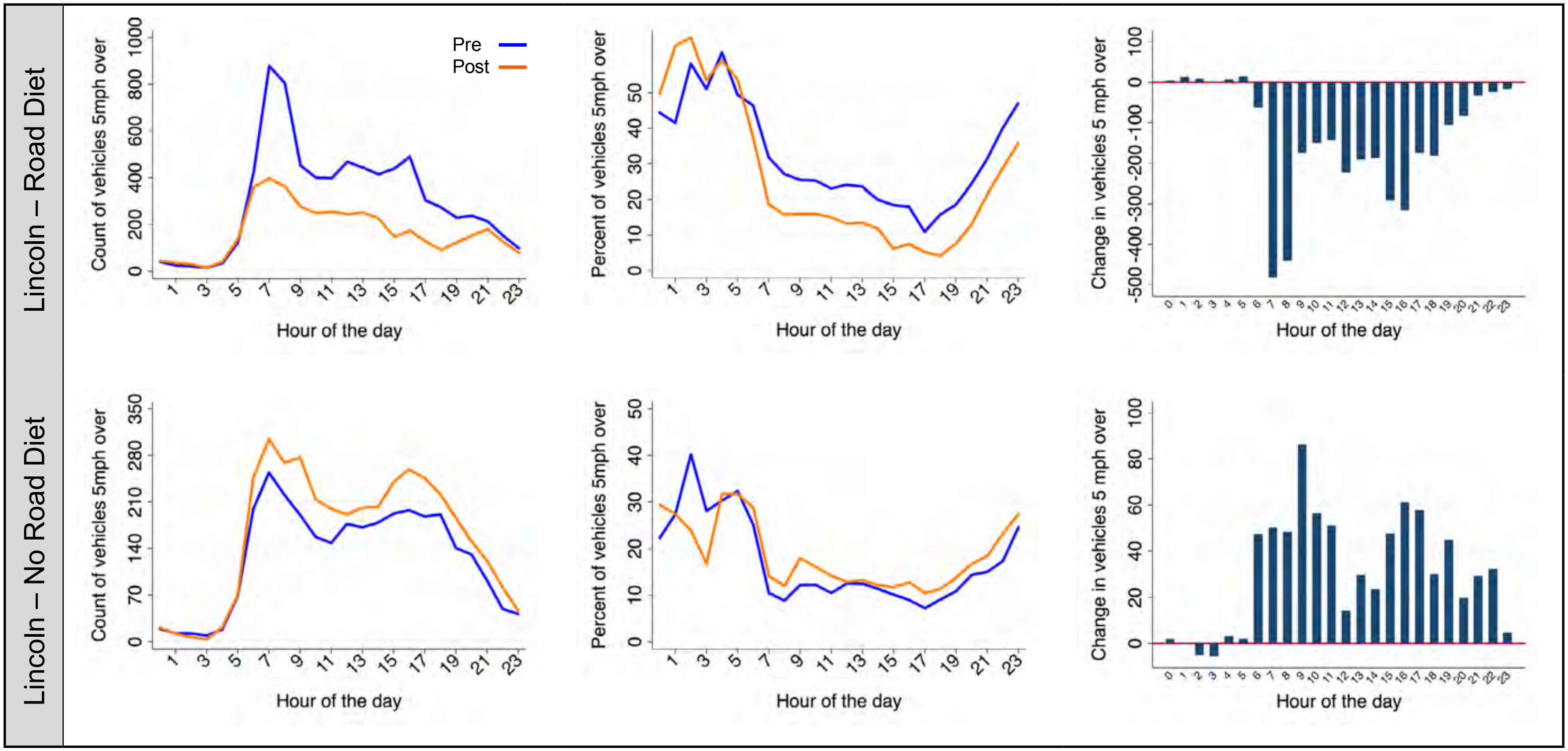


Figure 8. Vehicles Traveling 5+ MPH above the Speed Limit, Pre- and Post-Road Diet, by Hour of the Day, Lincoln Avenue Locations

Note: Y-axis scales differ for each graph.

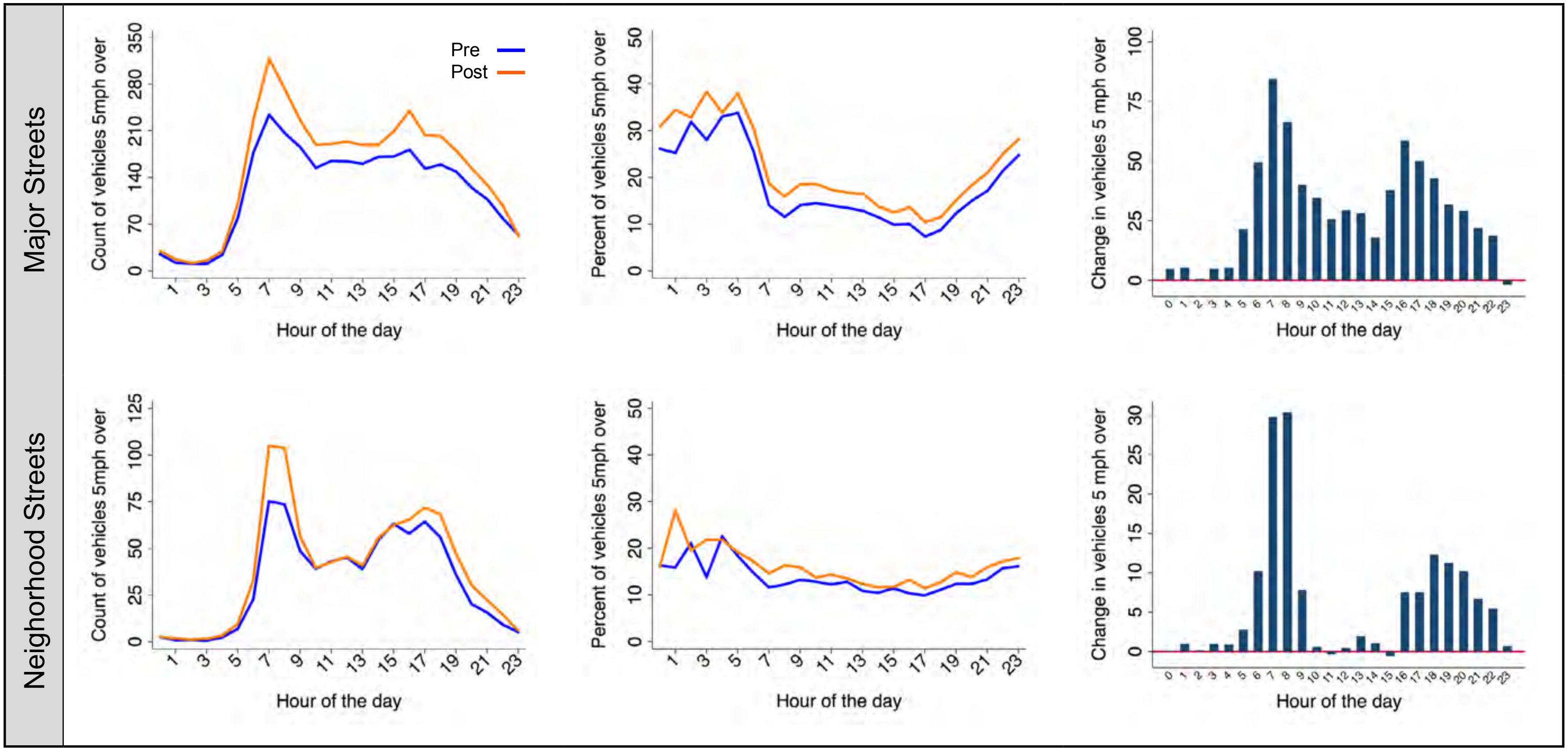


Figure 9. Vehicles Traveling 5+ MPH above the Speed Limit, Pre- and Post-Road Diet, by Hour of the Day, Major and Neighborhood Street Locations

Note: Y-axis scales differ for each graph.

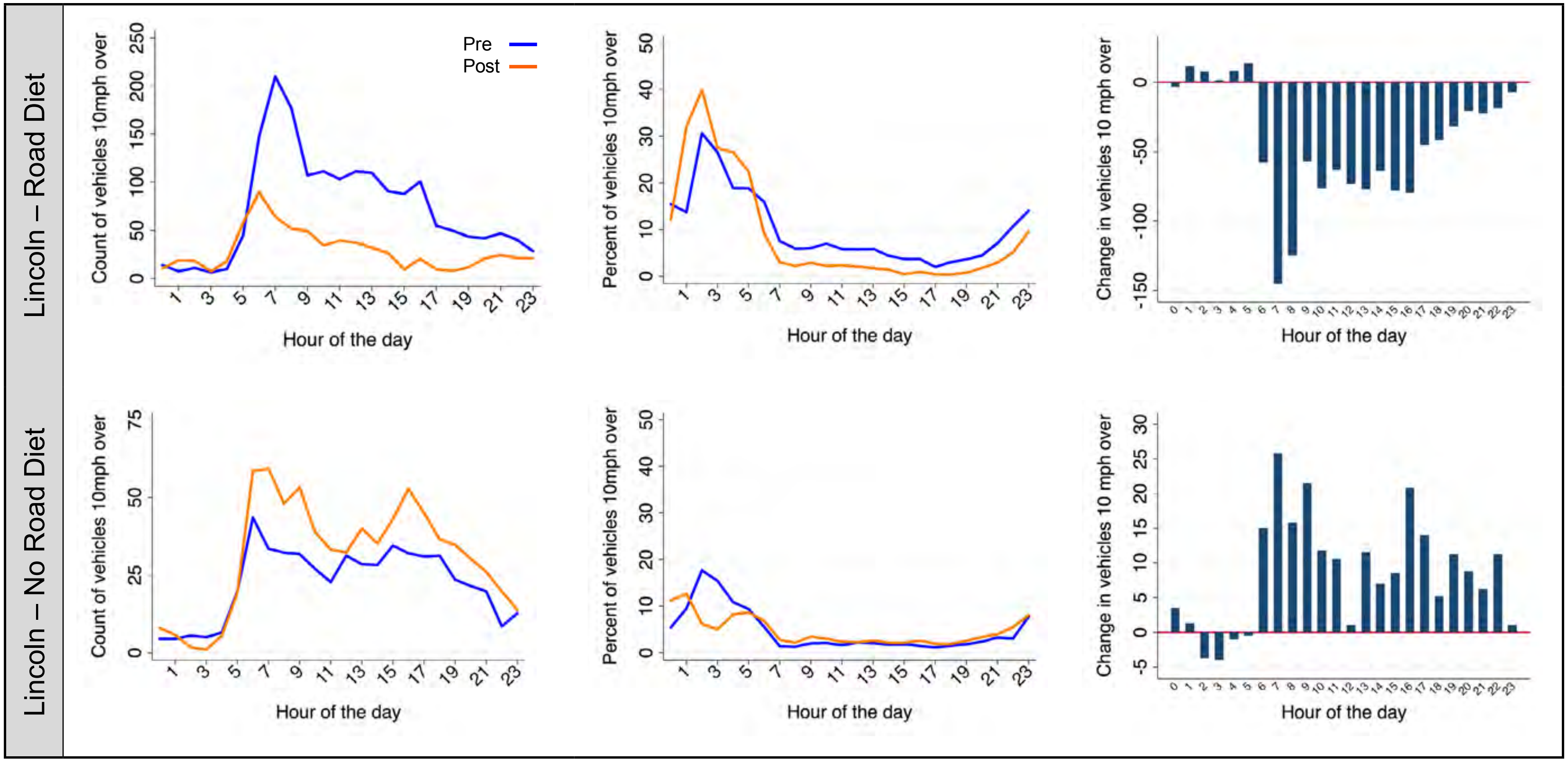


Figure 10. Vehicles Traveling 10+ MPH above the Speed Limit, Pre- and Post-Road Diet, by Hour of the Day, Lincoln Avenue Locations

Note: Y-axis scales differ for each graph.

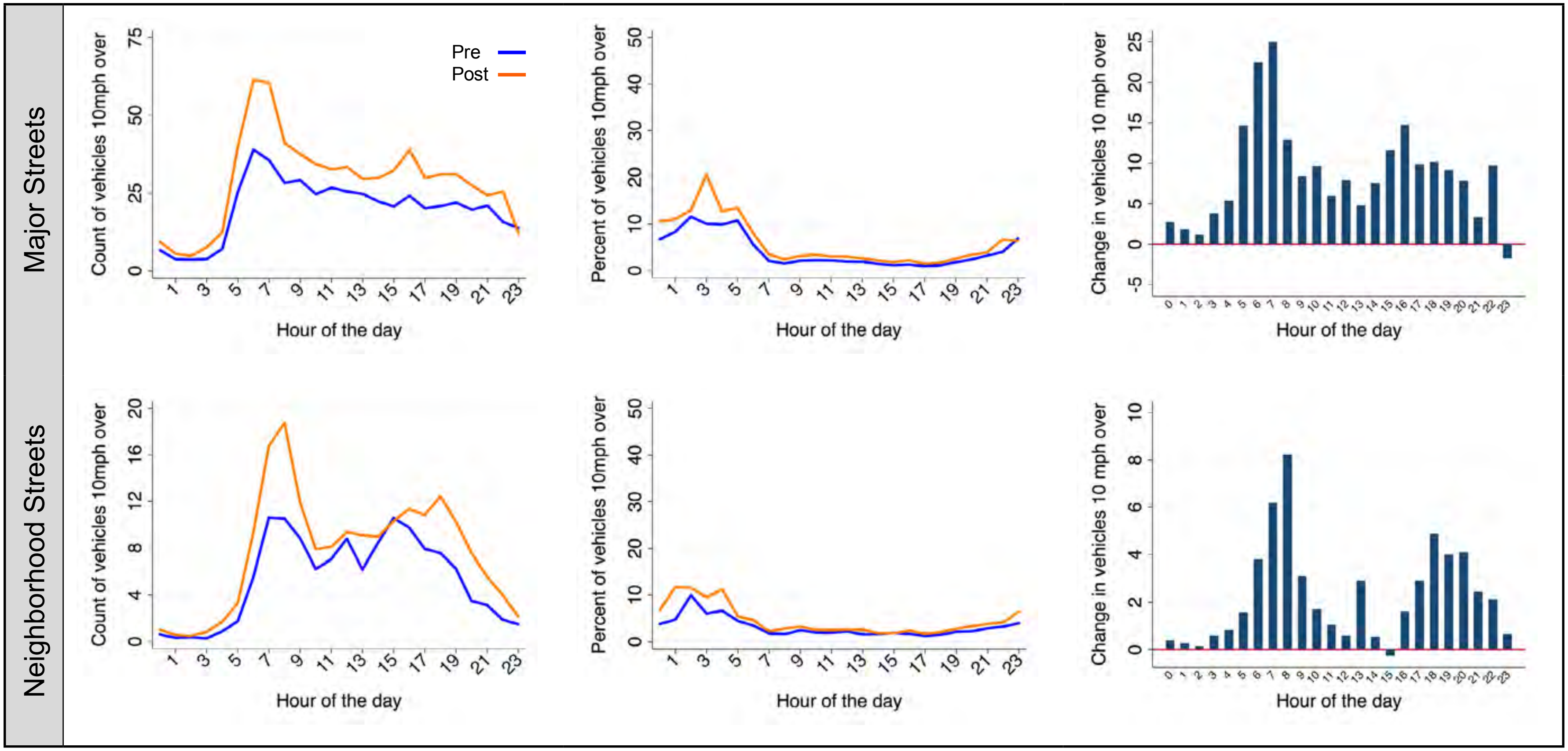


Figure 11. Vehicles Traveling 10+ MPH above the Speed Limit, Pre- and Post-Road Diet, by Hour of the Day, Major and Neighborhood Street Locations

Note: Y-axis scales differ for each graph.

Localized Impacts

One striking impact of the road diet, noticeable only from looking at the data in each of the 45 locations, is that the two Lincoln Avenue road diet data collection points saw very different changes in the number of speeders. (See Table 3 in Appendix A and the figures in Appendix B for detailed information about the road diet data collection points, which are locations 6 and 19.) Location 6 had a major drop in the number of speeders going both 5 mph+ and 10 mph+ over the limit, while location 19 saw only very modest decreases. This difference appears to be explained by the fact that location 6 had many more speeders than location 19, prior to the road diet. The stark difference between the impacts at locations 6 and 19 underscores the importance of collecting data at multiple points along a road diet, since the impacts may not be consistent throughout. Another implication of this observation is that aggregating speed and volume data across multiple locations (two, in this case) can obscure the major positive impact the road diet has in a particular place, in this case location 6.

Moving from the road diet segment itself to the other street types, it is important to assess whether there was increased speeding at specific locations that might warrant additional traffic calming. As noted above, speeds increased across all non-road-diet street types, although in many cases the actual increase in the number of speeders was small, particularly along neighborhood streets.

In general, major streets saw the highest increase in number of speeders. However, two neighborhood streets stood apart from this pattern, as they experienced some of the highest overall increases in number of vehicles speeding: Camino Ramon (location 21) and Hicks Avenue (location 28). In fact, Hicks Avenue saw the second highest overall increase in number of speeders all day going 10 mph+ over the speed limit (113% increase, +693 cars). These locations saw among the highest increase in speeders during the AM and PM peak hours as well. Both streets serve as a north-south route parallel to Lincoln, so some drivers may have shifted here in order to avoid the road diet segment. The large increase in speeders on a residential street suggests that additional traffic calming might be needed for those locations.

Another area of particular concern related to speeding are the locations on Minnesota Avenue very close to Willow Glen Elementary School, locations 25 and 23. Location 23, which is east of the school on the other side of Lincoln Avenue, saw a 215% increase in speeders going 5 mph+ over the limit (+1,558 vehicles) and nearly a 400% increase among those going 10 mph+ over (+342 vehicles). Location 23 also had the single largest increase in 85th percentile speed, an increase of 3.3 mph. (Speeds rose from 32.7 to 36 mph.) Similarly, Location 25, which sits just west of the school, also experienced one of the highest increases in number of speeders among all 45 locations after the road diet. During the AM peak period, a time when many students are arriving at school, there was a 29% increase in speeders going 5 mph+ over the limit and a 32% increase in those going 10 mph+ over the limit. Fortunately, the neighborhood street on the east side of the school (Iris Court, location 24) did not experience this same pattern and actually saw a slight decline in speeding.

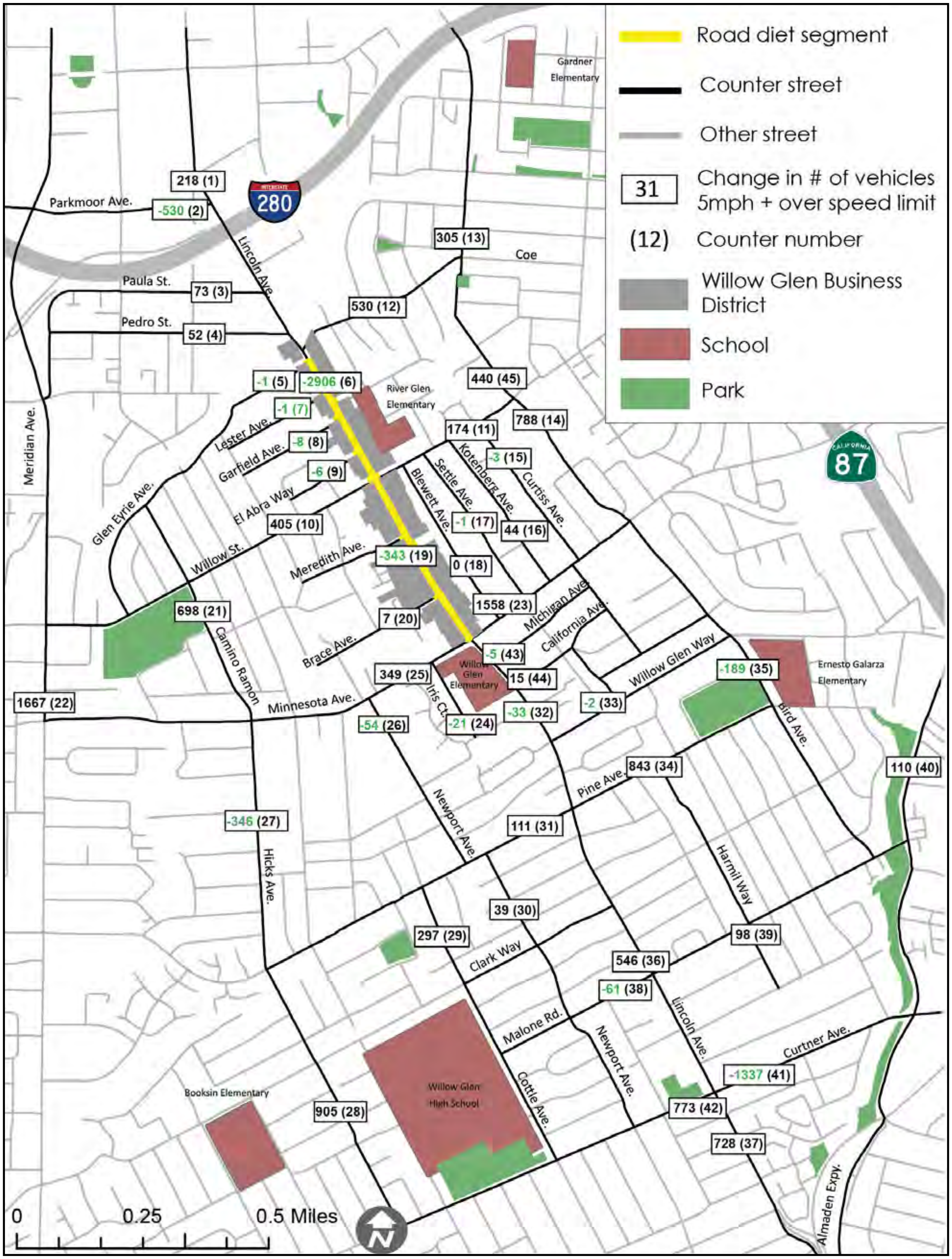


Figure 12. Change in Number of Vehicles 5+ MPH over the Speed Limt, Pre- and Post-Road Diet, by Counter Location

Source: Map created by Nicholas Danty using shapefiles from the City of San Jose Community Development Department and Santa Clara County Department of Planning and Development.

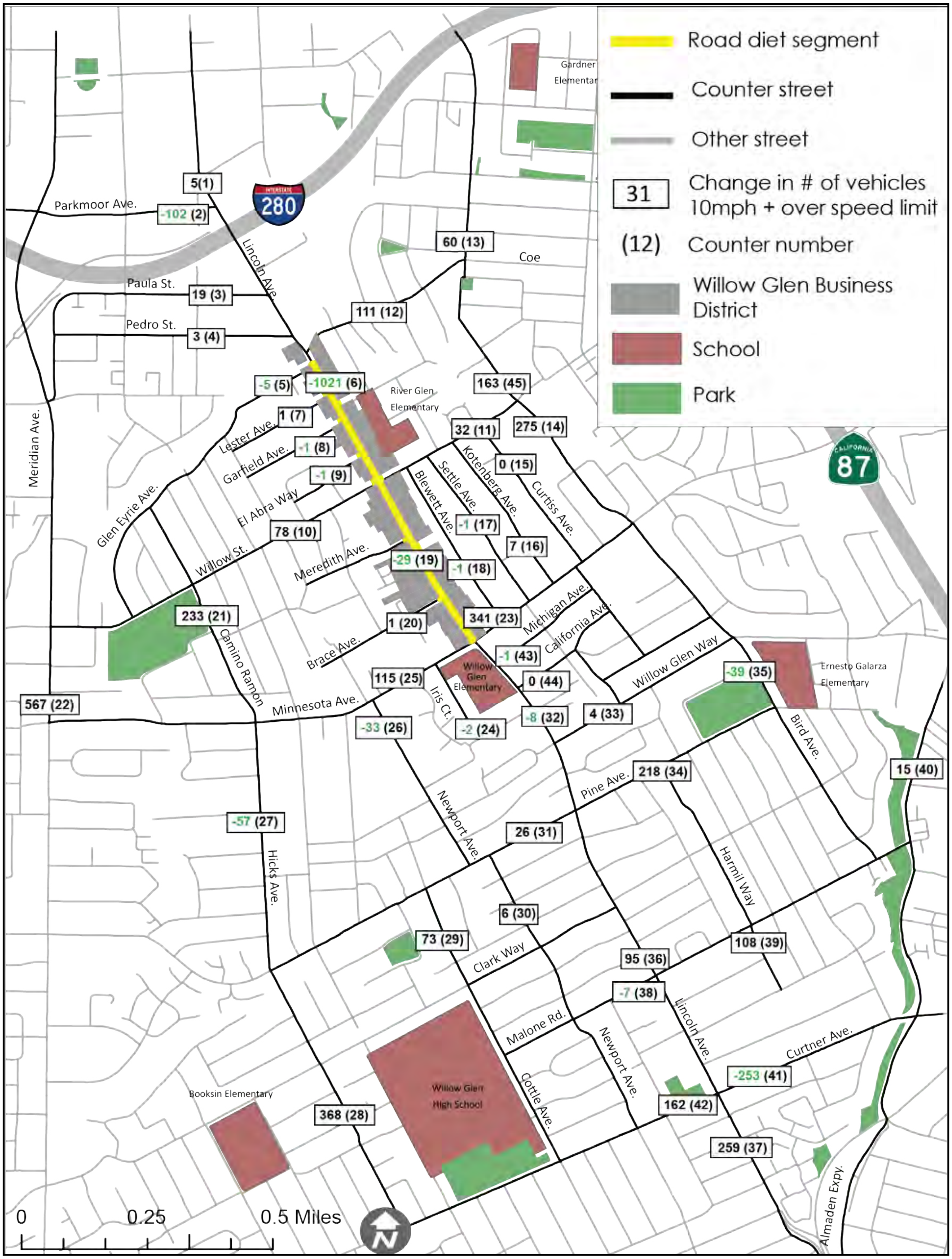


Figure 13. Change in Number of Vehicles 10+ MPH over the Speed Limt, Pre- and Post-Road Diet, by Counter Location

Source: Map created by Nicholas Danty using shapefiles from the City of San Jose Community Development Department and Santa Clara County Department of Planning and Development.

V. RECOMMENDATIONS FOR EVALUATING SPEED AND VOLUME IMPACTS FROM ROAD DIETS

This chapter concludes the report with recommendations for how city staff and researchers can design road diet evaluations to effectively assess speed and volume impacts. These recommendations flow from our analysis of the City of San José data, as well as from our review of other road diet evaluations. The chapter begins with suggested approaches to designing the data collection plan and then offers suggestions for the data analysis approach.

DESIGNING THE DATA COLLECTION PLAN

A careful plan for a road diet data collection effort, with an eye to the way the information will later by analyzed, permits high-quality evaluations. By contrast, without careful planning it is possible to spend a great deal of time and money collecting data that ultimately does not allow evaluators to assess the project impacts with any certainly or nuance. In short, if a city plans to invest the money to evaluate speed and volume impacts at all, it is worth making sure that this investment is carefully designed to get the maximum benefit possible.

For the Lincoln Avenue road diet, the City of San Jose collected an impressively large set of data that allowed for deep analysis of many facets of the road diet impacts. Particularly noteworthy was the choice to look at many locations outside the road diet segment itself. However, our analysis of the data revealed that some changes to the data collection process would have provided data that could have been considerably more useful for analysis. Our experience with the strengths and limitations of the Lincoln Avenue data supports the following recommendations for road diet evaluation plans:

- *Collect data on enough days to smooth day-to-day variations.* It is important to do this for various reasons. More days of data collection ensures that results aren't distorted by unusual events such as atypical weather, construction, or accidents. Additional days of collection also enables more accurate statistical analysis and a greater likelihood of detecting statistically significant impacts. The cost to add in additional days is unlikely to significantly add to evaluation costs, so is likely to be well worth the small extra investment.

- *Determine the minimum amount of data needed by conducting a power analysis*. Specifically, this process can identify the minimum sample size needed (i.e. days of data collection and/or number of locations for data collection) in order to increase the likelihood of detecting a statistically significant effect.

- *Select days for evaluation with "regular" traffic patterns*. It is important to collect data on days when there are no school holidays or other major events. For an area with a business district such as Lincoln Avenue, it may also be advisable to collect data on Friday evenings and/or weekends as well as the more traditional data collection on mid-week days. Business districts often see considerable traffic on weekends, but with different mixes of modes and types of drivers as compared to weekday traffic.

- *Collect and share the raw data for every vehicle instead of packaging data into categories*. Analysts have much greater flexibility with the types of analysis they can do if they can work with the raw data. For example, giving the data on the speed of each vehicle, rather than presenting the data by speed "buckets" as was done with the Lincoln Avenue data, would have allowed us to better estimate speeding patterns or recalculate 85th percentile speeds for different time periods. One potential limitation with this approach, however, is that analysts will need the technical skill to manipulate very large quantities of data.

- *Develop a method to compare changes in traffic volumes and speeds in the road diet area with changes in volumes and speeds outside the road-diet neighborhood itself*. This could be done with a cross-sectional research design – comparing the road diet neighborhood with a comparable neighborhood elsewhere in the city – or by using city-wide data as the comparison. For an example of a study that used the former approach, see the study by Huang, et al, that looks at a variety of road diets in the states of California and Washington.[18] The *Road Diet Handbook* by Knaap, et al, also provides advice on designing cross-sectional studies.[19]

DATA ANALYSIS APPROACHES

To prepare this report, we explored numerous options for different speed and volume impact metrics, for statistical testing of the road diet impacts, and for displaying the results graphically. Based on this experience, we recommend the following approaches to conducting the data analysis and communicating the findings:

- *Analyze and present the impacts at each data collection location as well as impacts by street types*. The Lincoln Avenue study results showed that averaging changes in speed and volume across multiple locations can mask significant variations at individual locations. Thus, it is important to look at each location as well as mean values across multiple data-collection locations.

- *Analyze impacts by time of day as well as by all-day metrics*. The study findings show that all-day metrics can mask considerable variation by time of day, with impacts at the peak hours often being much larger than the all-day impacts.

- *Present findings about changes as both actual counts and percentages.* It is important to look at changes both as numbers and percentages in order to understand the true impact and relevance of the study findings. For example, most traffic analysts would not consider an extra few hundred vehicles a day to be a meaningful increase for a street carrying ten thousand of vehicles a day, whereas that same number of extra vehicles might be concerning on a neighborhood street. Conversely, on a street that previously had only a handful of speeders, a few extra could create a very large *percentage* increase that is nevertheless an impact of only a few vehicles per day and therefore not likely to be a serious concern (even if undesirable).

- *Look at the numbers of "speeders," rather than mean speeds, to identify safety outcomes*. While mean speed values may help to assess whether a road diet is unreasonably slowing traffic flow, mean speeds are not an effective way to identify whether the road diet has achieved one of its key goals, which is to reduce the number of vehicles traveling at *dangerous* speeds. Analysts should define one or more speed thresholds of concern, and then assess the number of vehicles traveling above those thresholds.

- *Design graphics that emphasize the changes between the pre and post periods*. Using graphics that show the *change* before and after the road diet, as opposed to simply showing the before and after values, makes it easier for readers to quickly grasp which impacts are important and which are not.

APPENDIX A: SUMMARY DATA FOR EACH DATA COLLECTION POINT

Table 3 presents summary information about each data collection location.

Table 3. Volume and Speed Data for Each Location, Pre- and Post-Road Diet

Location name (and site #)	Speed limit	Average daily traffic Pre	Average daily traffic Post	#/vehicles per AM peak hour Pre	#/vehicles per AM peak hour Post	#/vehicles per PM peak hour Pre	#/vehicles per PM peak hour Post	#/vehicles 5+ MPH over limit, per day Pre	#/vehicles 5+ MPH over limit, per day Post	#/vehicles 10+ MPH over limit, per day Pre	#/vehicles 10+ MPH over limit, per day Post	85th percentile speed (MPH) Pre	85th percentile speed (MPH) Post
Lincoln road diet													
Lincoln s/o Glen Eyrie (6)	25	15,555	15,347	1,457	1,180	1,189	1,164	6,210	3,304	1,608	587	34	31
Lincoln s/o Meredith (19)	25	15,889	14,174	1,326	962	1,303	1,059	1155	812	147	118	28	27
Lincoln non-road diet													
Lincoln n/o Parkmoor (1)	35	10,382	9,879	1,019	850	886	803	972	1,191	161	220	39	39
Lincoln s/o Nevada (32)	35	14,818	14,674	1,402	1,172	1,268	1,124	1,121	1,087	174	166	38	38
Lincoln s/o Clark (36)	35	16,319	15,783	1,520	1,330	1,409	1,219	1,398	1,945	223	318	38	39
Lincoln s/o Curtner (37)	35	13,261	13,344	1,306	1,238	1,120	1,067	2,638	3,366	521	780	41	42
Major streets													
Parkmoor w/o Lincoln (2)	30	7,855	6,947	579	475	578	496	924	394	150	48	34	32
Willow w/o Lincoln (10)	30	8,778	8,200	570	521	739	662	1,001	1,406	123	201	34	35
Willow e/o Lincoln (11)	30	12,103	11,298	695	656	964	950	674	848	93	126	32	33
Coe e/o Riverside (12)	30	5,782	5,977	426	455	517	525	515	1,045	58	170	33	35
Bird n/o Coe (13)	35	16,022	16,318	1,313	1,374	1,423	1,361	1,301	1,606	222	282	38	39
Bird s/o Willow (14)	25	10,307	9,533	923	793	953	951	3,744	4,533	635	910	33	34
Meridian n/o Minnesota (22)	35	33,421	33,221	2,584	2,479	2,577	2,473	2,723	4,390	446	1,013	38	40
Minnesota e/o Lincoln (23)	30	10,772	11,251	785	843	915	944	725	2,283	89	431	33	36
Minnesota w/o Lincoln (25)	30	11,156	11,863	839	967	924	998	2,720	3,069	529	644	37	37
Pine w/o Lincoln (31)	30	7,763	7,815	594	609	684	672	388	499	40	67	32	33
Pine e/o Lincoln (34)	25	4,620	4,655	378	437	413	402	849	1,693	106	325	30	33
Bird s/o Willow Glen Way (35)	35	11,995	11,274	1,048	1,085	1,049	954	714	525	100	60	37	37
Almaden RD n/o Malone (40)	35	6,344	6,523	565	588	471	460	692	802	110	125	39	39
Curtner e/o Lincoln (41)	35	16,846	17,006	1,278	1,265	1,334	1,337	3,602	2,264	767	514	41	39
Curtner w/o Lincoln (42)	35	17,794	18,219	1,470	1,469	1,428	1,471	1,745	2,518	286	448	39	40
Bird n/o Willow (45)	25	12,154	12,837	1,060	1,180	1,110	1,086	2,830	3,270	357	520	31	32

Table 3, continued

Location name (and site #)	Speed limit	Average daily traffic		#/vehicles per AM peak hour		#/vehicles per PM peak hour		#/vehicles 5+ MPH over limit, per day		#/vehicles 10+ MPH over limit, per day		85th percentile speed (MPH)	
		Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Neighborhood streets													
Paula w/o Lincoln (3)	25	1,402	1,567	79	89	127	125	216	289	33	52	30	30
Pedro w/o Lincoln (4)	25	3,227	2,984	251	213	279	258	590	642	96	99	30	31
Glen Eyrie w/o Lincoln (5)	25	1,784	1,932	118	138	166	190	89	87	13	8	27	27
Lester w/o Lincoln (7)	25	640	531	47	40	58	45	10	9	2	3	24	24
Garfield w/o Lincoln (8)	25	561	575	41	42	57	54	26	18	4	2	27	25
El Abra w/o Lincoln (9)	25	402	414	40	49	32	34	7	1	2	0	26	22
Curtiss s/o Willow (15)	25	659	592	45	46	50	43	6	3	1	1	23	23
Kotenburg s/o Willow (16)	25	618	724	57	75	57	58	50	94	5	13	28	29
Settle s/o Willow (17)	25	523	469	38	40	34	37	16	14	3	2	26	26
Blewett s/o Willow (18)	25	1,144	1,154	57	71	100	105	22	21	4	3	25	25
Brace e/o Coolidge (20)	25	1,812	1,449	89	87	126	122	41	48	3	4	25	26
Camino Ramon s/o Willow (21)	25	3,461	3,532	382	424	279	280	956	1,654	140	373	32	34
Iris s/o Minnesota (24)	20	736	580	69	62	38	35	62	41	7	5	23	22
Newport s/o Minnesota (26)	25	3,145	3,040	349	372	203	225	839	785	156	123	32	32
Hicks s/o Cherry Valley (27)	25	4,932	4,929	423	476	448	413	2,024	1,678	398	340	33	33
Hicks s/o Callecita (28)	25	5,429	5,378	585	578	424	418	2,132	3,037	325	693	33	34
Cottle s/o Pine (29)	25	3,831	3,720	431	434	321	302	1,020	1,317	171	245	32	33
Newport s/o Fairview (30)	25	1,622	1,766	206	222	111	123	73	112	8	14	27	28
Willow Glen w/o Hill (33)	25	968	850	100	89	75	67	74	71	9	13	28	28
Malone w/o Lincoln (38)	25	2,557	1,197	360	168	189	77	111	50	14	7	26	26
Malone e/o Harmil (39)	30	4,295	4,231	472	463	348	315	2,233	2,331	590	698	35	35
Michigan e/o Lincoln (43)	25	309	301	18	37	28	18	6	1	1	0	24	22
California e/o Lincoln (44)	25	551	643	45	80	28	37	9	24	2	3	26	26

APPENDIX B: GRAPHIC REPRESENTATION OF VOLUME AND SPEED DATA AT EACH DATA COLLECTION POINT

This appendix shows three types of data for each data collection point:

- All-day volumes
- 5+ MPH over speeders (“all speeders”)
- 10+ mph over speeders (“extreme speeders”)

The appendix is organized by data type. Within each data type section, the locations are organized by road type: first the road diet locations, then the Lincoln Avenue-no diet locations, then major streets, and finally the neighborhood streets.

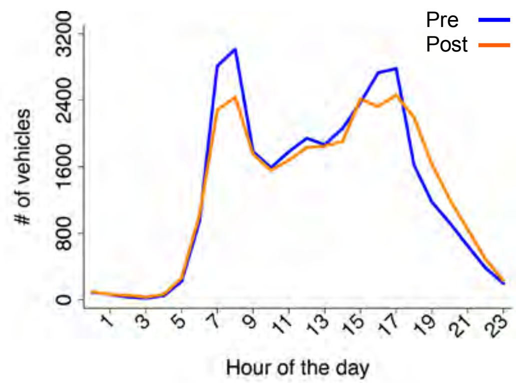
Note that the y-axis scale is not consistent across all graphs.

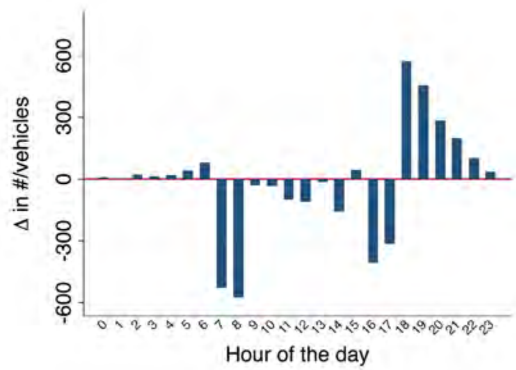
ALL-DAY TRAFFIC VOLUME GRAPHS

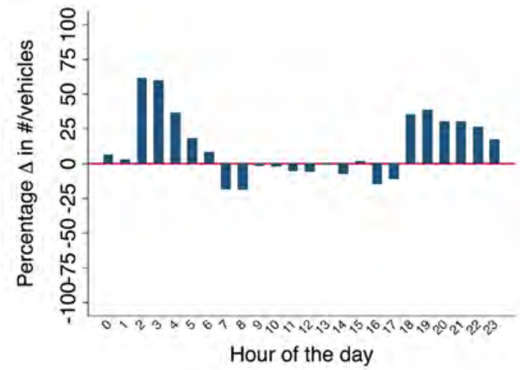
Lincoln Avenue Road Diet Location Graphs: Before-and-after the road diet – total number of vehicles before-and-after, change in number of vehicles after the road diet, and percentage change in number of vehicles after the road diet.

Total number of vehicles, by hour	Change in number of vehicles after the road diet, by hour	Percentage change in number of vehicles after the road diet, by hour

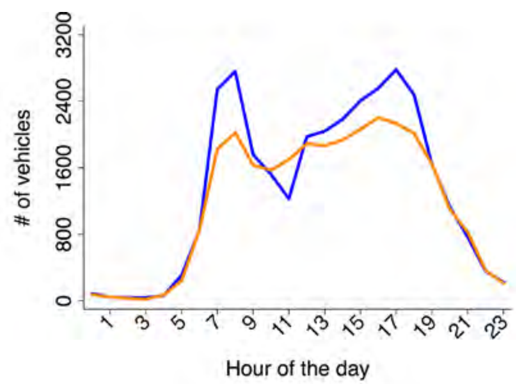
Location 6: Lincoln, south of Glen Eyrie

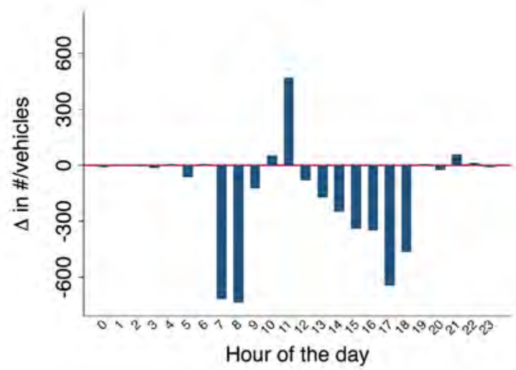


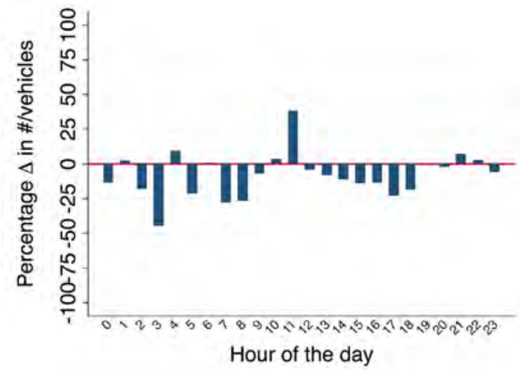




Location 19: Lincoln, south of Meredith



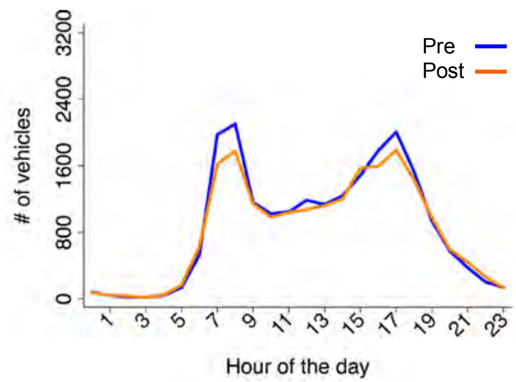


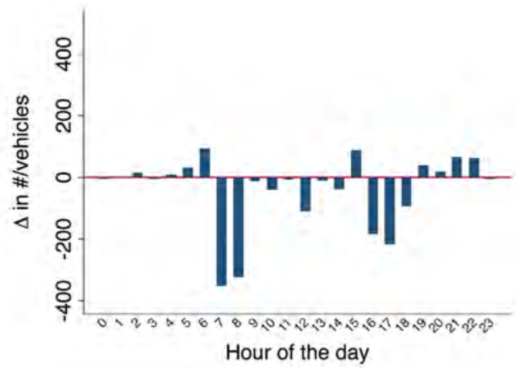


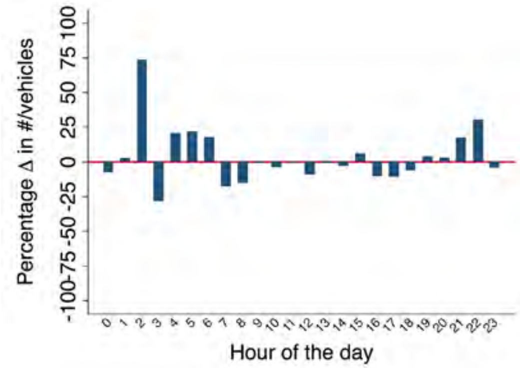
Lincoln Avenue Non-Road Diet Location Graphs: Before-and-after the road diet – total number of vehicles before-and-after, change in number of vehicles after the road diet, and percentage change in number of vehicles after the road diet.

Total number of vehicles, by hour	Change in number of vehicles after the road diet, by hour	Percentage change in number of vehicles after the road diet, by hour

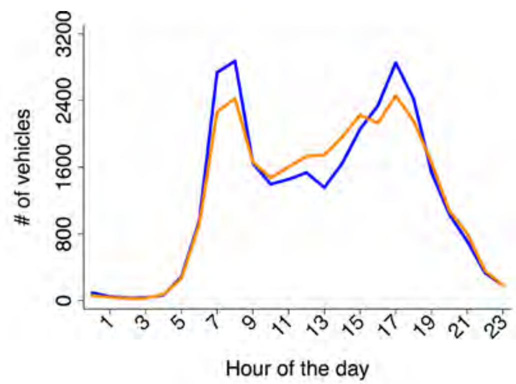
Location 1: Lincoln, north of Parkmoor

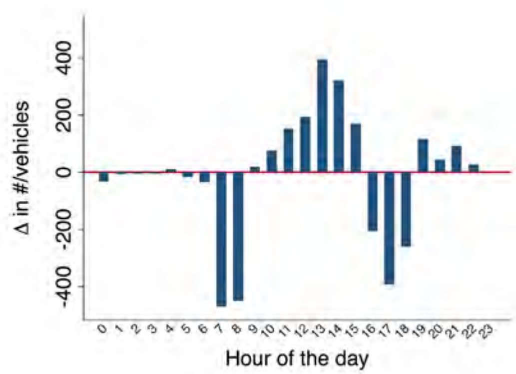


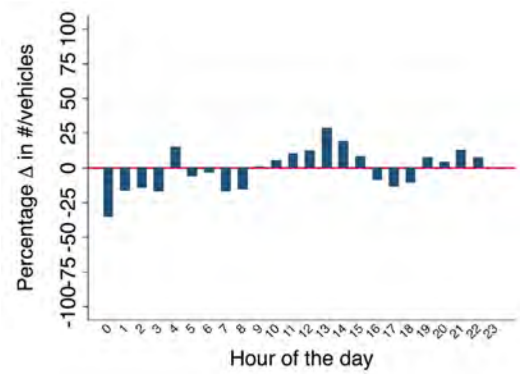




Location 32: Lincoln, south of Nevada

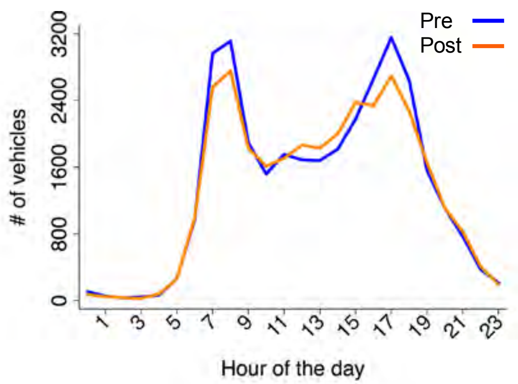


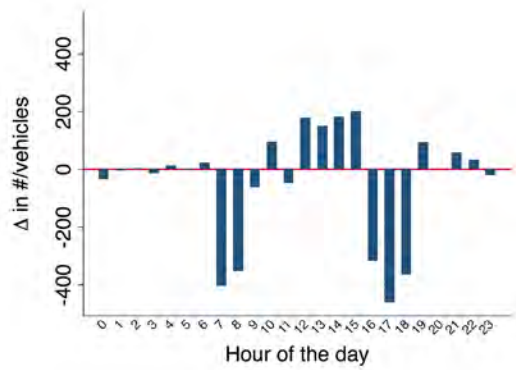


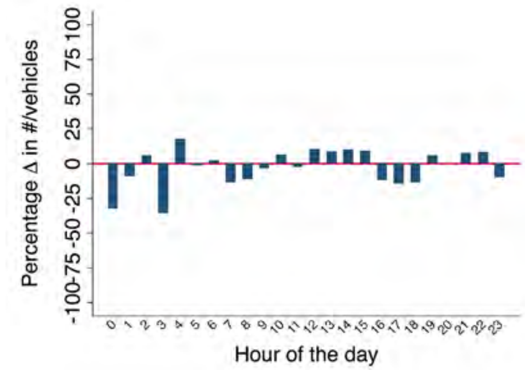


Total number of vehicles, by hour	Change in number of vehicles after the road diet, by hour	Percentage change in number of vehicles after the road diet, by hour

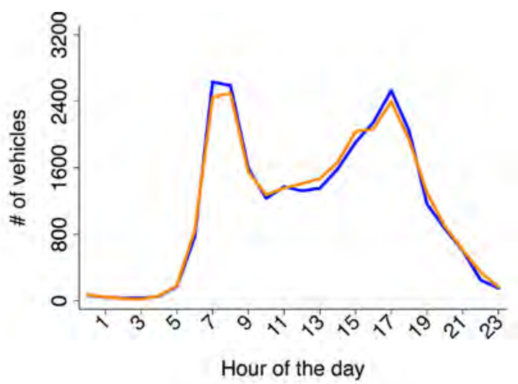
Location 36: Lincoln, south of Clark

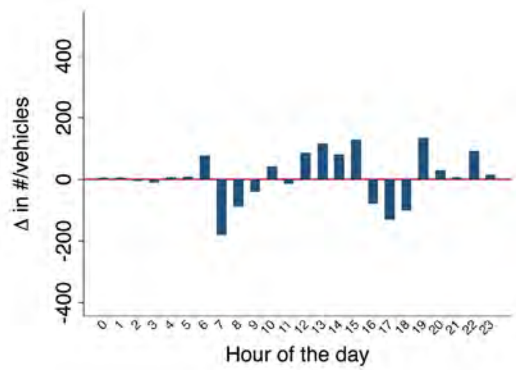


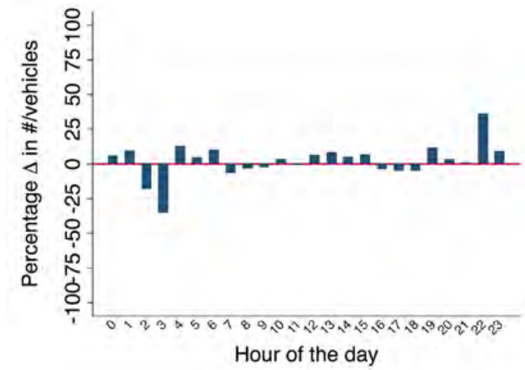




Location 37: Lincoln, south of Curtner



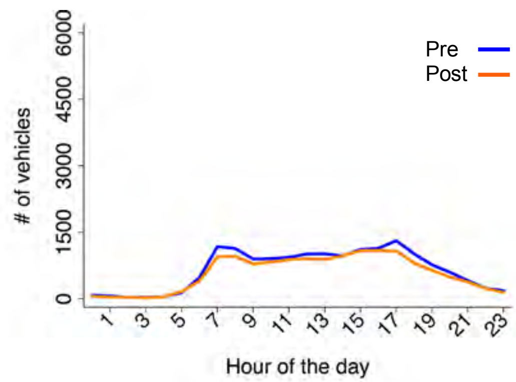


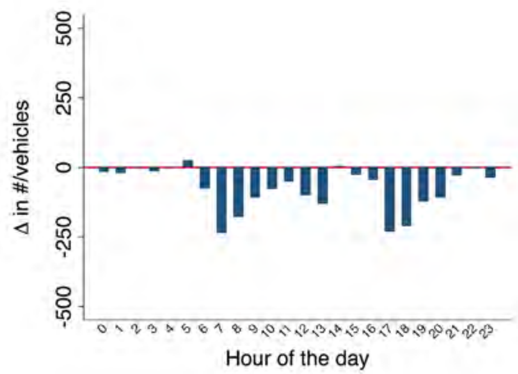


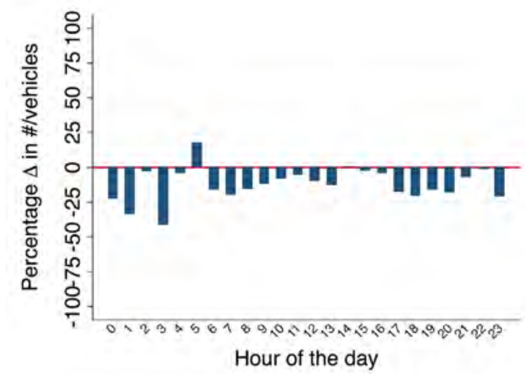
Major Streets Location Graphs: Before-and-after the road diet – total number of vehicles before-and-after, change in number of vehicles after the road diet, and percentage change in number of vehicles after the road diet.

Total number of vehicles, by hour	Change in number of vehicles after the road diet, by hour	Percentage change in number of vehicles after the road diet, by hour

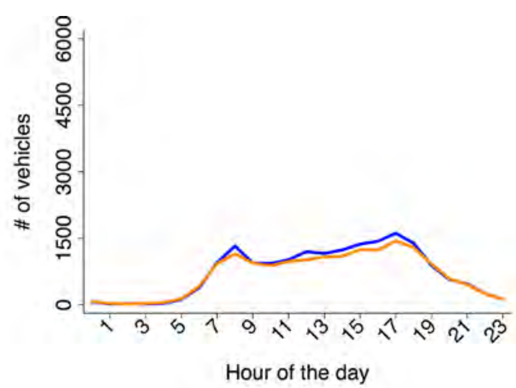
Location 2: Lincoln, south of Glen Eyrie

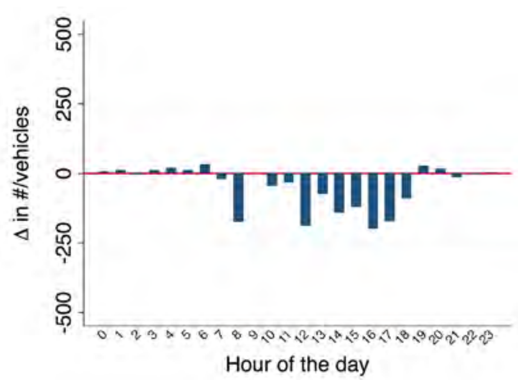


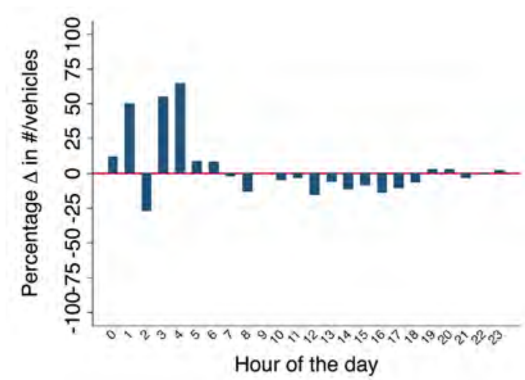




Location 10: Willow, west of Lincoln

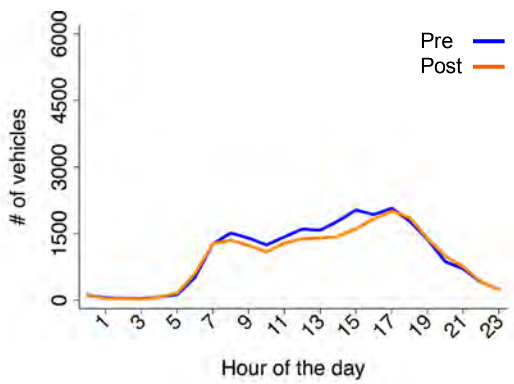


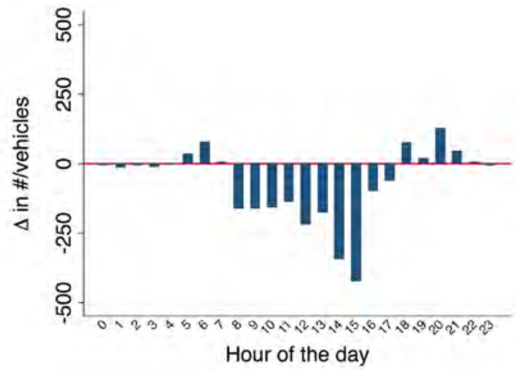


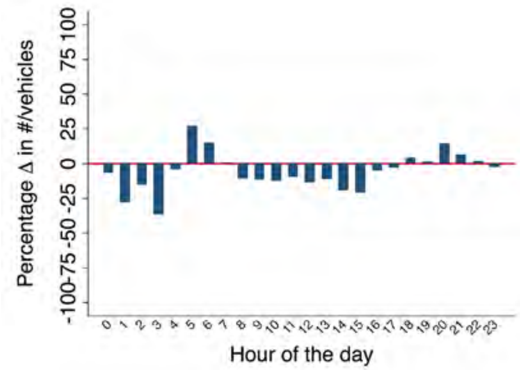


Total number of vehicles, by hour	Change in number of vehicles after the road diet, by hour	Percentage change in number of vehicles after the road diet, by hour

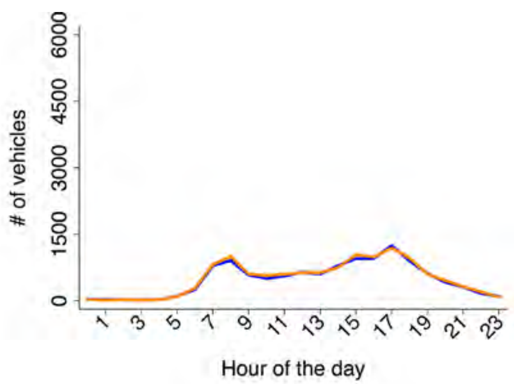
Location 11: Willow, east of Lincoln

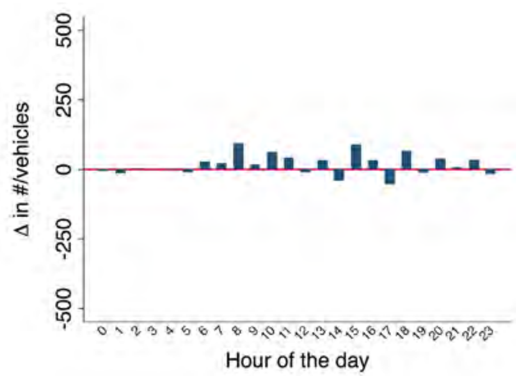


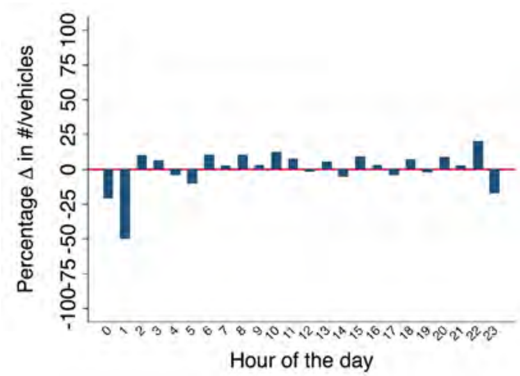




Location 12: Coe, east of Riverside

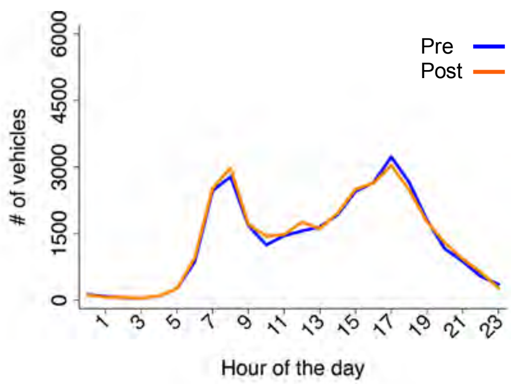


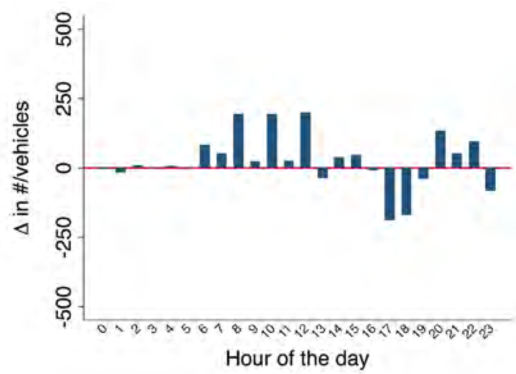


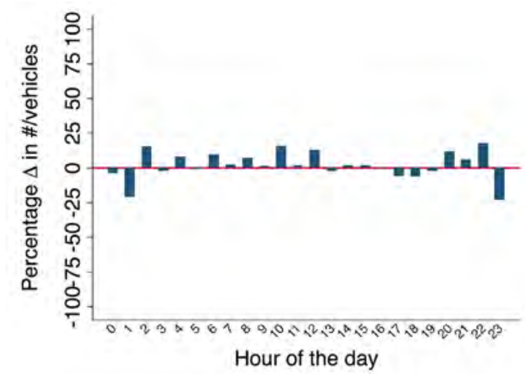


Total number of vehicles, by hour	Change in number of vehicles after the road diet, by hour	Percentage change in number of vehicles after the road diet, by hour

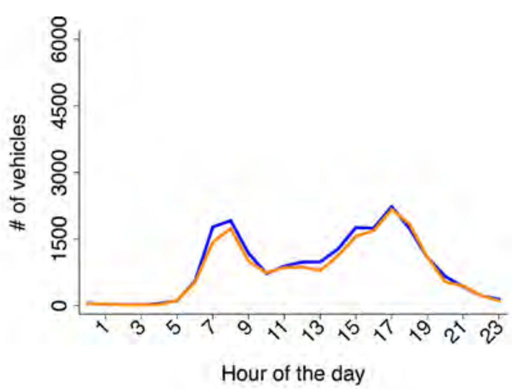
Location 13: Bird, north of Coe

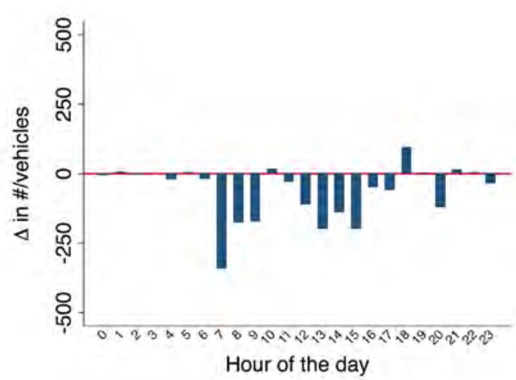


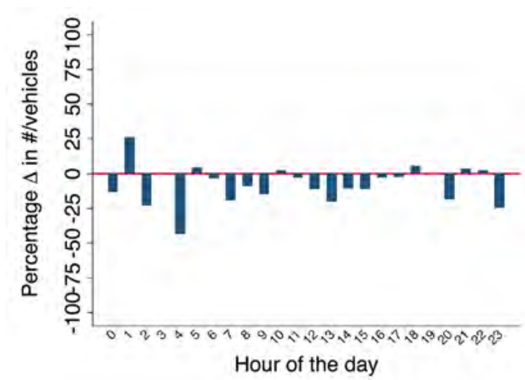




Location 14: Bird, south of Willow

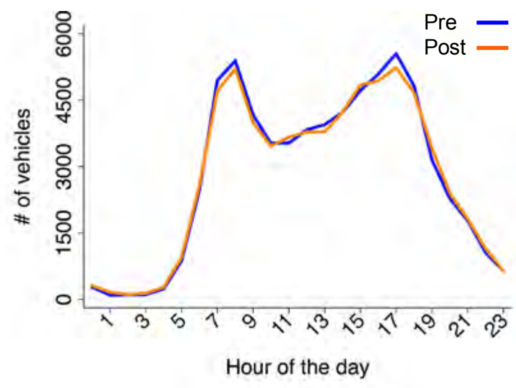


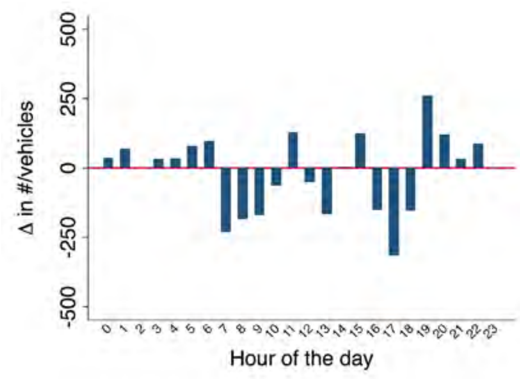


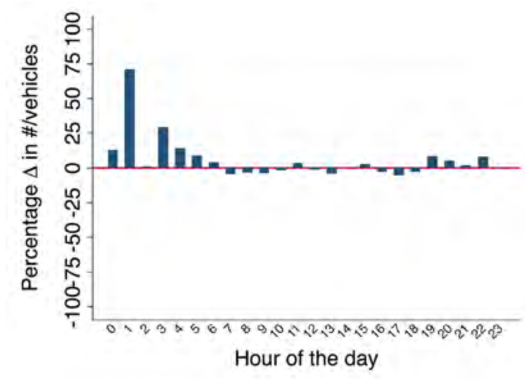


Total number of vehicles, by hour	Change in number of vehicles after the road diet, by hour	Percentage change in number of vehicles after the road diet, by hour

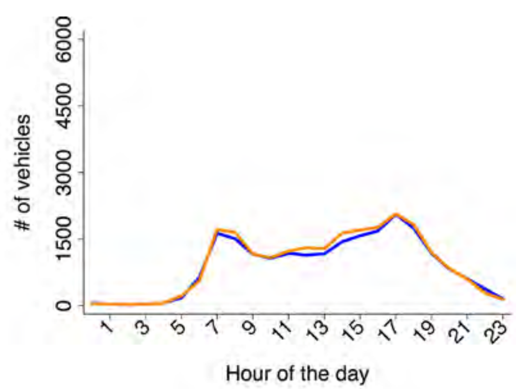
Location 22: Meridian, north of Minnesota

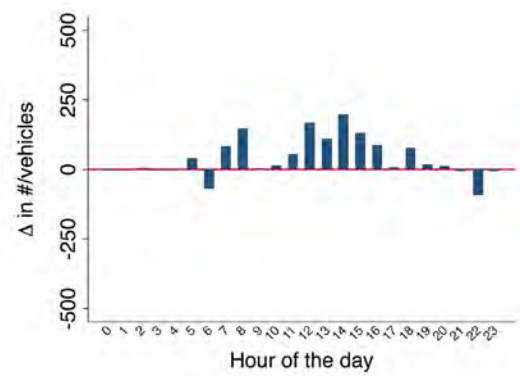


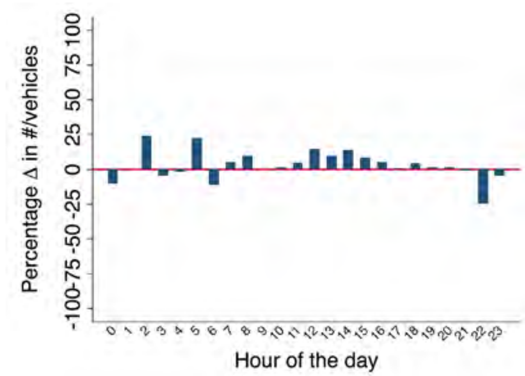




Location 23: Minnesota, east of Lincoln

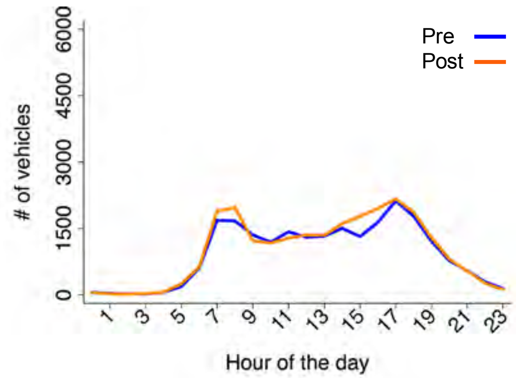


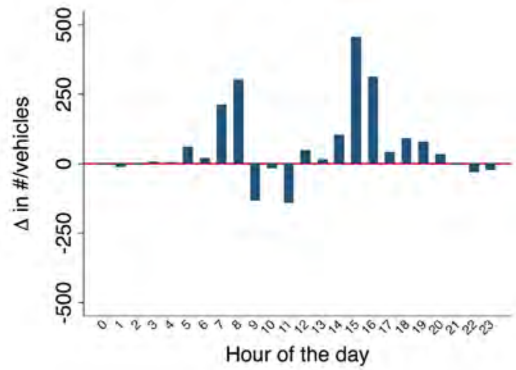


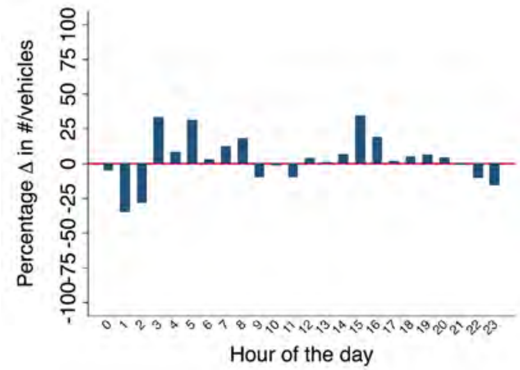


Total number of vehicles, by hour	Change in number of vehicles after the road diet, by hour	Percentage change in number of vehicles after the road diet, by hour

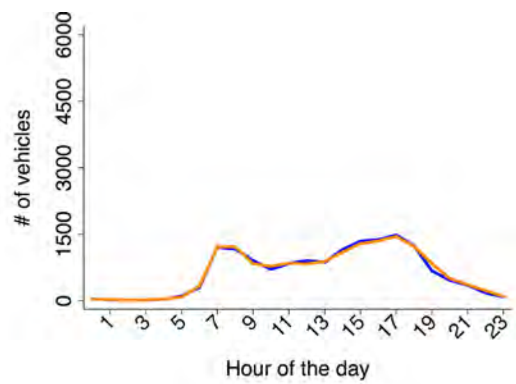
Location 25: Minnesota, west of Lincoln

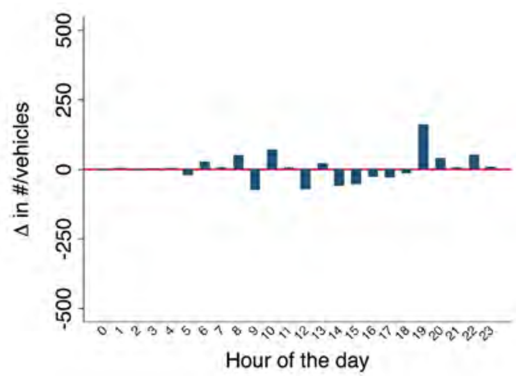


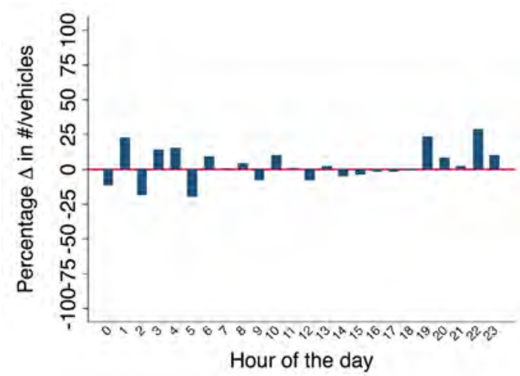




Location 31: Pine, west of Lincoln

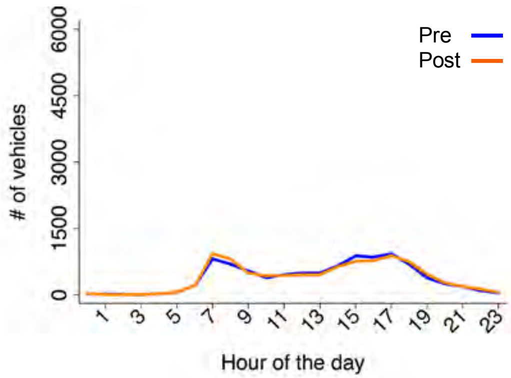


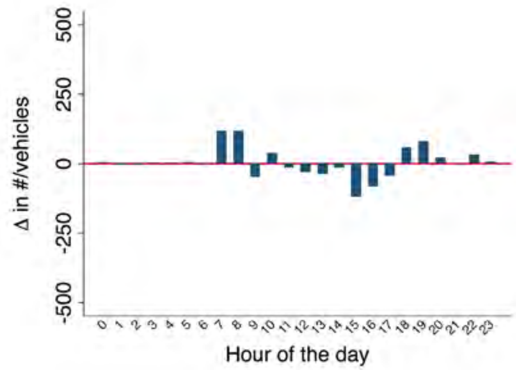


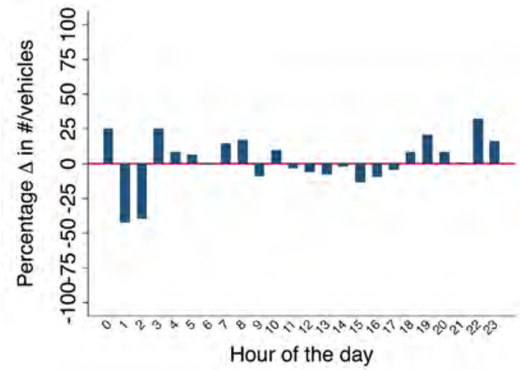


Total number of vehicles, by hour	Change in number of vehicles after the road diet, by hour	Percentage change in number of vehicles after the road diet, by hour

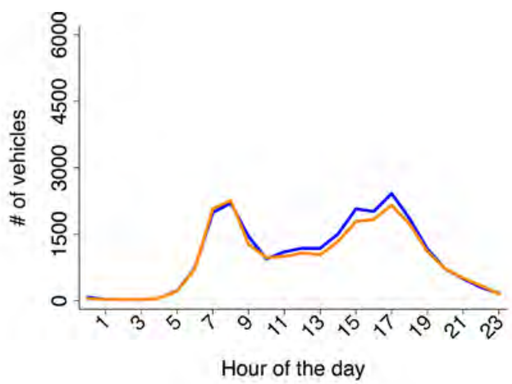
Location 34: Pine, east of Lincoln

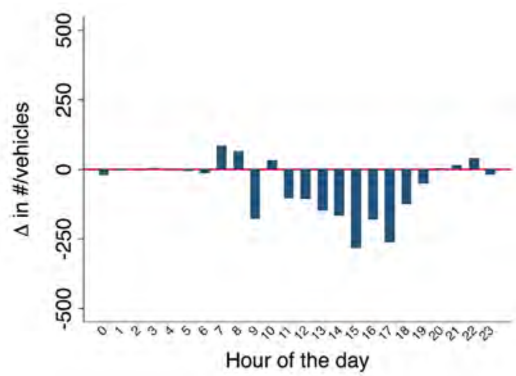


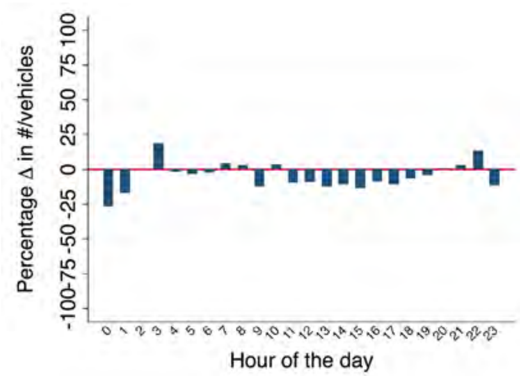




Location 35: Bird, south of Willow Glen Way

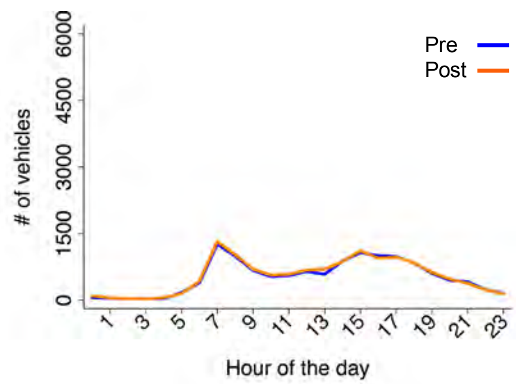


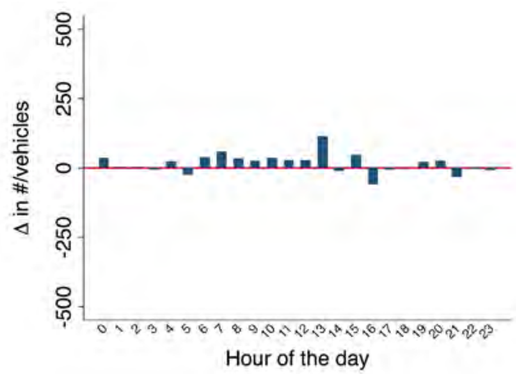


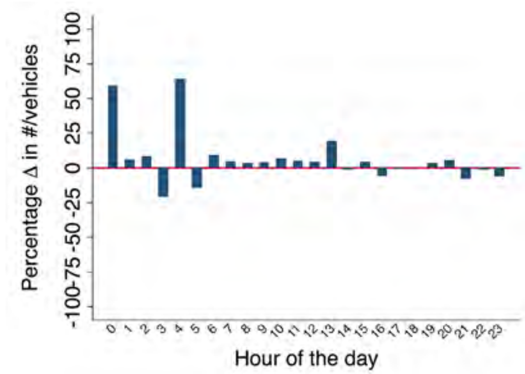


Total number of vehicles, by hour	Change in number of vehicles after the road diet, by hour	Percentage change in number of vehicles after the road diet, by hour

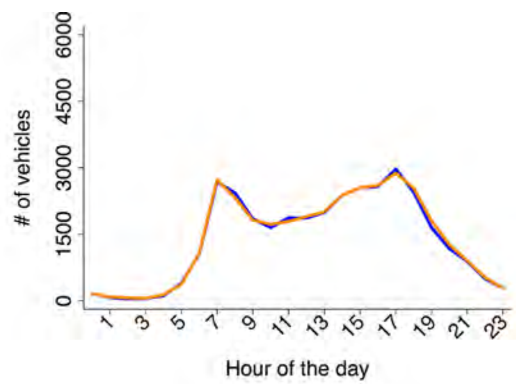
Location 40: Almaden, north of Malone

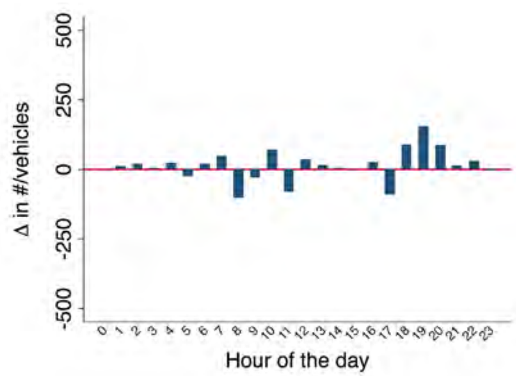


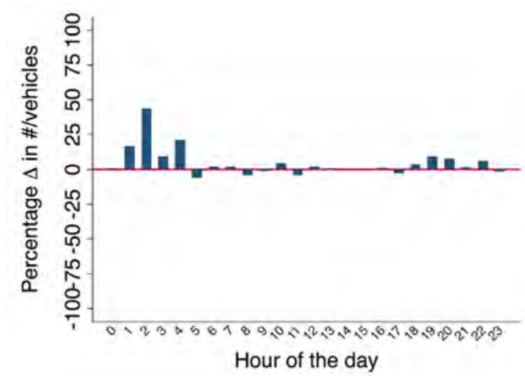




Location 41: Curtner, east of Lincoln

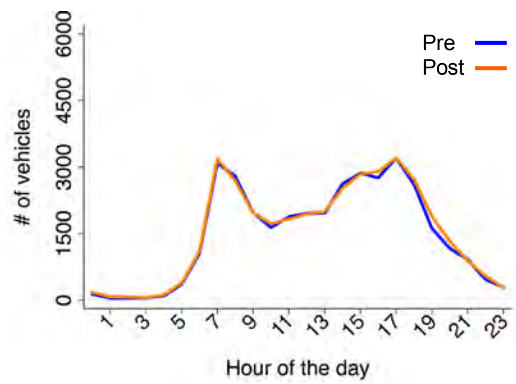


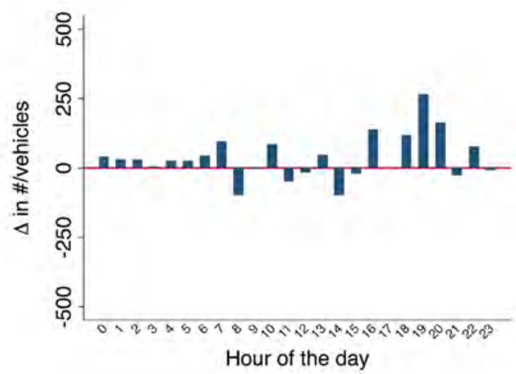


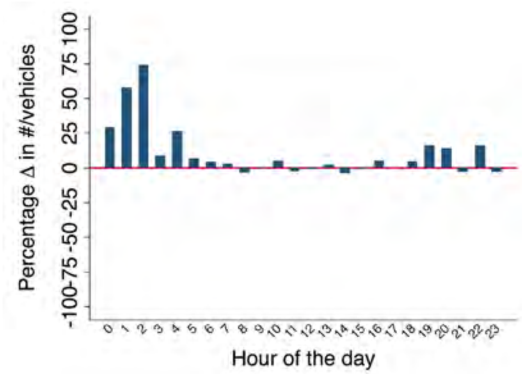


Total number of vehicles, by hour	Change in number of vehicles after the road diet, by hour	Percentage change in number of vehicles after the road diet, by hour

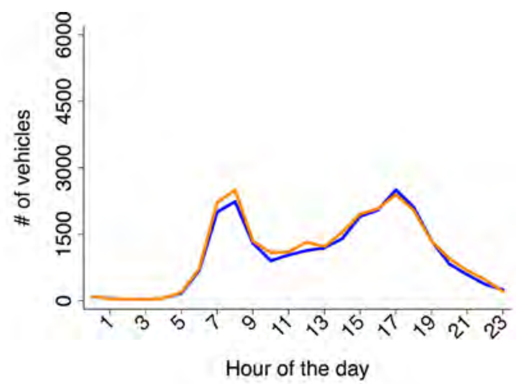
Location 42: Curtner, west of Lincoln

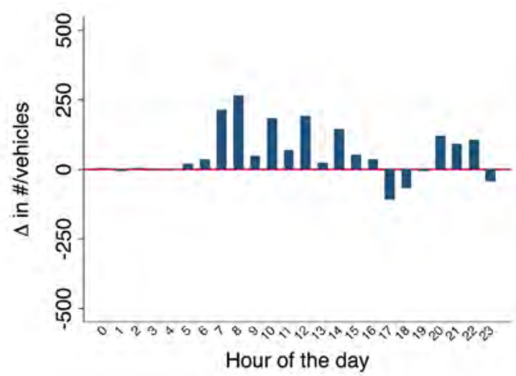


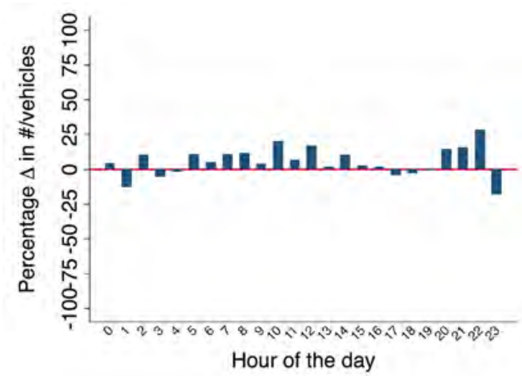




Location 45: Bird, north of Willow



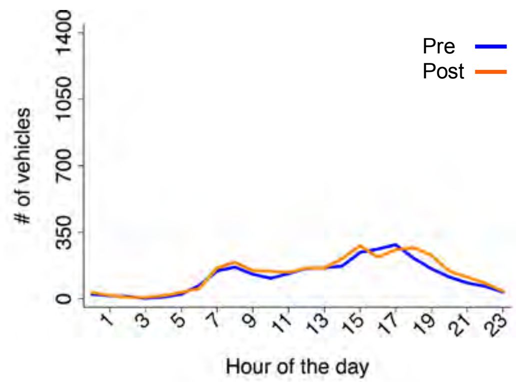


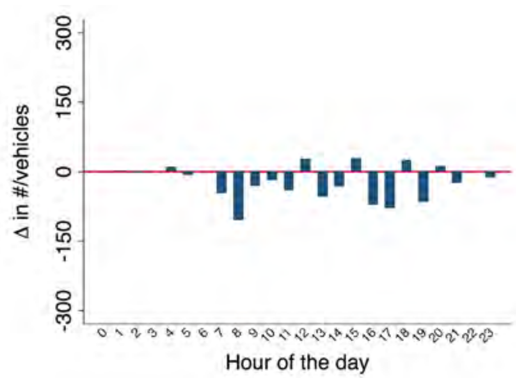


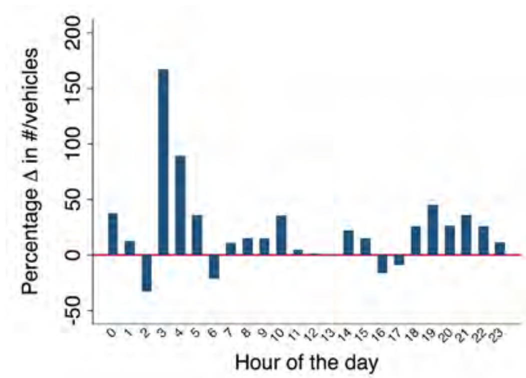
Neighborhood Streets Location Graphs: Before-and-after the road diet – total number of vehicles before-and-after, change in number of vehicles after the road diet, and percentage change in number of vehicles after the road diet.

Total number of vehicles	Change in number of vehicles after the road diet, by hour	Percentage change in number of vehicles after the road diet, by hour

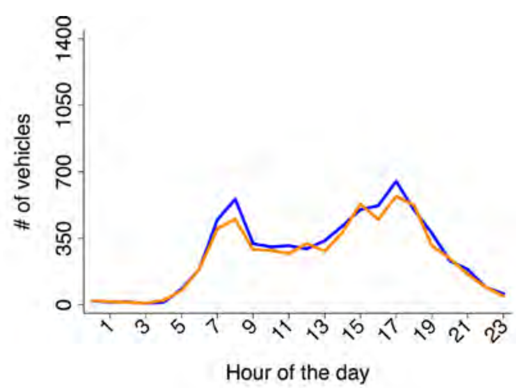
Location 3: Paula, west of Lincoln

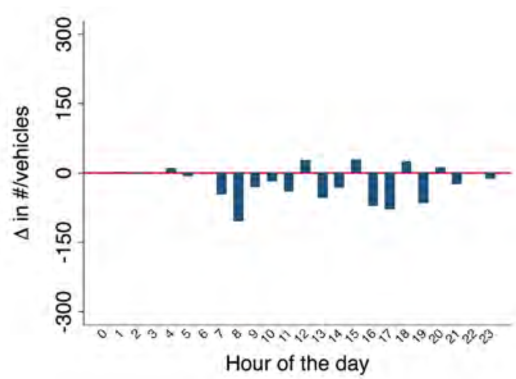


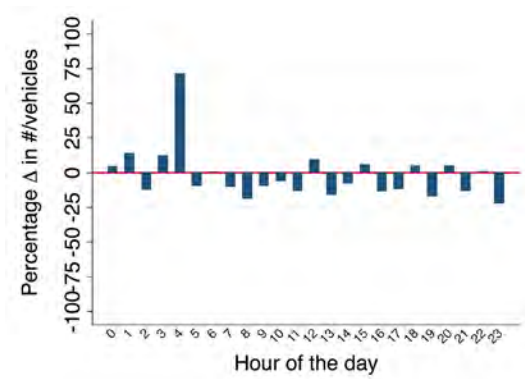




Location 4: Pedro, west of Lincoln

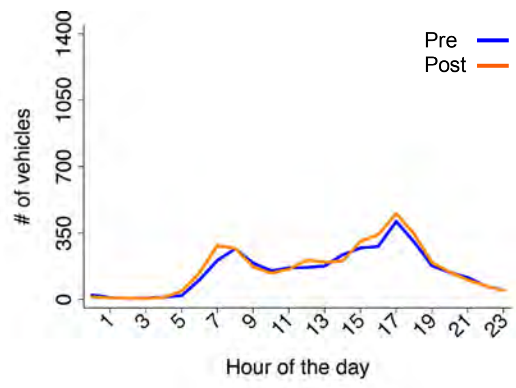


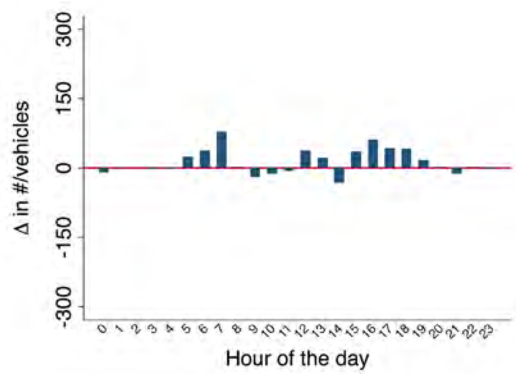


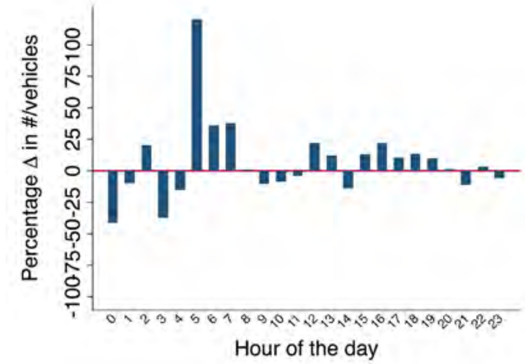


Total number of vehicles, by hour	Change in number of vehicles after the road diet, by hour	Percentage change in number of vehicles after the road diet, by hour

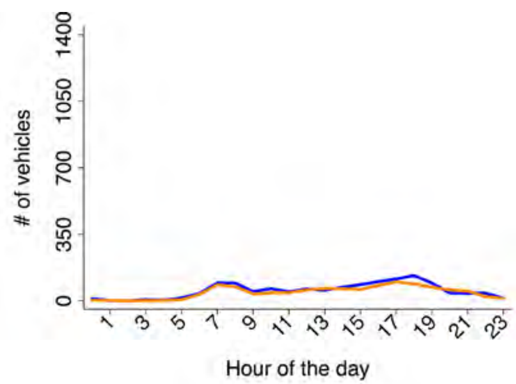
Location 5: Glen Eyrie, west of Lincoln

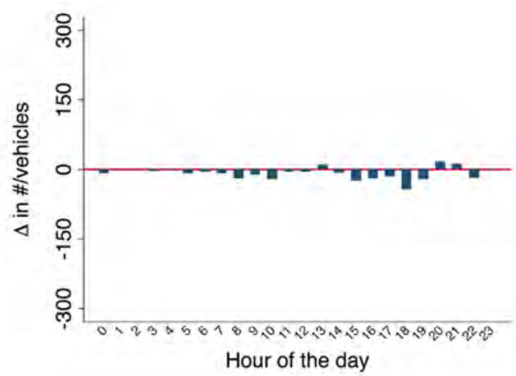


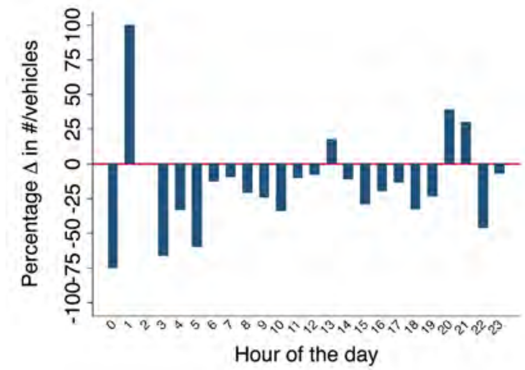




Location 7: Lester, west of Lincoln

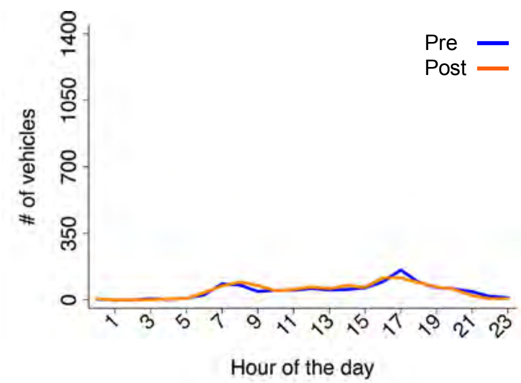


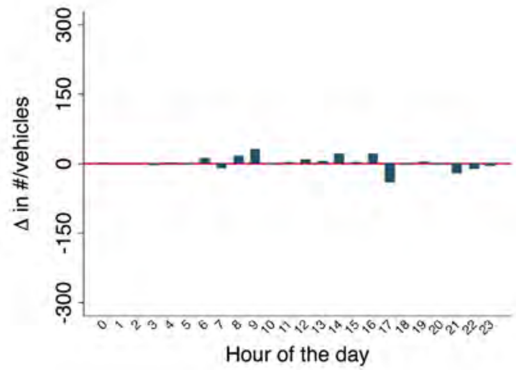


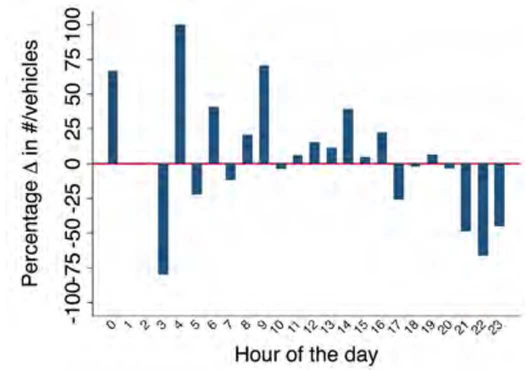


Total number of vehicles, by hour	Change in number of vehicles after the road diet, by hour	Percentage change in number of vehicles after the road diet, by hour

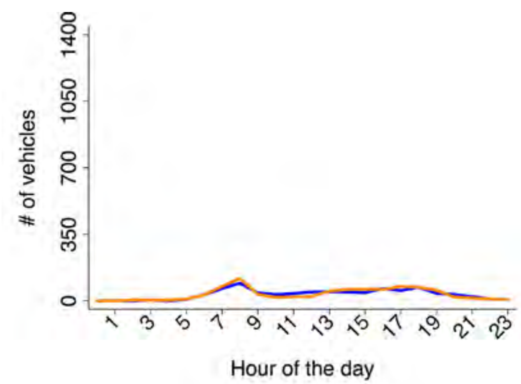
Location 8: Garfield, west of Lincoln

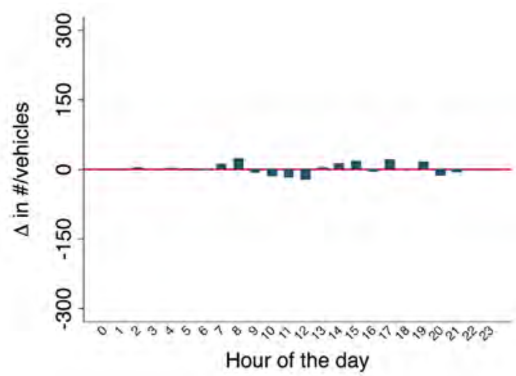


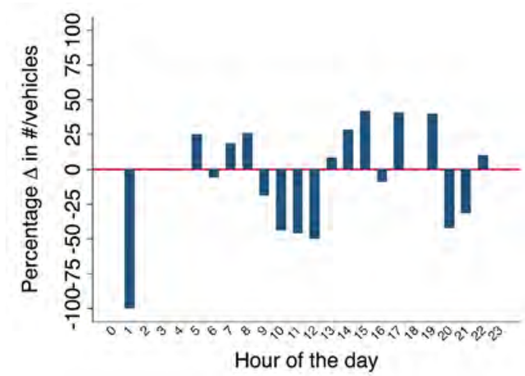




Location 9: El Abra, West of Lincoln

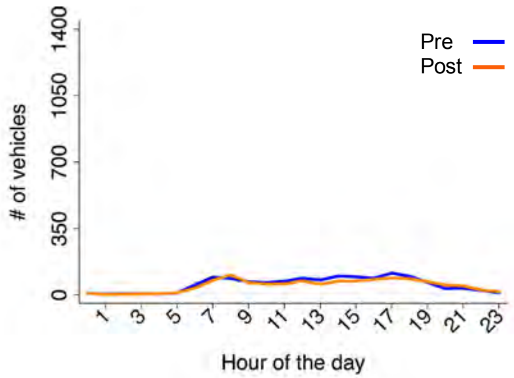


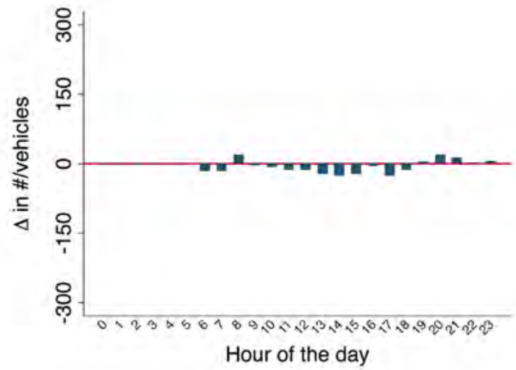


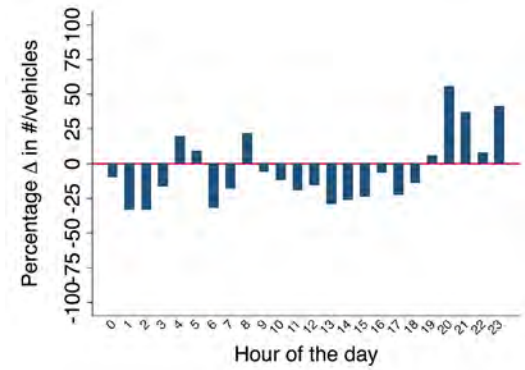


Total number of vehicles, by hour	Change in number of vehicles after the road diet, by hour	Percentage change in number of vehicles after the road diet, by hour

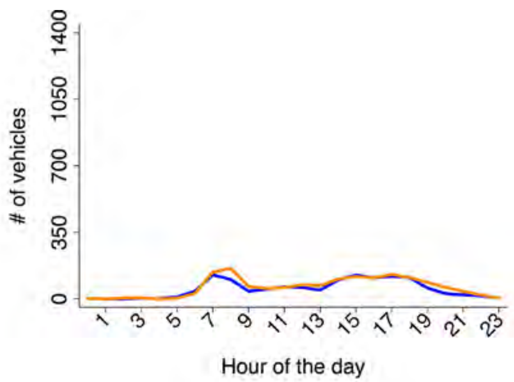
Location 15: Curtiss, south of Willow

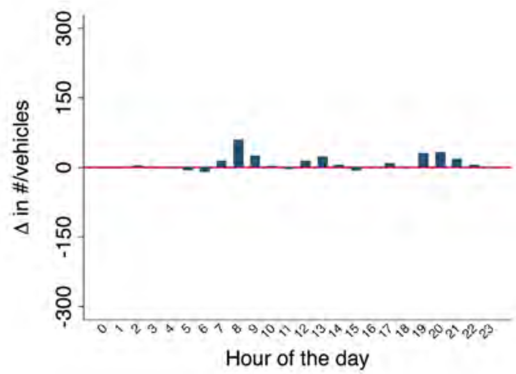


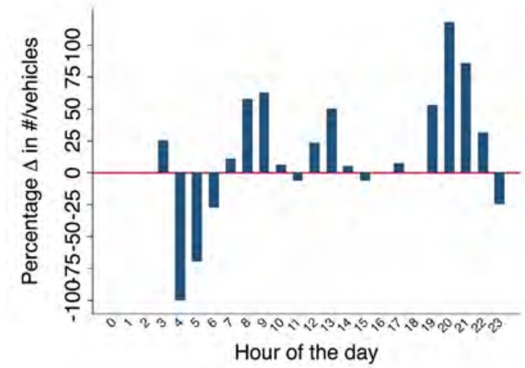




Location 16: Kotenburg, south of Willow

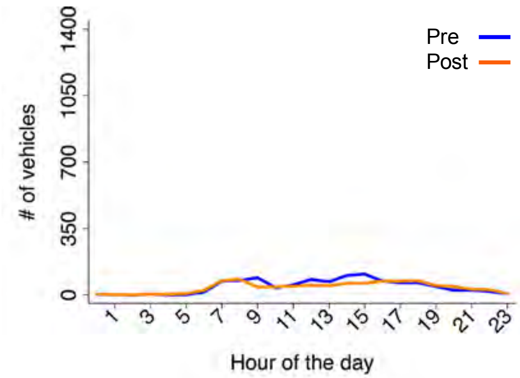


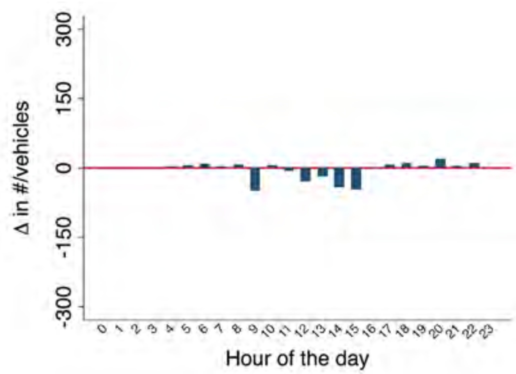


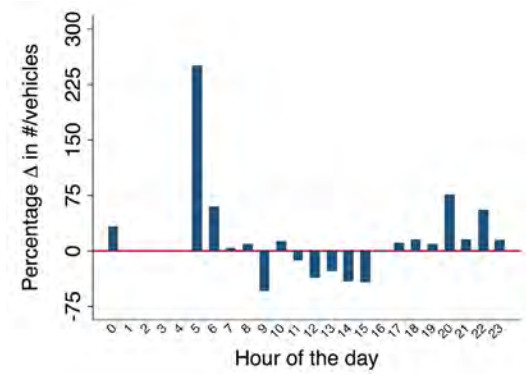


Total number of vehicles, by hour	Change in number of vehicles after the road diet, by hour	Percentage change in number of vehicles after the road diet, by hour

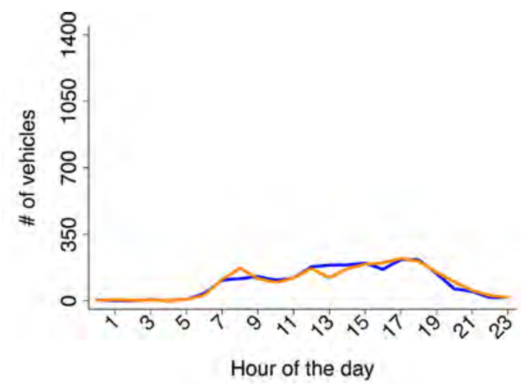
Location 17: Settle, south of Willow

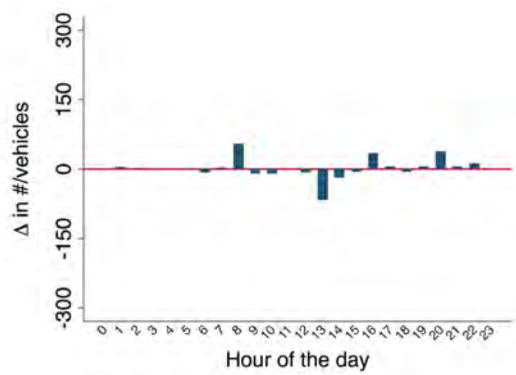


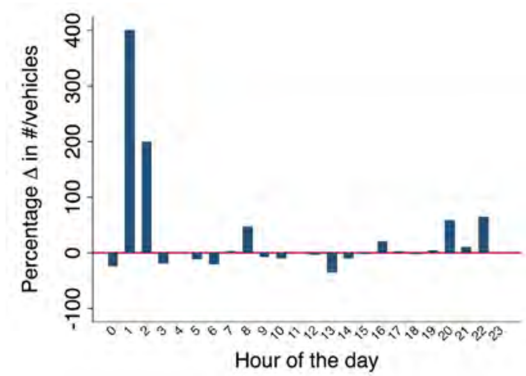




Location 18: Blewett, south of Willow

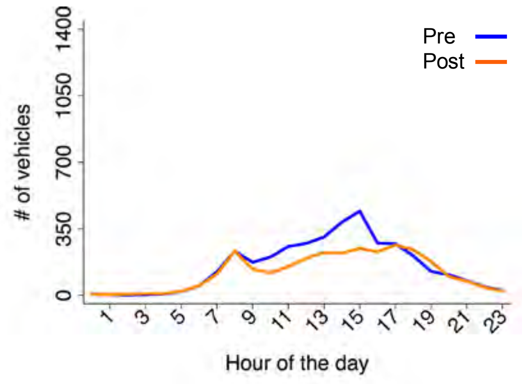


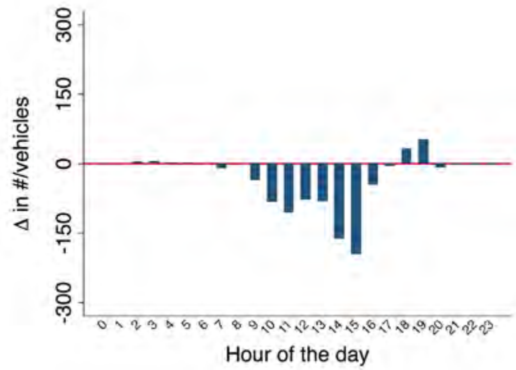


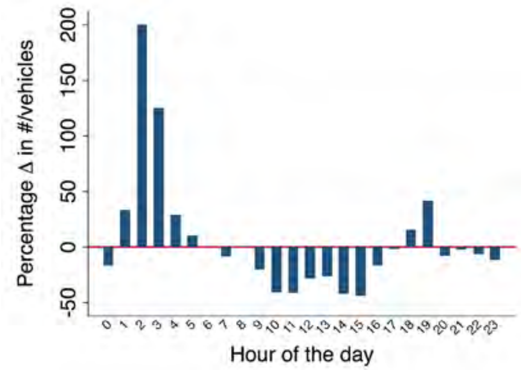


Total number of vehicles, by hour	Change in number of vehicles after the road diet, by hour	Percentage change in number of vehicles after the road diet, by hour

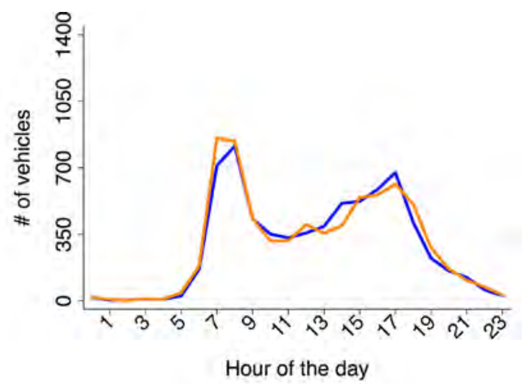
Location 20: Brace, east of Coolidge

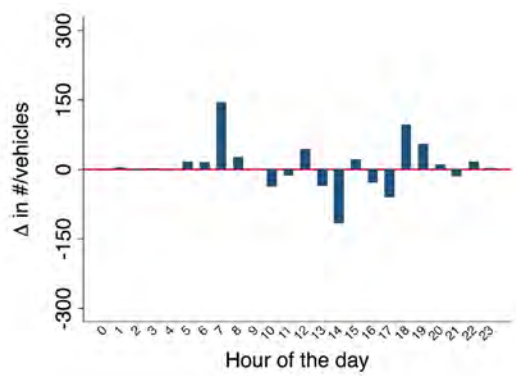


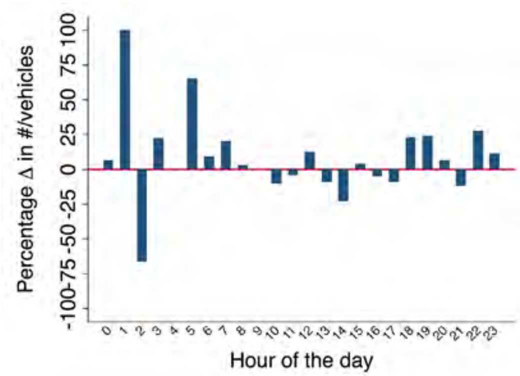




Location 21: Camino Ramon, south of Willow

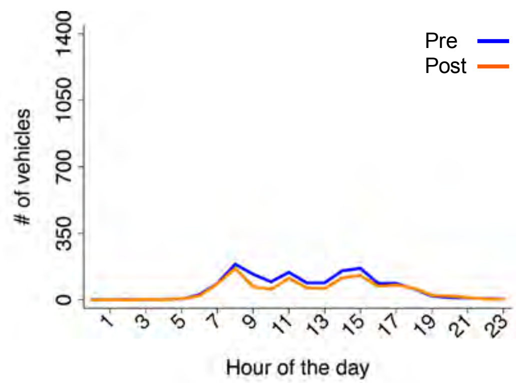


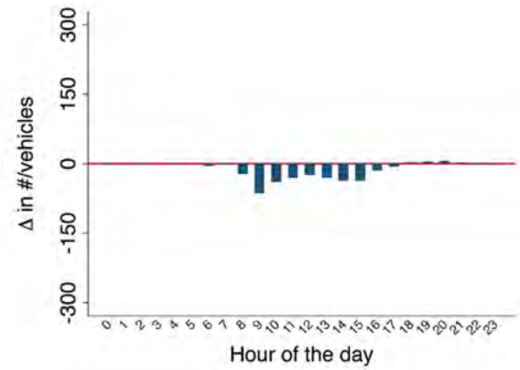


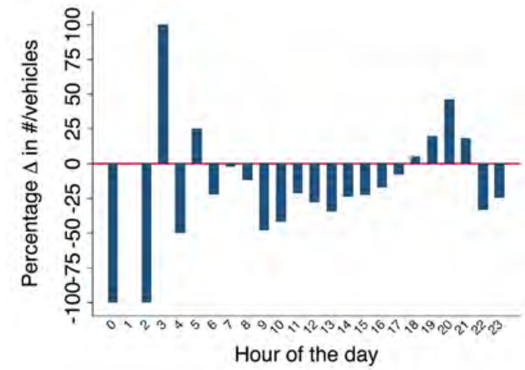


Total number of vehicles, by hour	Change in number of vehicles after the road diet, by hour	Percentage change in number of vehicles after the road diet, by hour

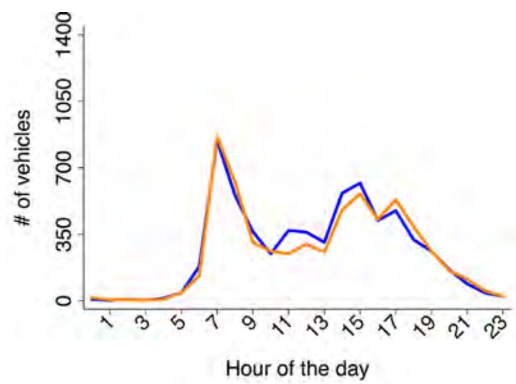
Location 24: Iris, south of Minnesota

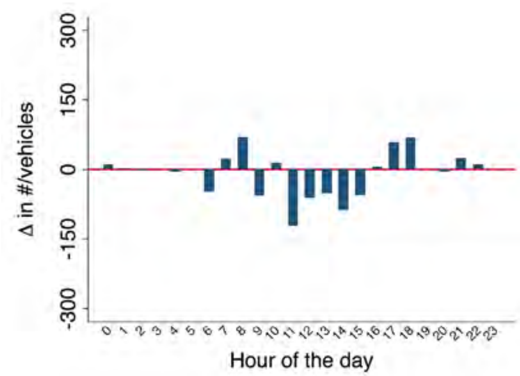


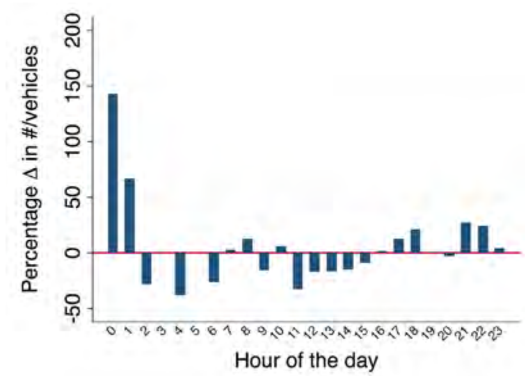




Location 26: Newport, south of Minnesota

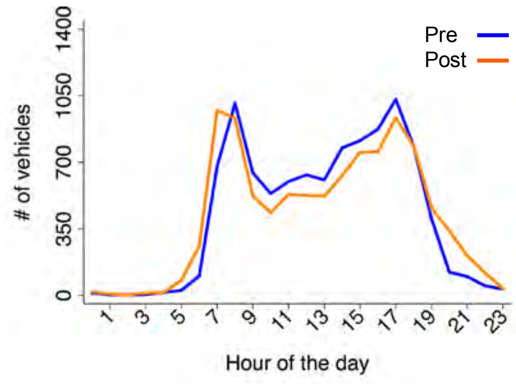


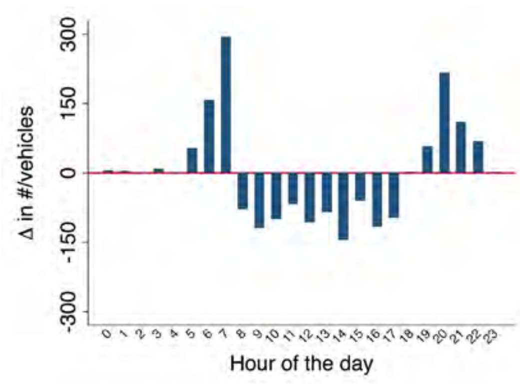


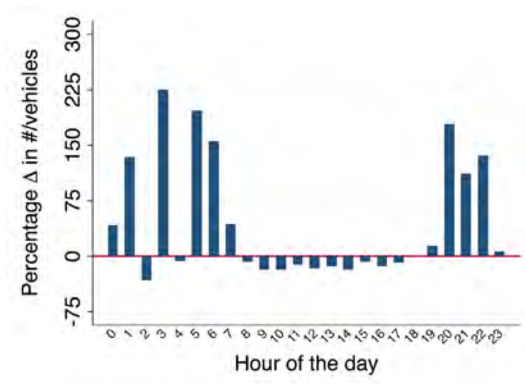


Total number of vehicles, by hour	Change in number of vehicles after the road diet, by hour	Percentage change in number of vehicles after the road diet, by hour

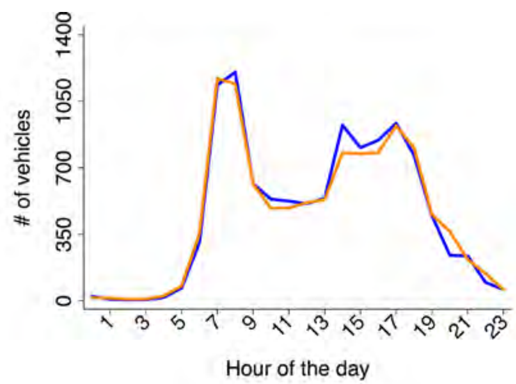
Location 27: Hicks, south of Cherry Valley

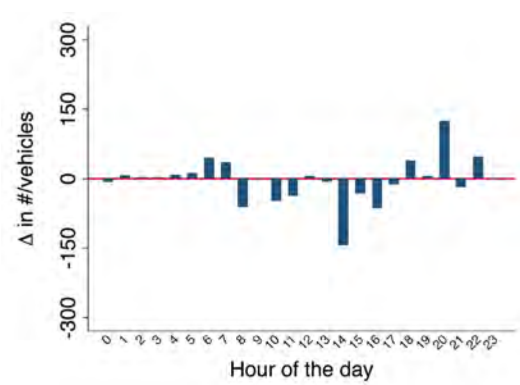


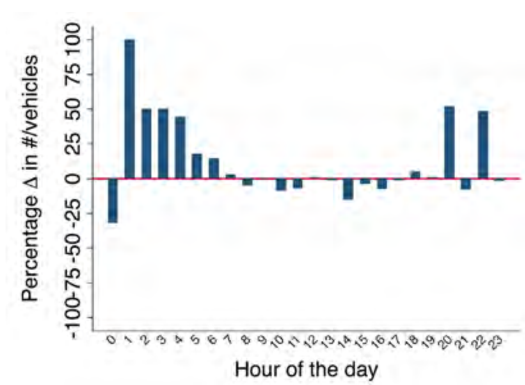




Location 28: Hicks, south of Callecita

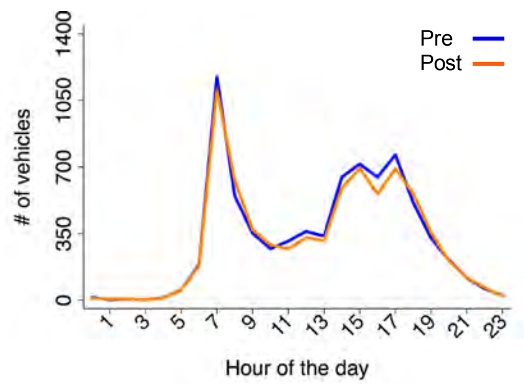


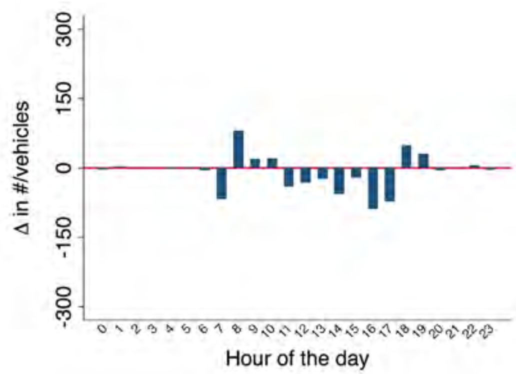


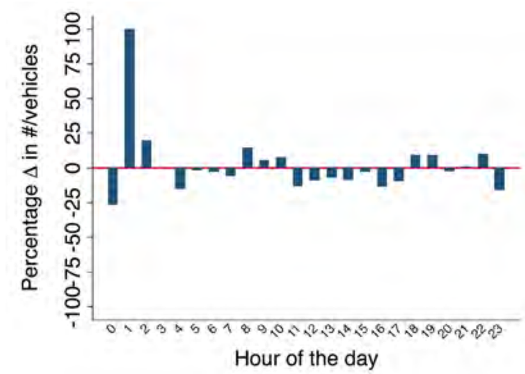


Total number of vehicles, by hour	Change in number of vehicles after the road diet, by hour	Percentage change in number of vehicles after the road diet, by hour

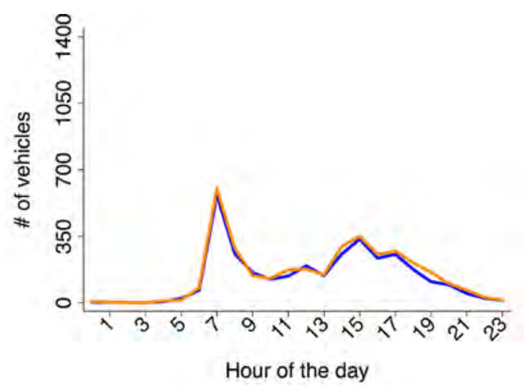
Location 29: Cottle, south of Pine

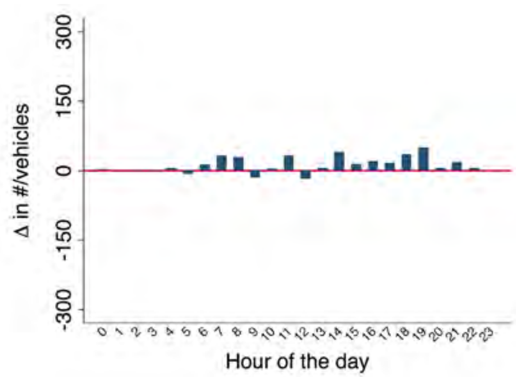


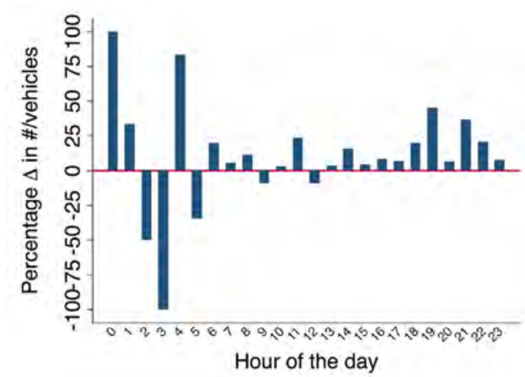




Location 30: Newport, south of Fairview

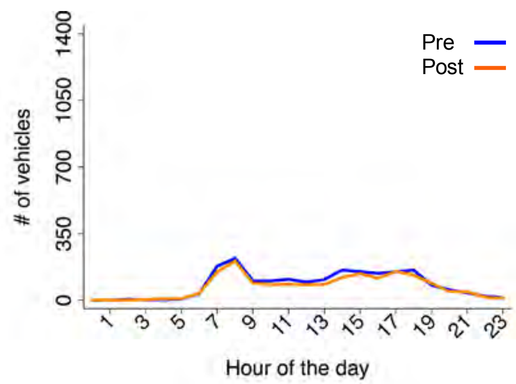


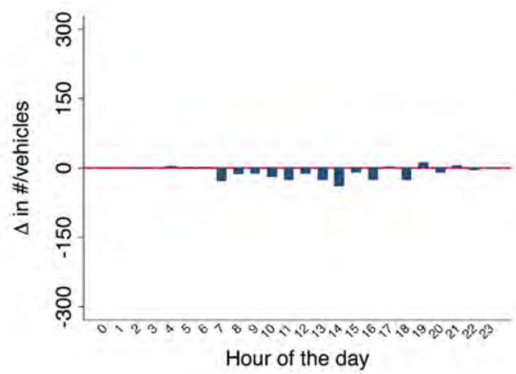


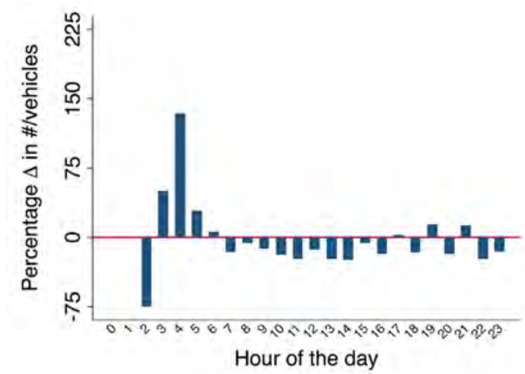


Total number of vehicles, by hour	Change in number of vehicles after the road diet, by hour	Percentage change in number of vehicles after the road diet, by hour

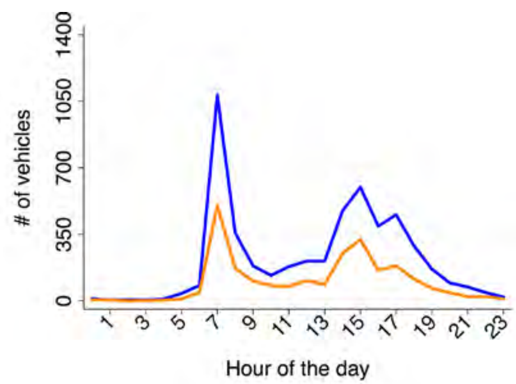
Location 33: Willow Glen, west of Hill

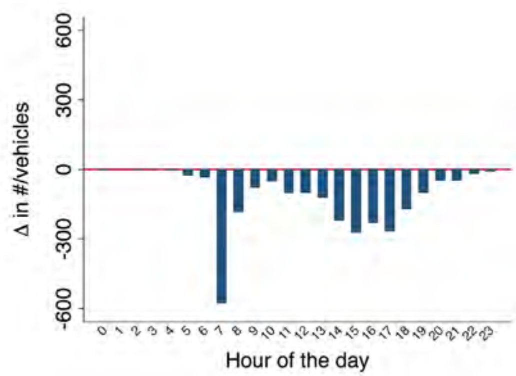


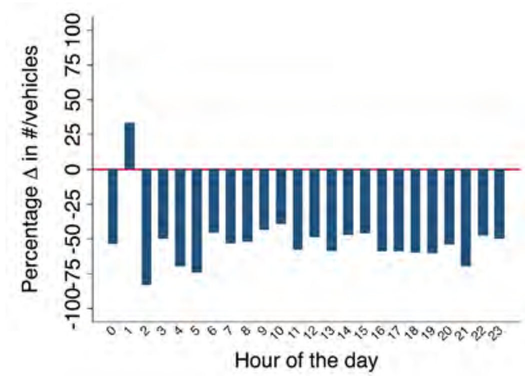




Location 38: Malone, west of Lincoln

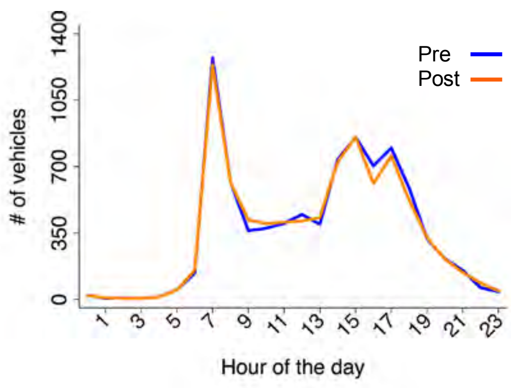


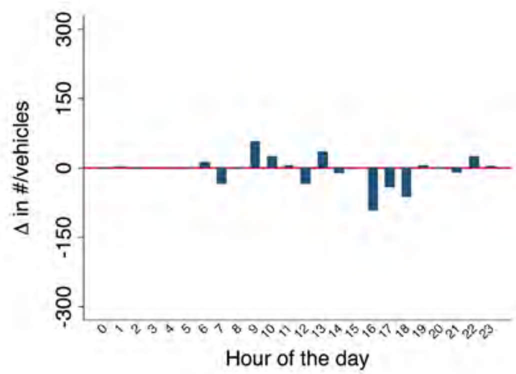


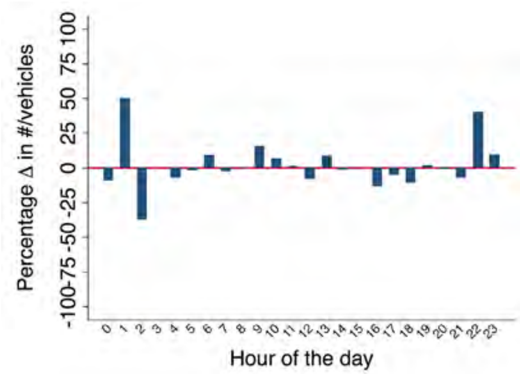


Total number of vehicles, by hour	Change in number of vehicles after the road diet, by hour	Percentage change in number of vehicles after the road diet, by hour

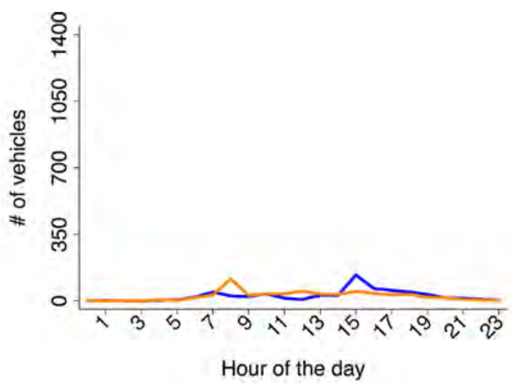
Location 39: Malone, east of Harmil

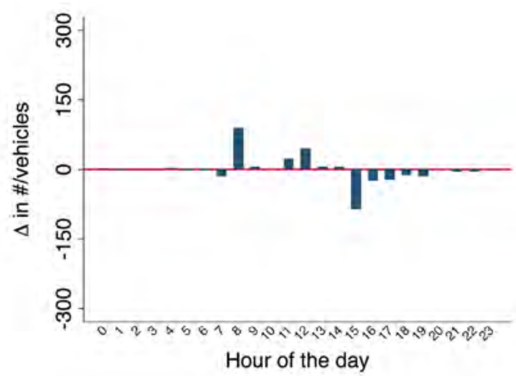


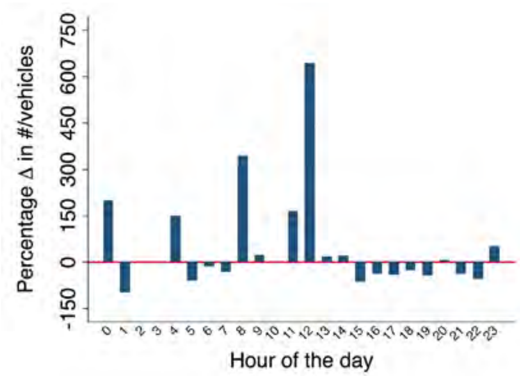


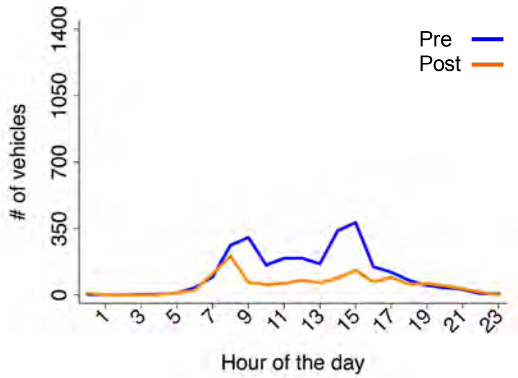
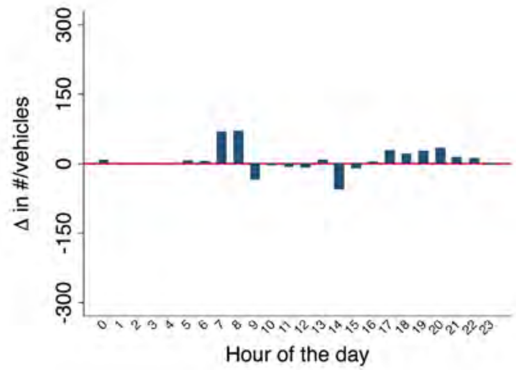
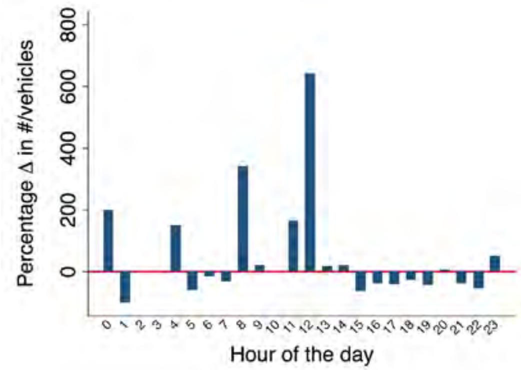


Location 43: Michigan, east of Lincoln







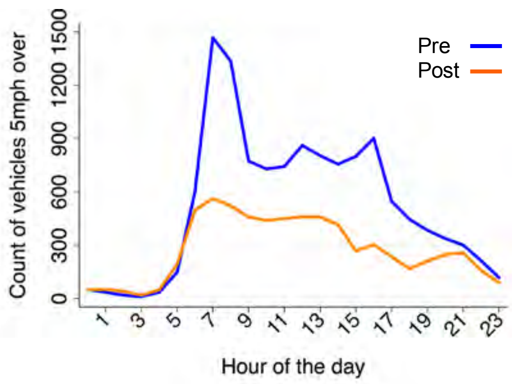
Total number of vehicles, by hour	Change in number of vehicles after the road diet, by hour	Percentage change in number of vehicles after the road diet, by hour
Location 44: California, east of Lincoln		
		

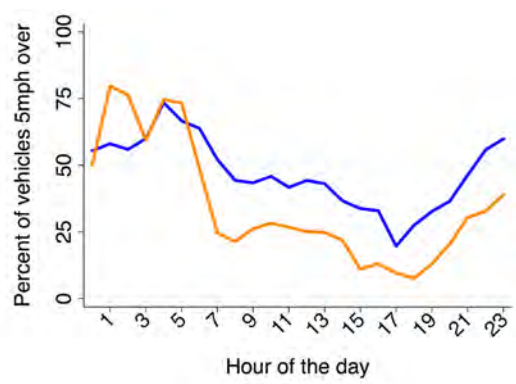
5 MPH+ OVER THE SPEED LIMIT GRAPHS

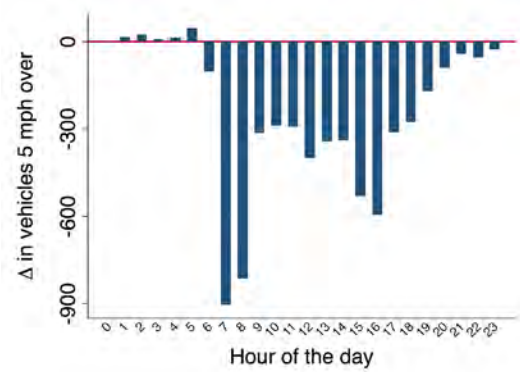
Lincoln Avenue Road Diet Location Graphs: Before-and-after the road diet – total number of vehicles traveling 5mph+ over posted speed limit, percent of vehicles traveling 5mph+ over posted speed limit, and change in number of vehicles travelling 5mph+ over posted speed limit.

Total number of vehicles traveling 5mph+ over posted speed limit, before-and-after the road diet, by hour	Percent of vehicles traveling 5mph+ over posted speed limit, before-and-after the road diet, by hour	Change in number of vehicles travelling 5mph+ over posted speed limit, by hour

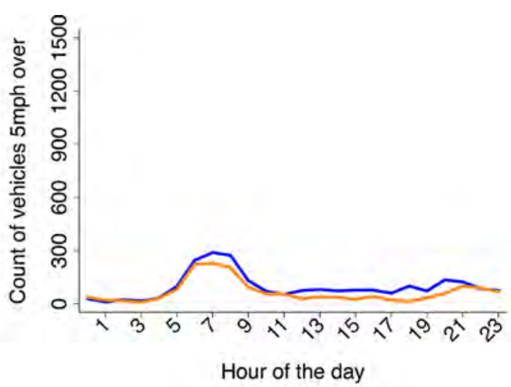
Location 6: Lincoln, south of Glen Eyrie

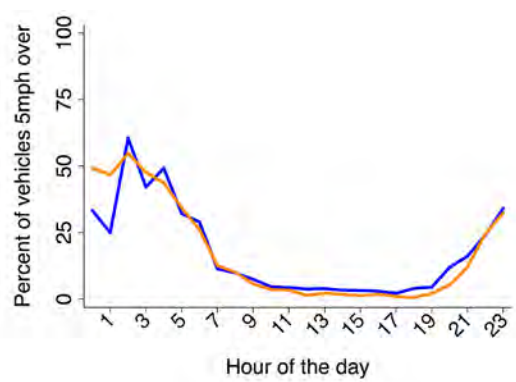


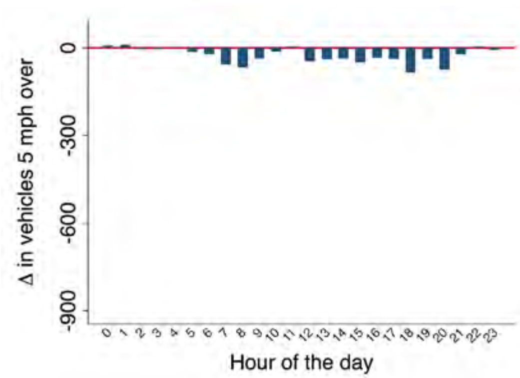




Location 19: Lincoln, south of Meredith



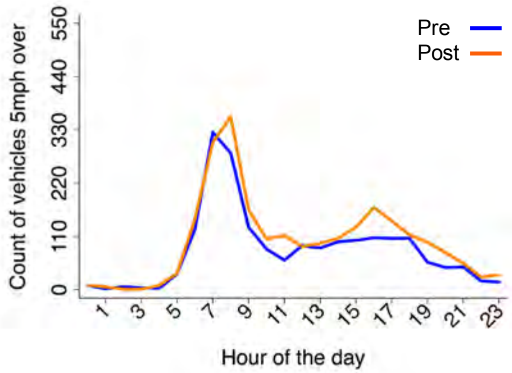


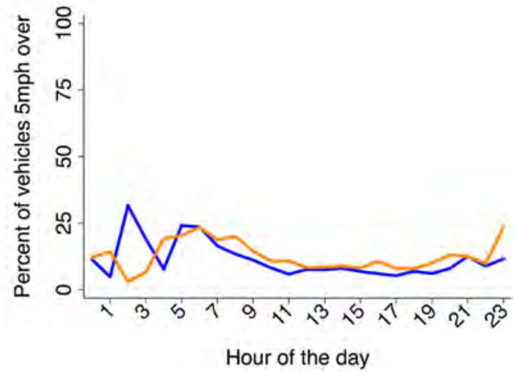


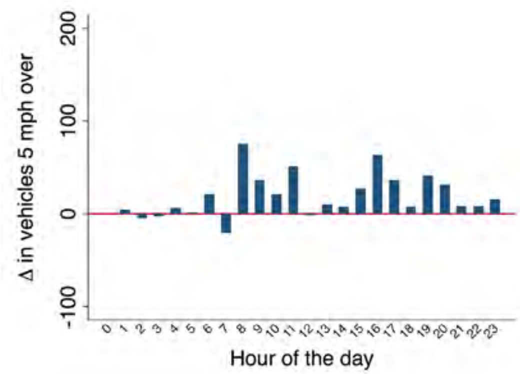
Lincoln Avenue Non-Road Diet Location Graphs: Before-and-after the road diet – total number of vehicles traveling 5mph+ over posted speed limit, percent of vehicles traveling 5mph+ over posted speed limit, and change in number of vehicles travelling 5mph+ over posted speed limit.

Total number of vehicles traveling 5mph+ over posted speed limit, before-and-after the road diet, by hour	Percent of vehicles traveling 5mph+ over posted speed limit, before-and-after the road diet, by hour	Change in number of vehicles travelling 5mph+ over posted speed limit, by hour

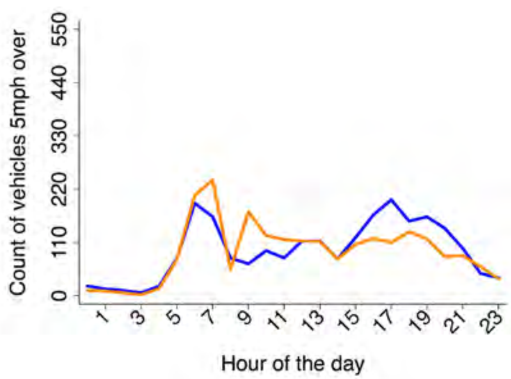
Location 1: Lincoln, north of Parkmoor

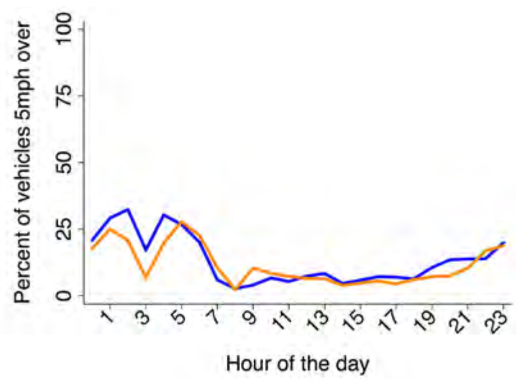


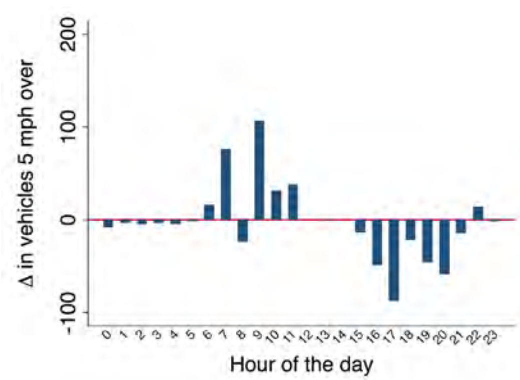




Location 32: Lincoln, south of Nevada

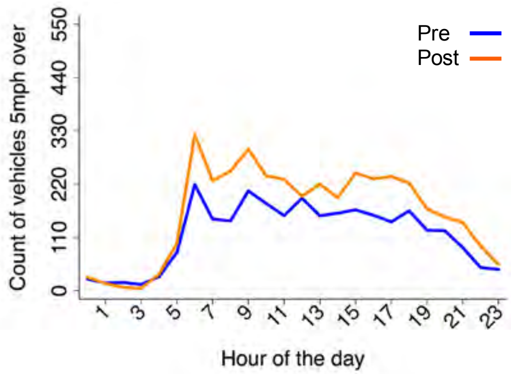


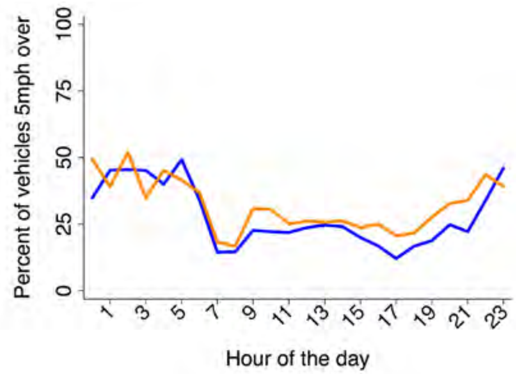


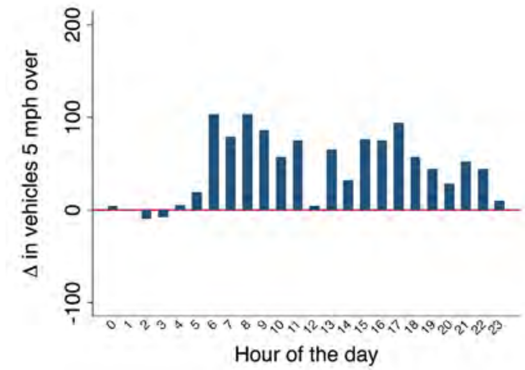


Total number of vehicles traveling 5mph+ over posted speed limit, before-and-after the road diet, by hour	Percent of vehicles traveling 5mph+ over posted speed limit, before-and-after the road diet, by hour	Change in number of vehicles travelling 5mph+ over posted speed limit, by hour

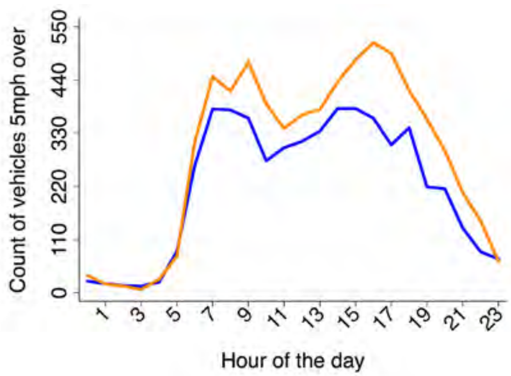
Location 36: Lincoln, south of Clark

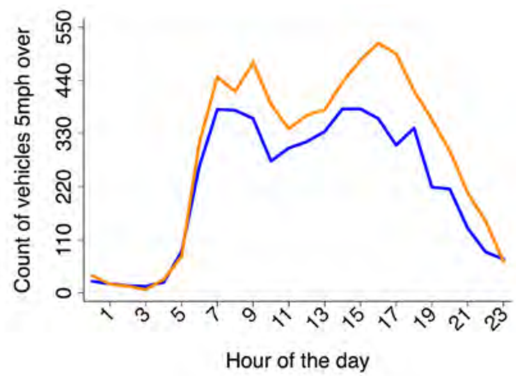


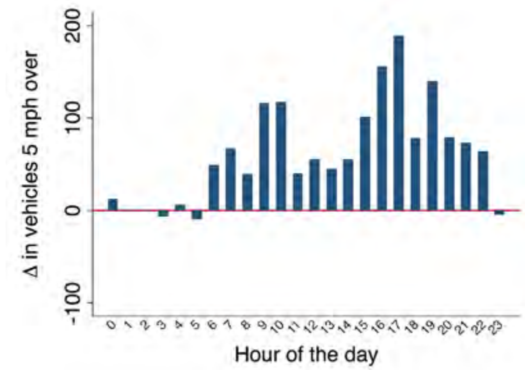




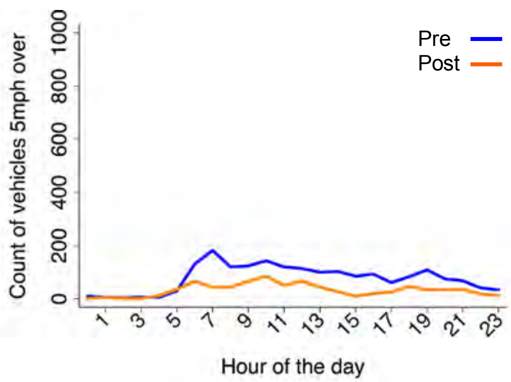
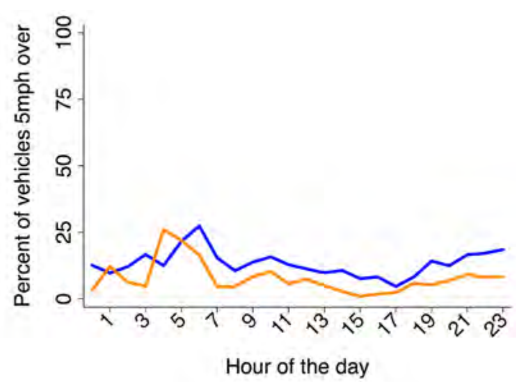
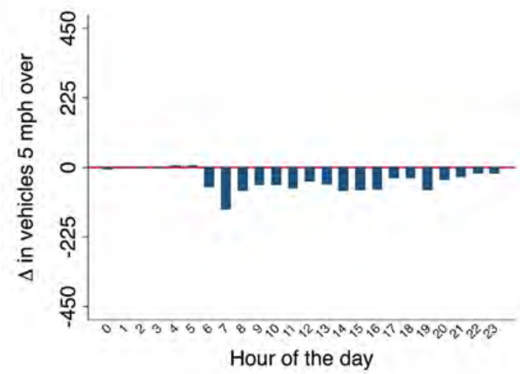
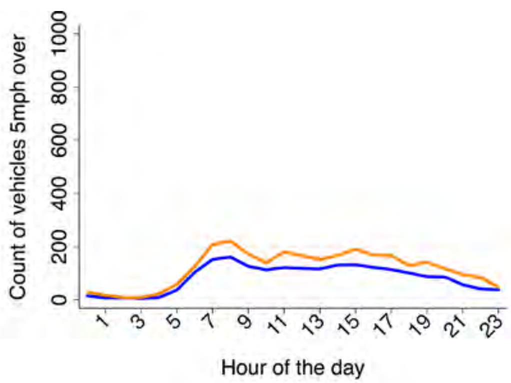
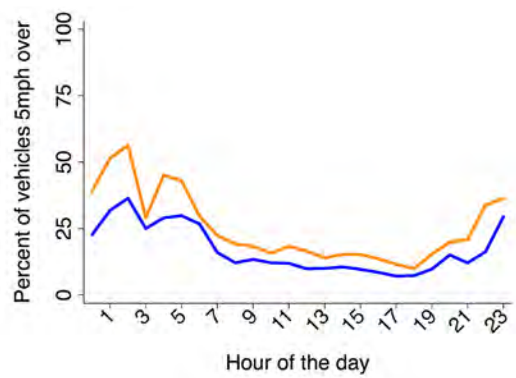
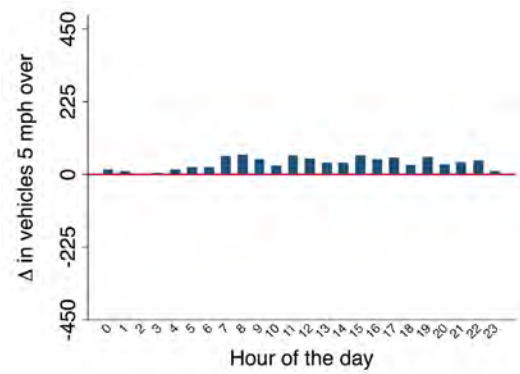
Location 37: Lincoln, south of Curtner





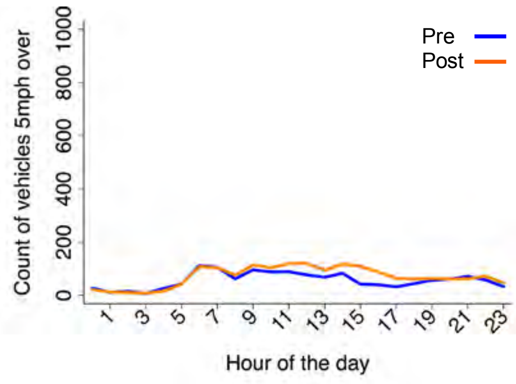


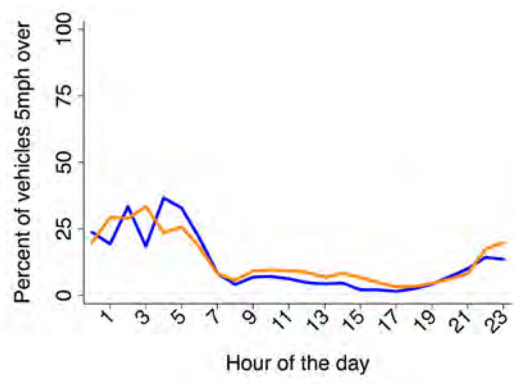
Major Streets Location Graphs: Before-and-after the road diet – total number of vehicles traveling 5mph+ over posted speed limit, percent of vehicles traveling 5mph+ over posted speed limit, and change in number of vehicles travelling 5mph+ over posted speed limit.

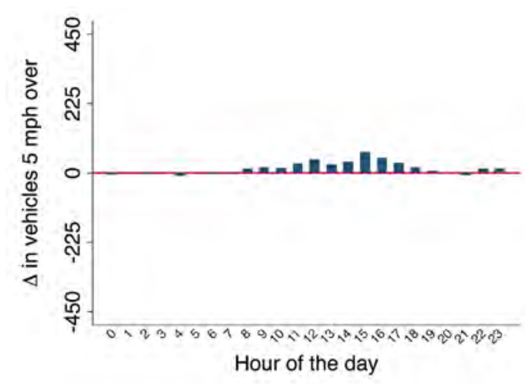
Total number of vehicles traveling 5mph+ over posted speed limit, before-and-after the road diet, by hour	Percent of vehicles traveling 5mph+ over posted speed limit, before-and-after the road diet, by hour	Change in number of vehicles travelling 5mph+ over posted speed limit, by hour
Location 2: Lincoln, south of Glen Eyrie		
		
Location 10: Willow, west of Lincoln		
		

Total number of vehicles traveling 5mph+ over posted speed limit, before-and-after the road diet, by hour	Percent of vehicles traveling 5mph+ over posted speed limit, before-and-after the road diet, by hour	Change in number of vehicles travelling 5mph+ over posted speed limit, by hour

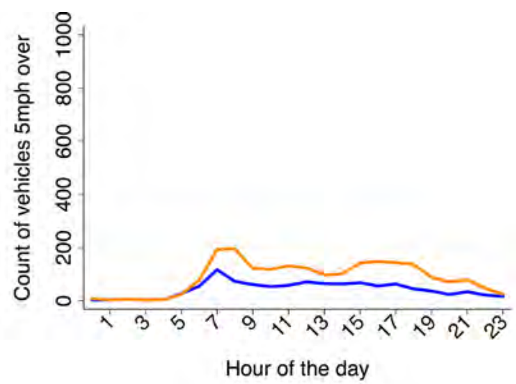
Location 11: Willow, east of Lincoln

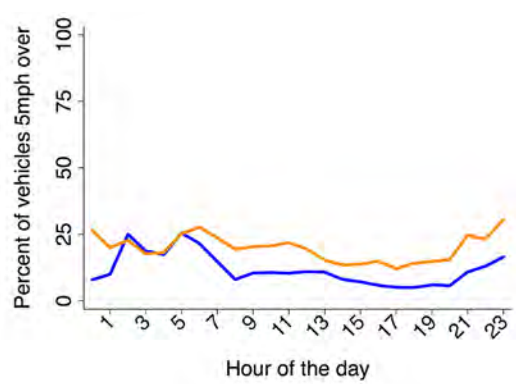


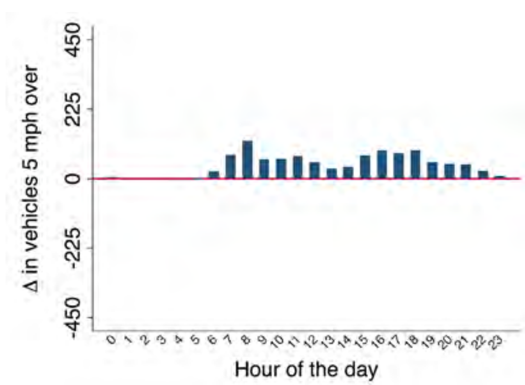




Location 12: Coe, east of Riverside

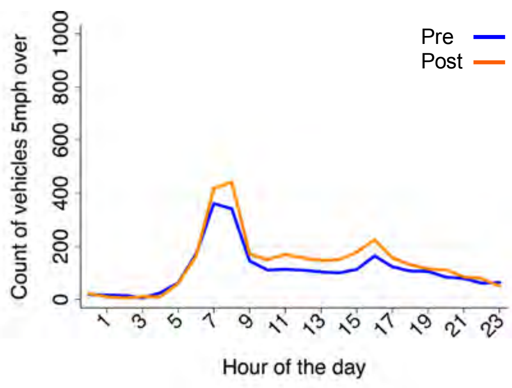


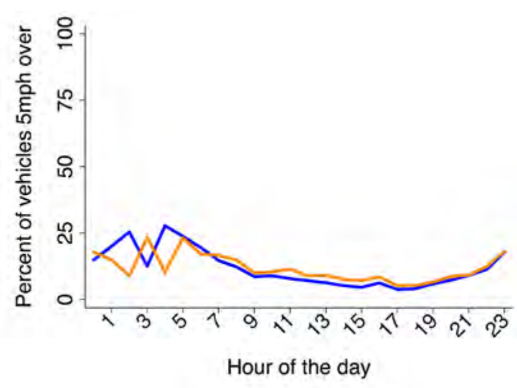


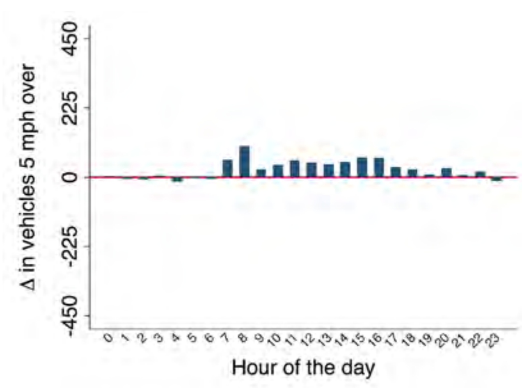


Total number of vehicles traveling 5mph+ over posted speed limit, before-and-after the road diet, by hour	Percent of vehicles traveling 5mph+ over posted speed limit, before-and-after the road diet, by hour	Change in number of vehicles travelling 5mph+ over posted speed limit, by hour

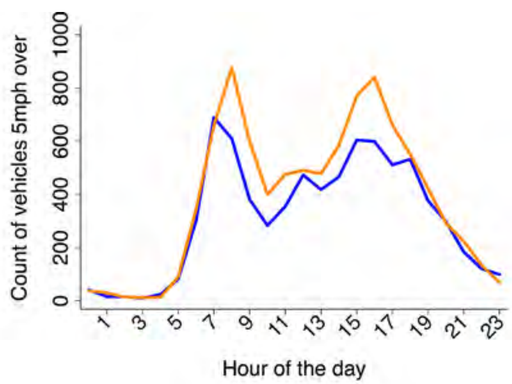
Location 13: Bird, north of Coe

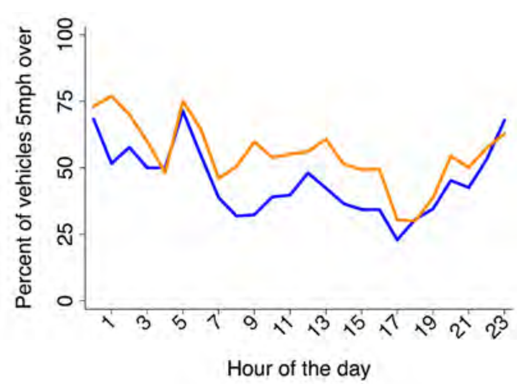


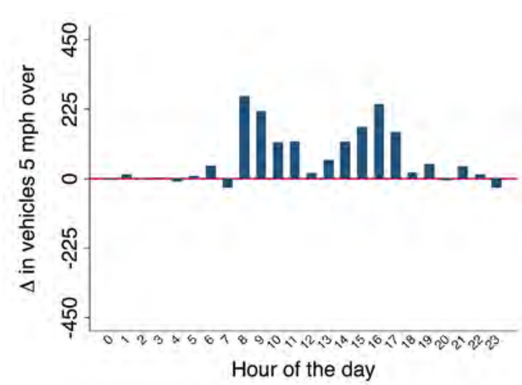




Location 14: Bird, south of Willow

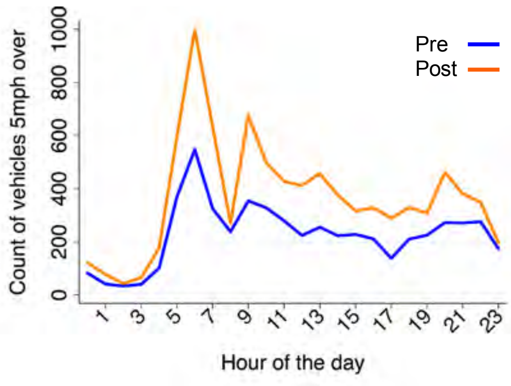


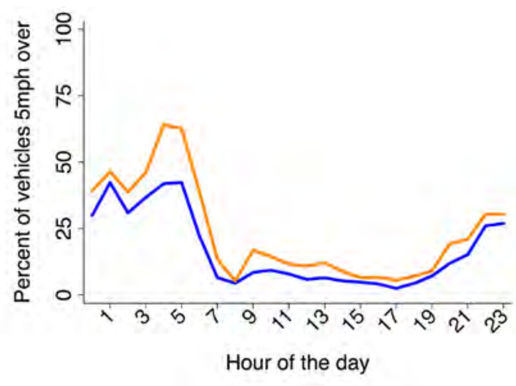


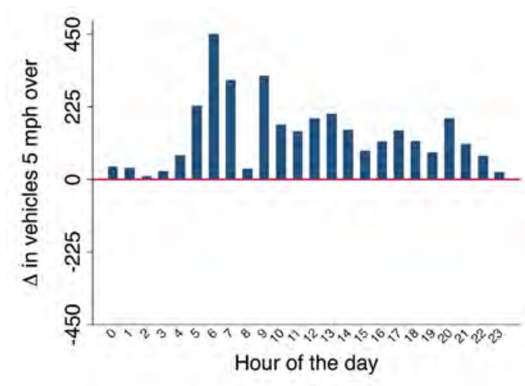


Total number of vehicles traveling 5mph+ over posted speed limit, before-and-after the road diet, by hour	Percent of vehicles traveling 5mph+ over posted speed limit, before-and-after the road diet, by hour	Change in number of vehicles travelling 5mph+ over posted speed limit, by hour

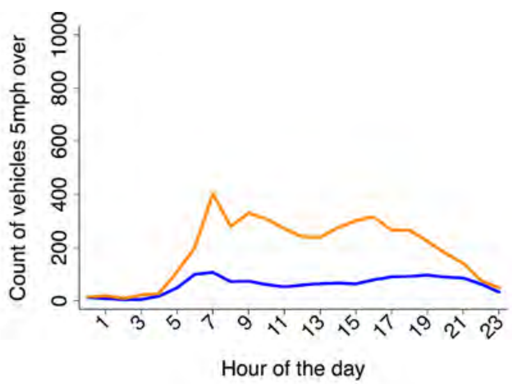
Location 22: Meridian, north of Minnesota

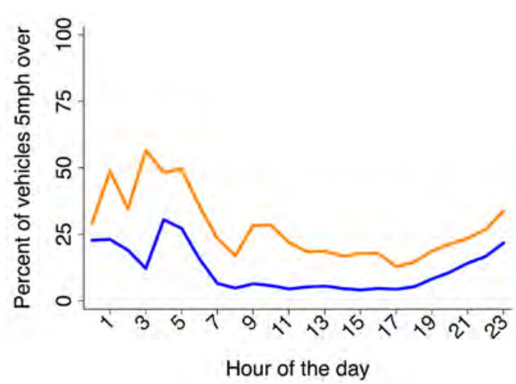


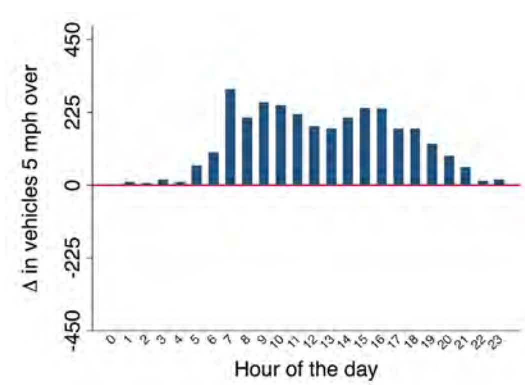




Location 23: Minnesota, east of Lincoln

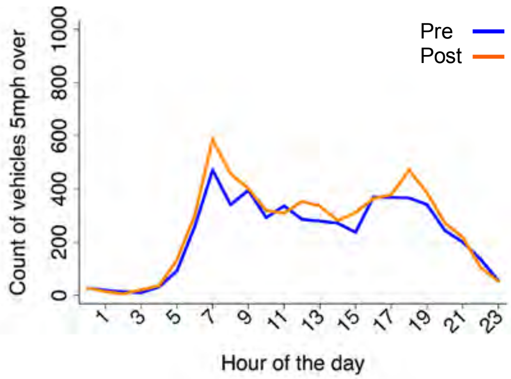


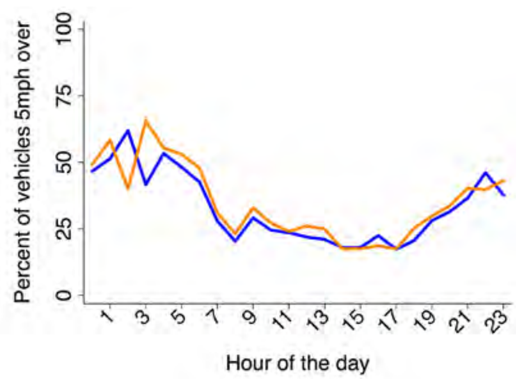


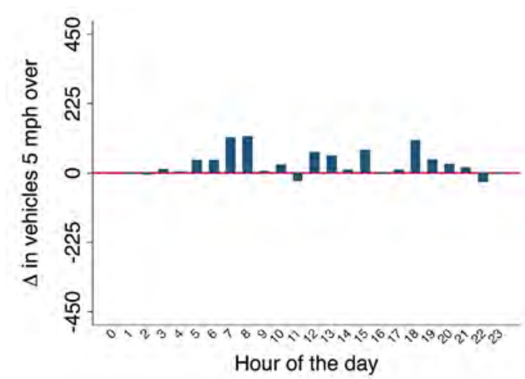


Total number of vehicles traveling 5mph+ over posted speed limit, before-and-after the road diet, by hour	Percent of vehicles traveling 5mph+ over posted speed limit, before-and-after the road diet, by hour	Change in number of vehicles travelling 5mph+ over posted speed limit, by hour

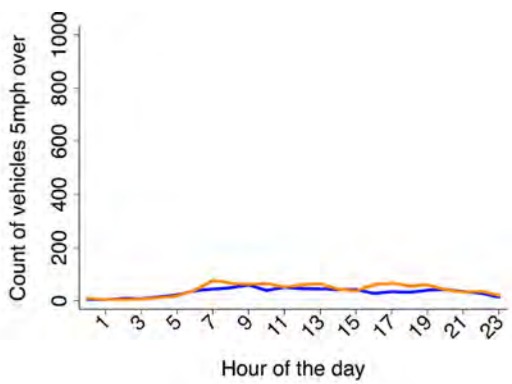
Location 25: Minnesota, west of Lincoln

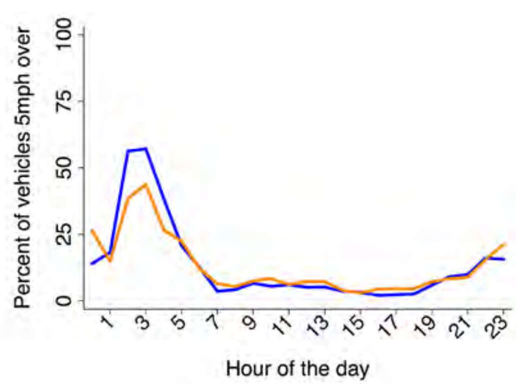


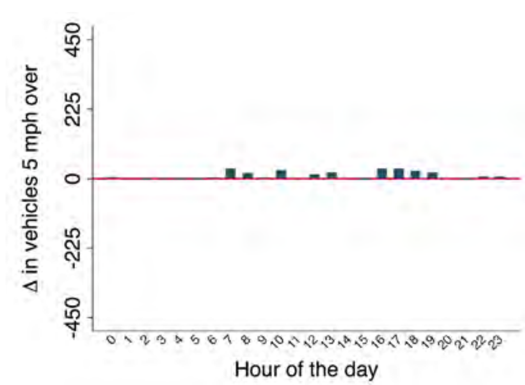




Location 31: Pine, west of Lincoln

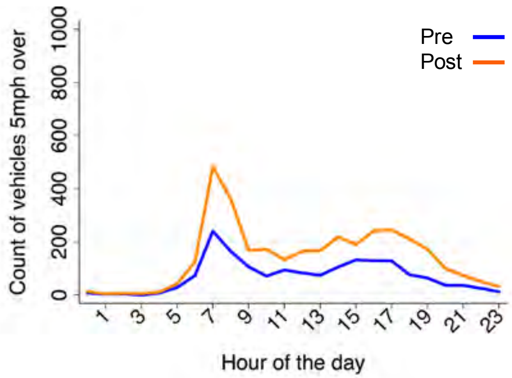


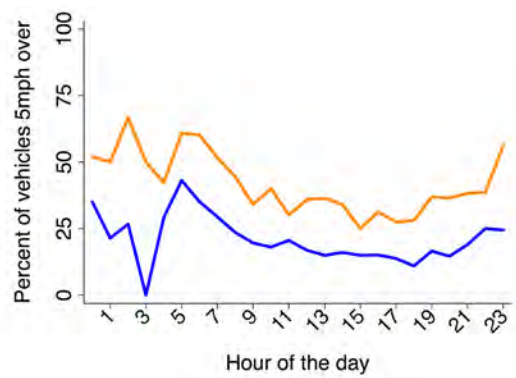


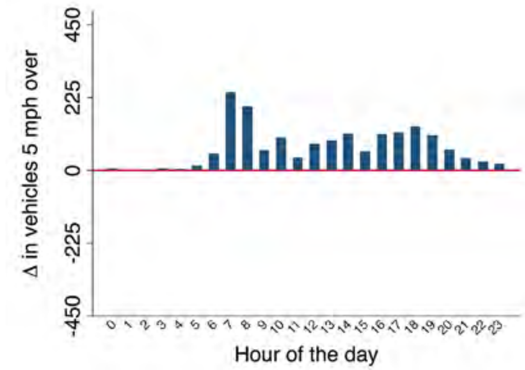


Total number of vehicles traveling 5mph+ over posted speed limit, before-and-after the road diet, by hour	Percent of vehicles traveling 5mph+ over posted speed limit, before-and-after the road diet, by hour	Change in number of vehicles travelling 5mph+ over posted speed limit, by hour

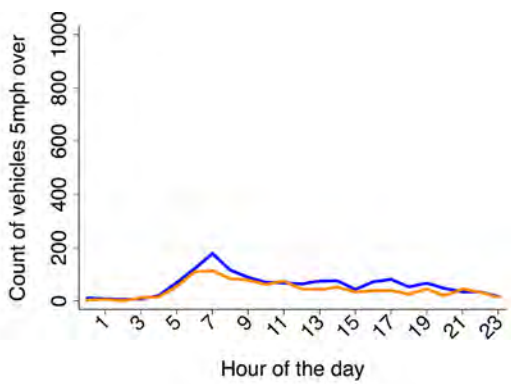
Location 34: Pine, east of Lincoln

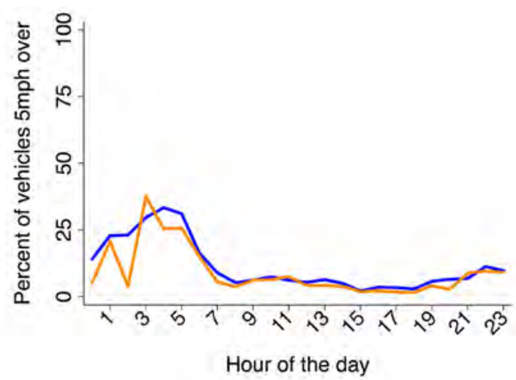


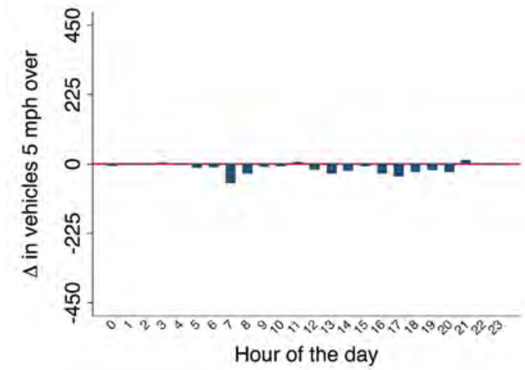




Location 35: Bird, south of Willow Glen Way

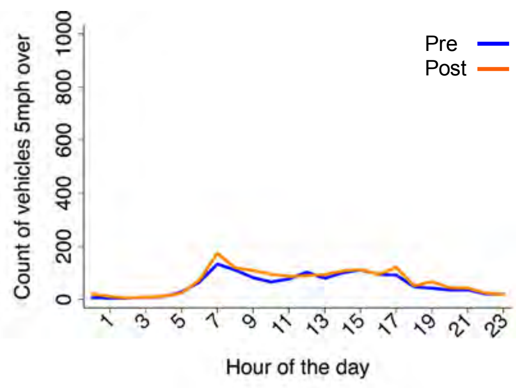


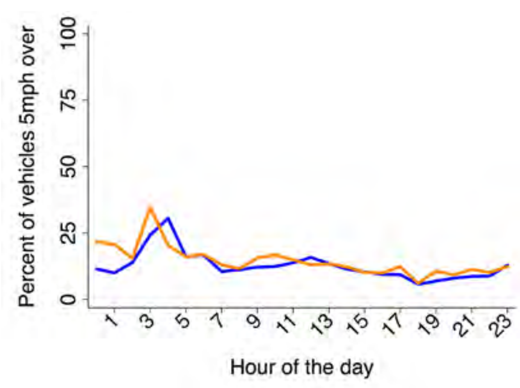


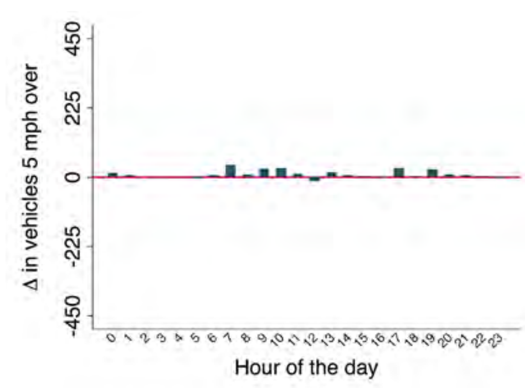


Total number of vehicles traveling 5mph+ over posted speed limit, before-and-after the road diet, by hour	Percent of vehicles traveling 5mph+ over posted speed limit, before-and-after the road diet, by hour	Change in number of vehicles travelling 5mph+ over posted speed limit, by hour

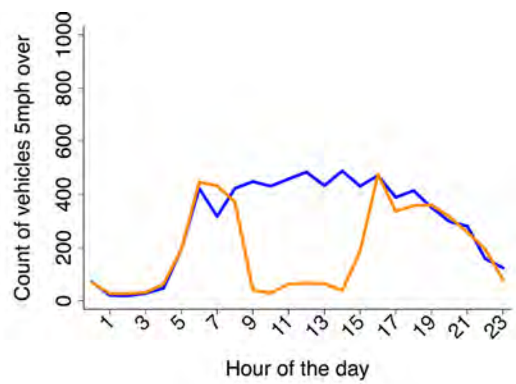
Location 40: Almaden, north of Malone

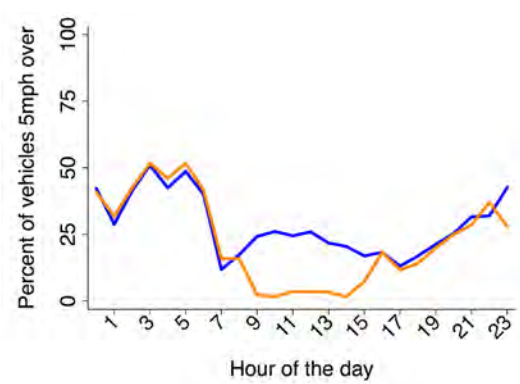


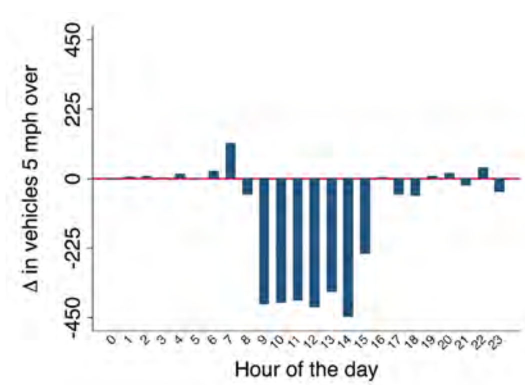




Location 41: Curtner, east of Lincoln

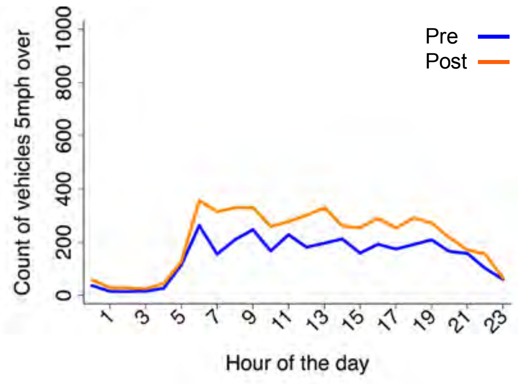


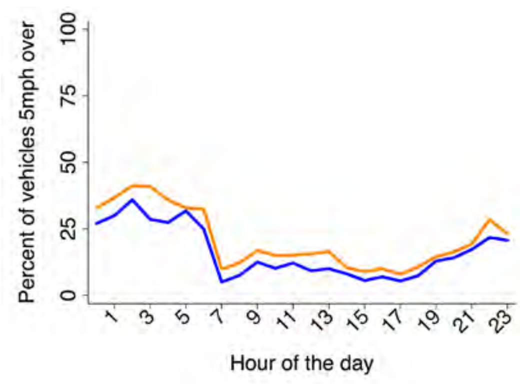


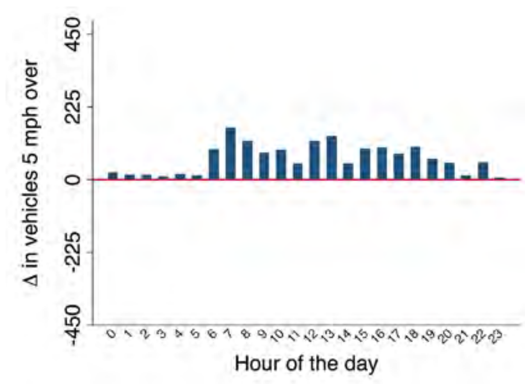


Total number of vehicles traveling 5mph+ over posted speed limit, before-and-after the road diet, by hour	Percent of vehicles traveling 5mph+ over posted speed limit, before-and-after the road diet, by hour	Change in number of vehicles travelling 5mph+ over posted speed limit, by hour

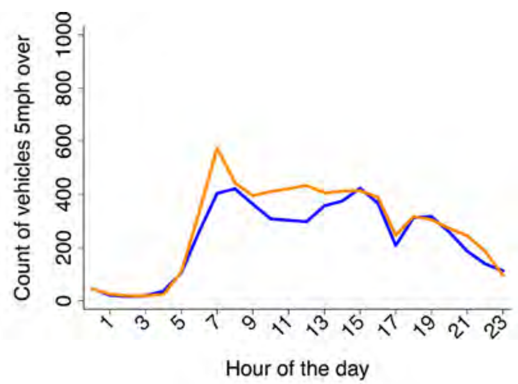
Location 42: Curtner, west of Lincoln

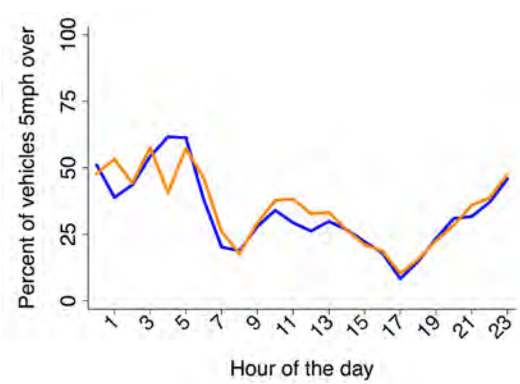


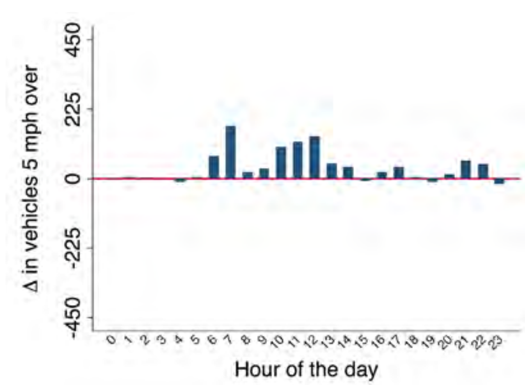




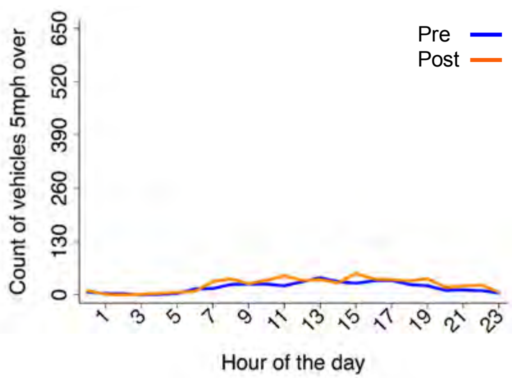
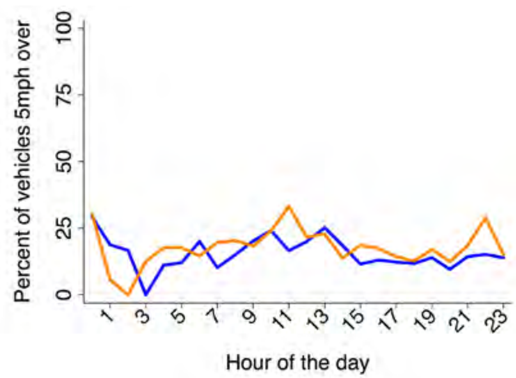
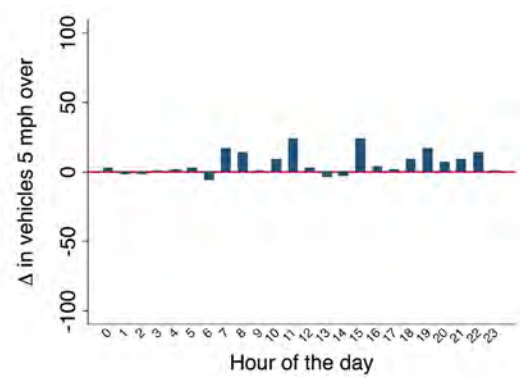
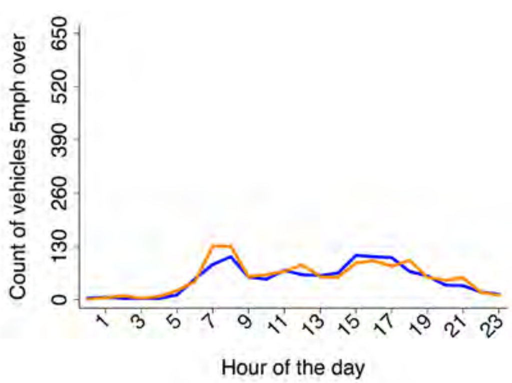
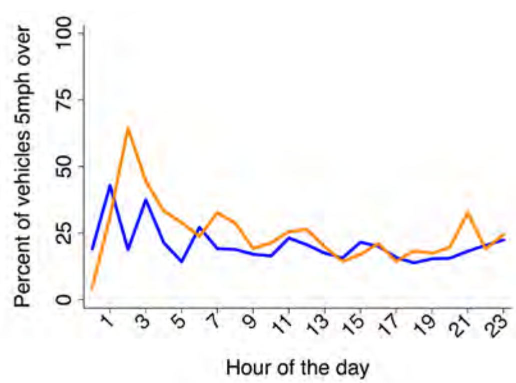
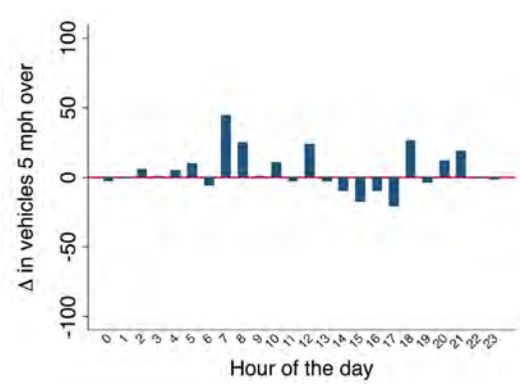
Location 45: Bird, north of Willow





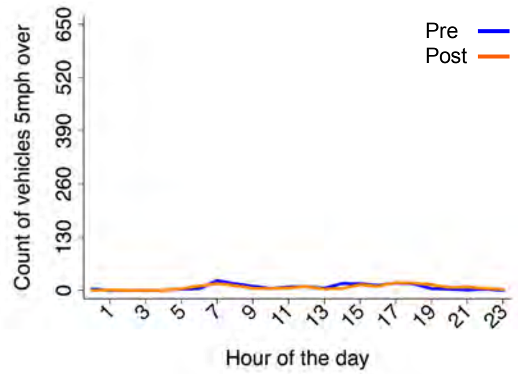


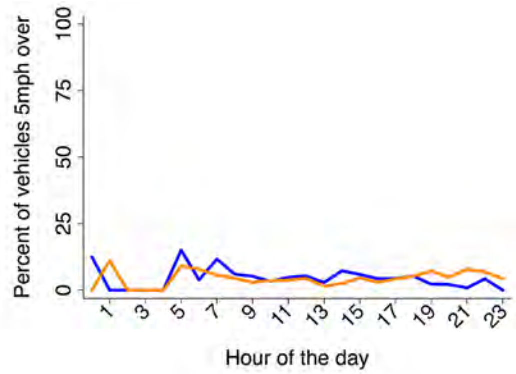
Neighborhood Streets Location Graphs: Before-and-after the road diet – total number of vehicles traveling 5mph+ over posted speed limit, percent of vehicles traveling 5mph+ over posted speed limit, and change in number of vehicles travelling 5mph+ over posted speed limit.

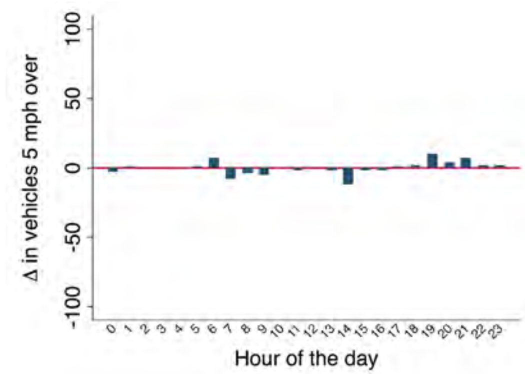
Total number of vehicles traveling 5mph+ over posted speed limit, before-and-after the road diet, by hour	Percent of vehicles traveling 5mph+ over posted speed limit, before-and-after the road diet, by hour	Change in number of vehicles travelling 5mph+ over posted speed limit, by hour
Location 3: Paula, west of Lincoln		
		
Location 4: Pedro, west of Lincoln		
		

Total number of vehicles traveling 5mph+ over posted speed limit, before-and-after the road diet, by hour	Percent of vehicles traveling 5mph+ over posted speed limit, before-and-after the road diet, by hour	Change in number of vehicles travelling 5mph+ over posted speed limit, by hour

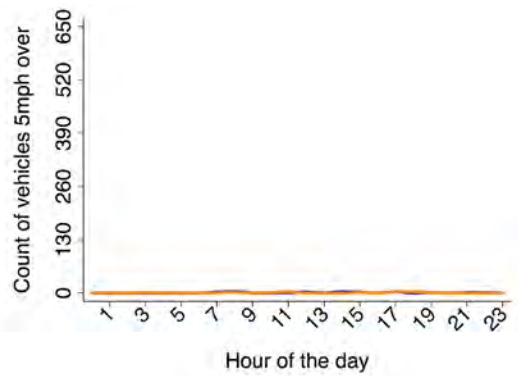
Location 5: Glen Eyrie, west of Lincoln

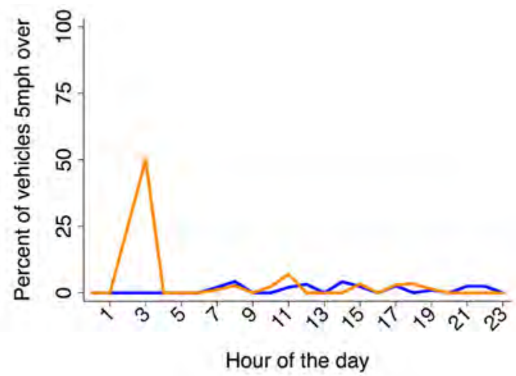


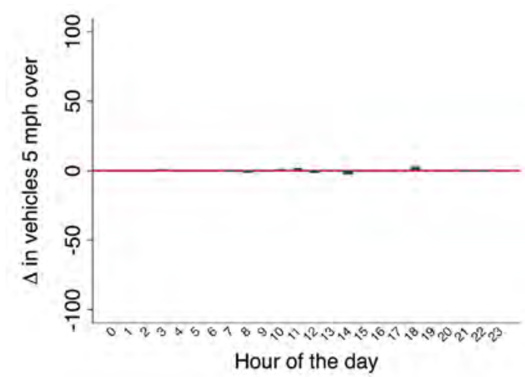




Location 7: Lester, west of Lincoln

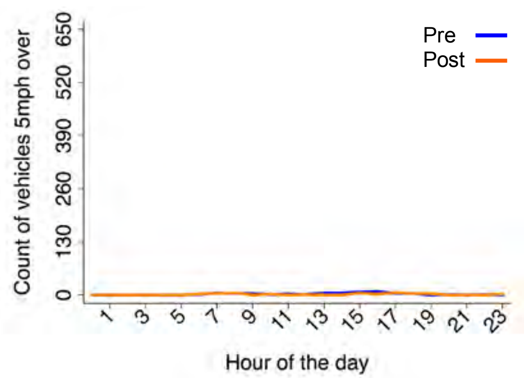


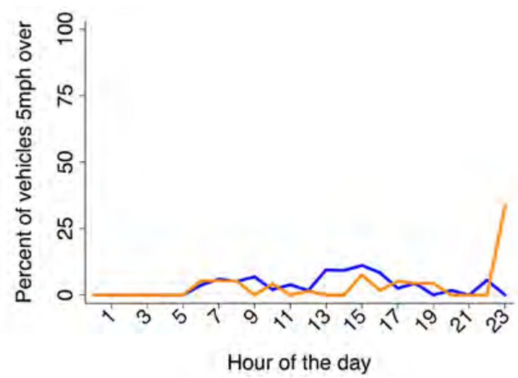


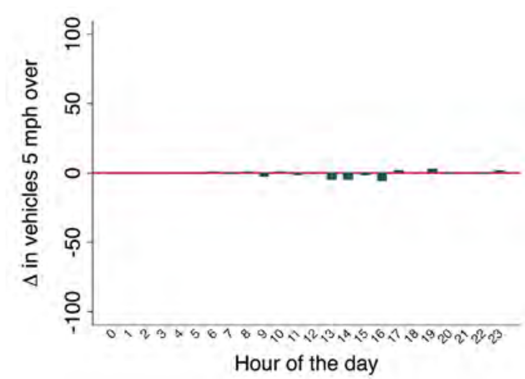


Total number of vehicles traveling 5mph+ over posted speed limit, before-and-after the road diet, by hour	Percent of vehicles traveling 5mph+ over posted speed limit, before-and-after the road diet, by hour	Change in number of vehicles travelling 5mph+ over posted speed limit, by hour

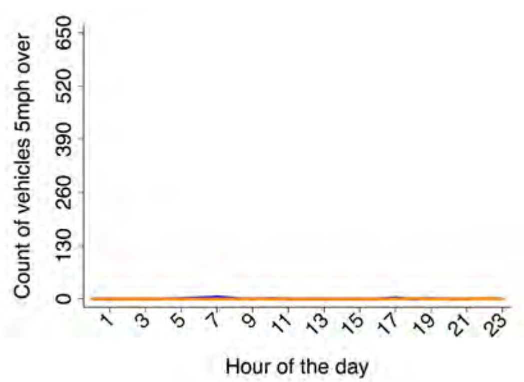
Location 8: Garfield, west of Lincoln

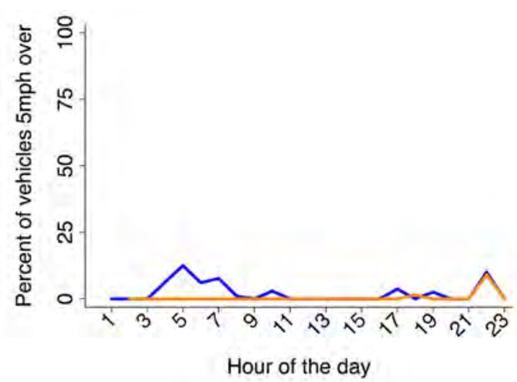


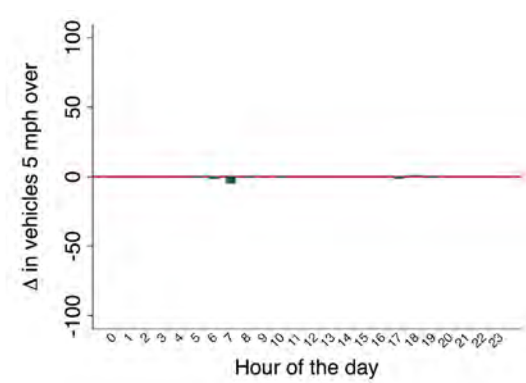




Location 9: El Abra, West of Lincoln

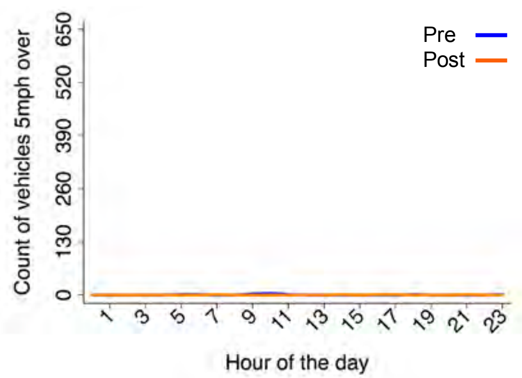


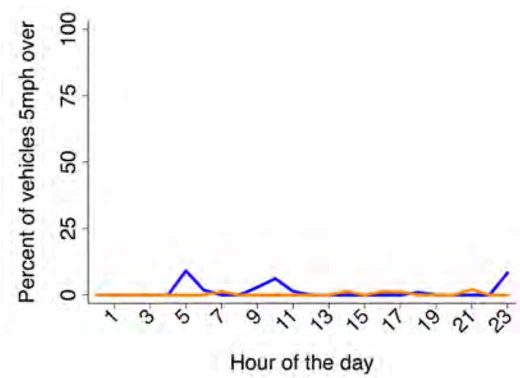


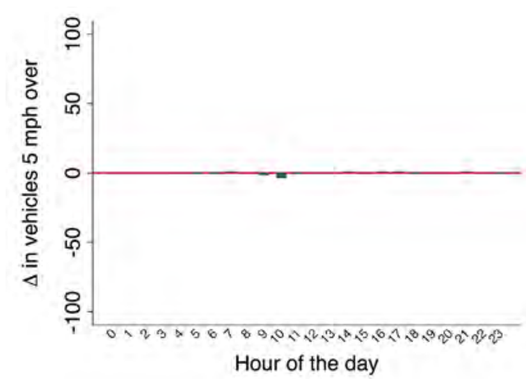


Total number of vehicles traveling 5mph+ over posted speed limit, before-and-after the road diet, by hour	Percent of vehicles traveling 5mph+ over posted speed limit, before-and-after the road diet, by hour	Change in number of vehicles travelling 5mph+ over posted speed limit, by hour

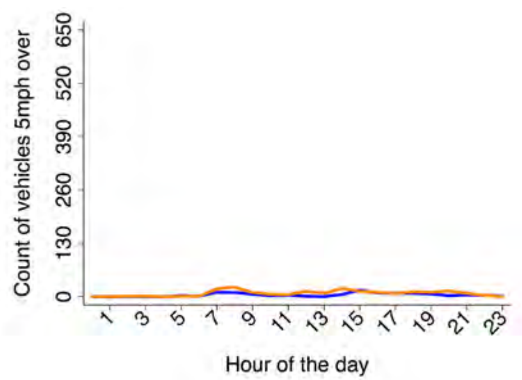
Location 15: Curtiss, south of Willow

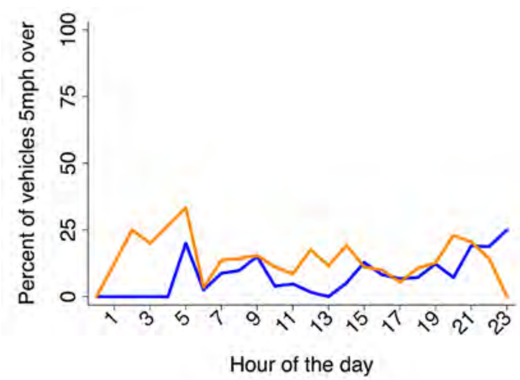


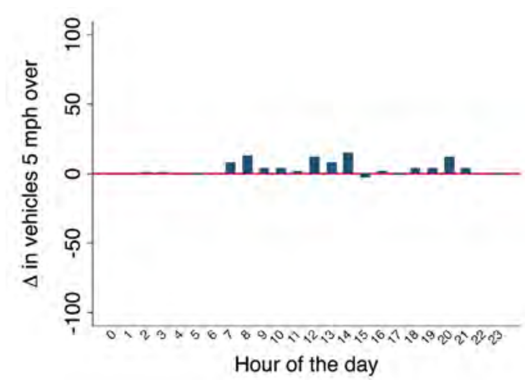




Location 16: Kotenburg, south of Willow

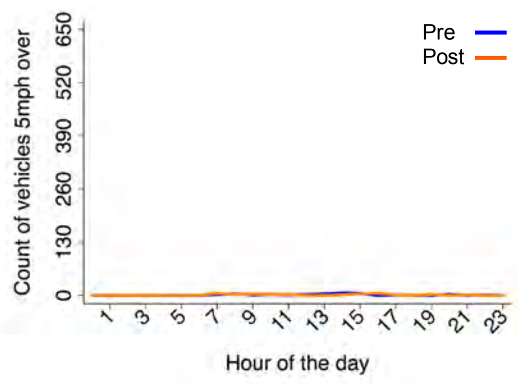


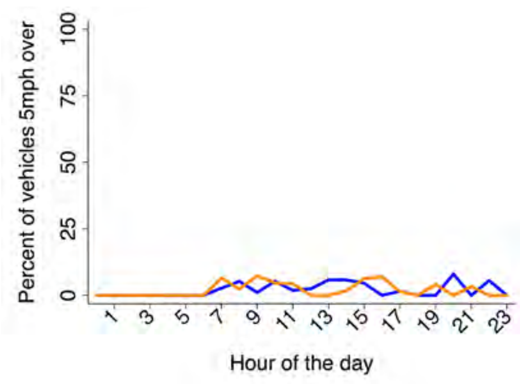


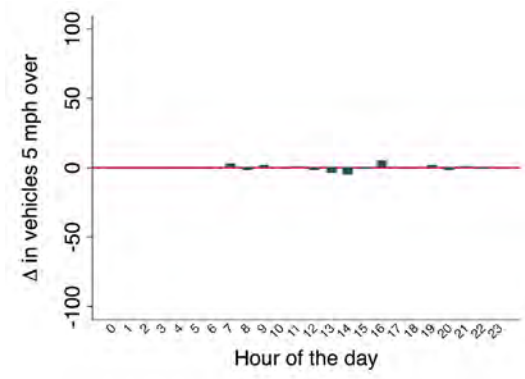


Total number of vehicles traveling 5mph+ over posted speed limit, before-and-after the road diet, by hour	Percent of vehicles traveling 5mph+ over posted speed limit, before-and-after the road diet, by hour	Change in number of vehicles travelling 5mph+ over posted speed limit, by hour

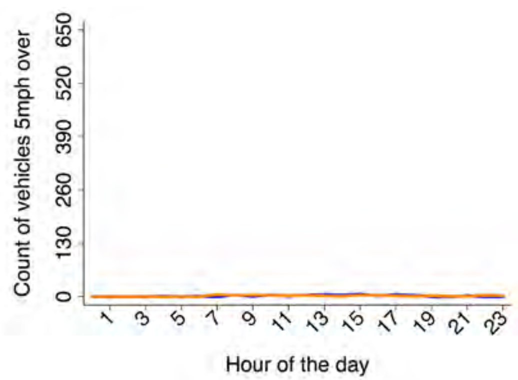
Location 17: Settle, south of Willow

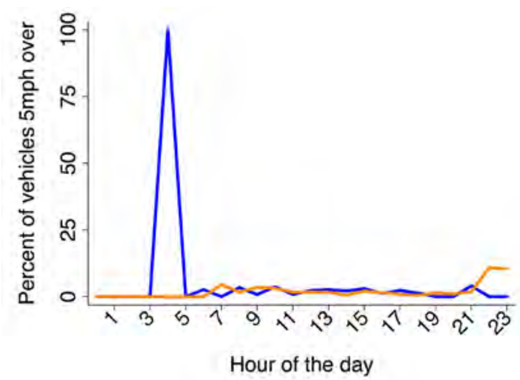


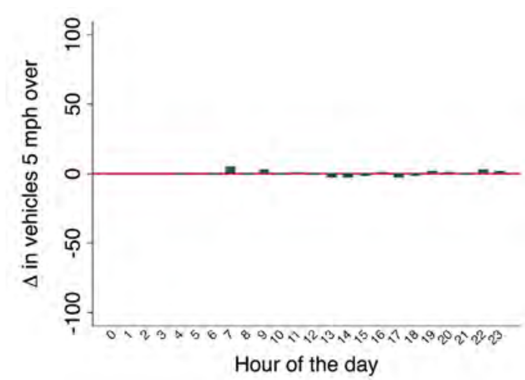




Location 18: Blewett, south of Willow

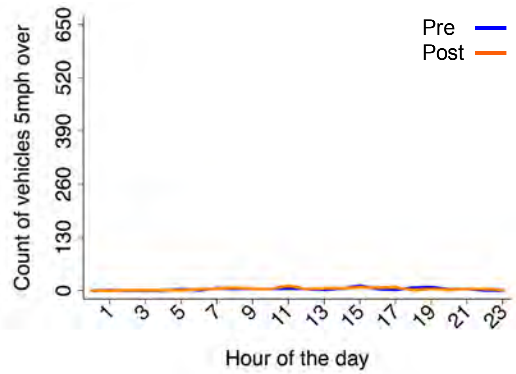


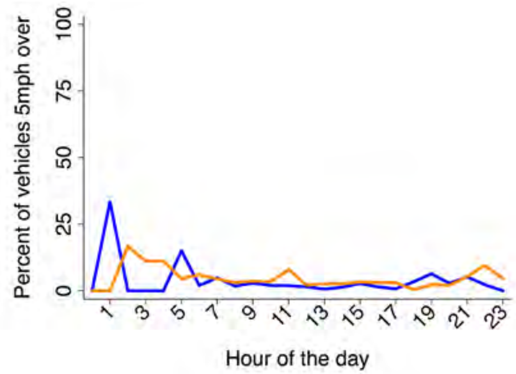


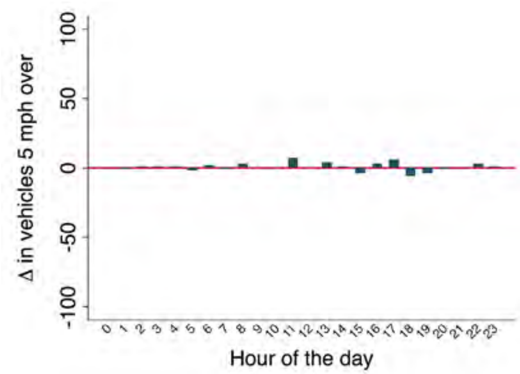


Total number of vehicles traveling 5mph+ over posted speed limit, before-and-after the road diet, by hour	Percent of vehicles traveling 5mph+ over posted speed limit, before-and-after the road diet, by hour	Change in number of vehicles travelling 5mph+ over posted speed limit, by hour

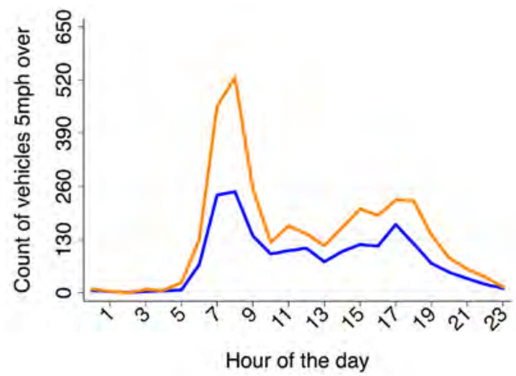
Location 20: Brace, east of Coolidge

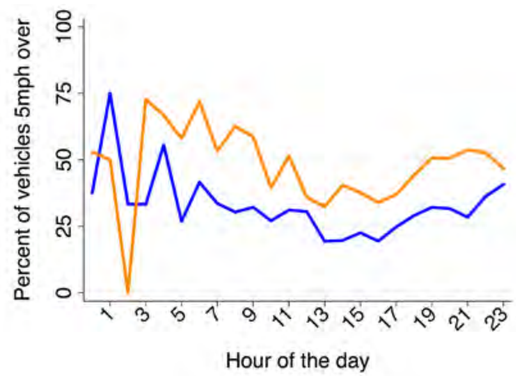


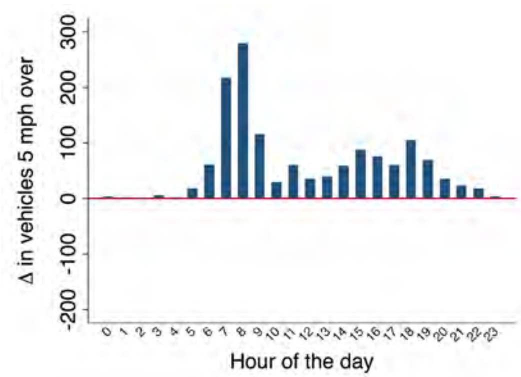


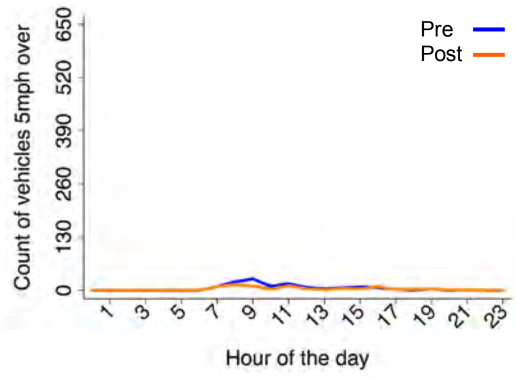
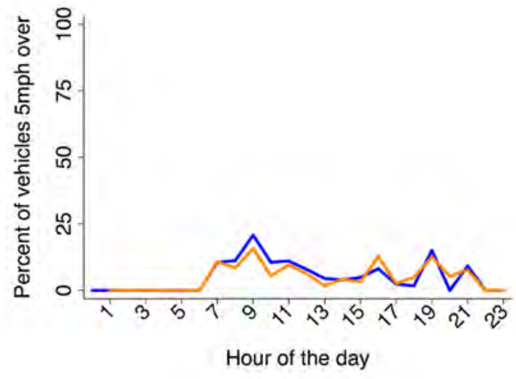
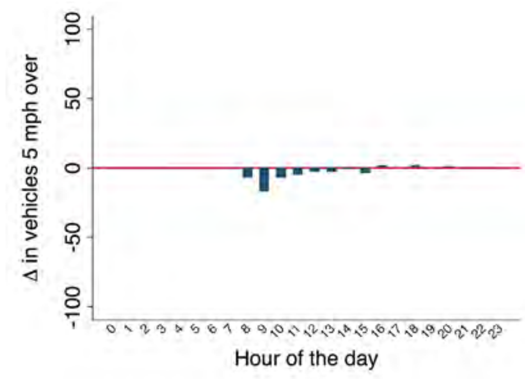
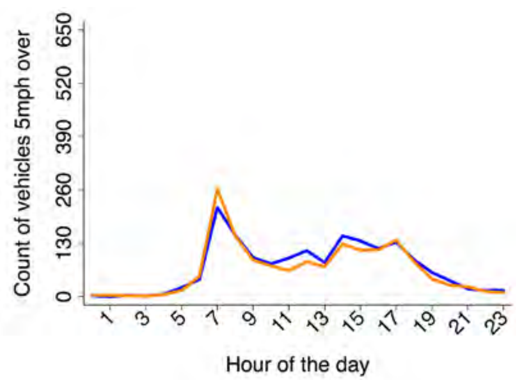
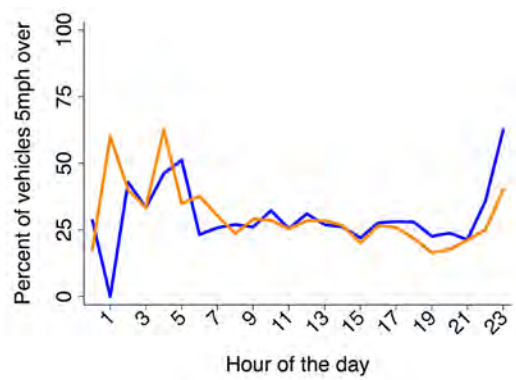
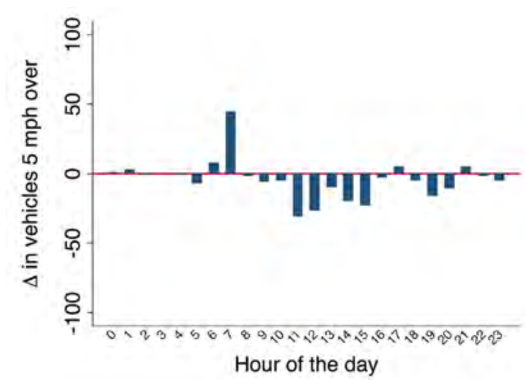


Location 21: Camino Ramon, south of Willow



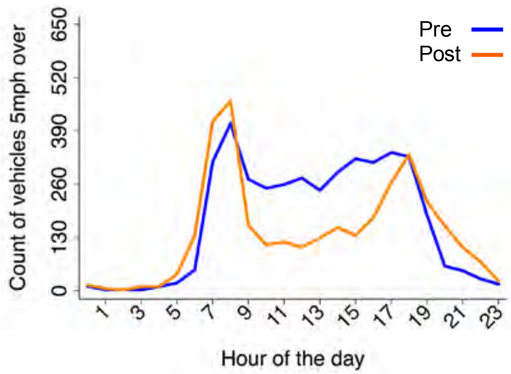


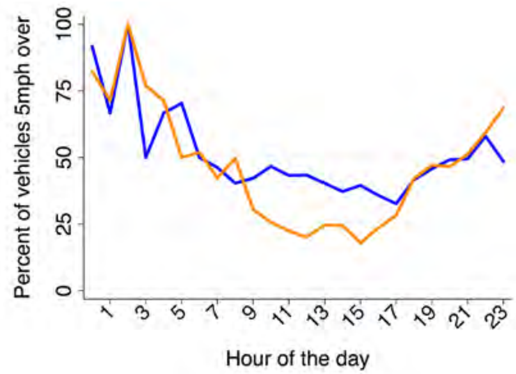


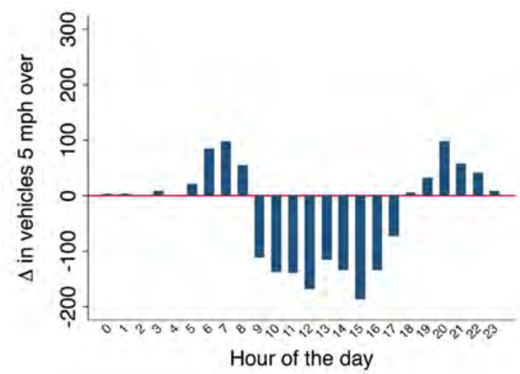
Total number of vehicles traveling 5mph+ over posted speed limit, before-and-after the road diet, by hour	Percent of vehicles traveling 5mph+ over posted speed limit, before-and-after the road diet, by hour	Change in number of vehicles travelling 5mph+ over posted speed limit, by hour
Location 24: Iris, south of Minnesota		
		
Location 26: Newport, south of Minnesota		
		

Total number of vehicles traveling 5mph+ over posted speed limit, before-and-after the road diet, by hour	Percent of vehicles traveling 5mph+ over posted speed limit, before-and-after the road diet, by hour	Change in number of vehicles travelling 5mph+ over posted speed limit, by hour

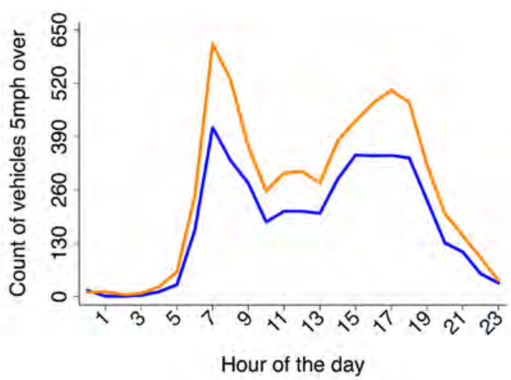
Location 27: Hicks, south of Cherry Valley

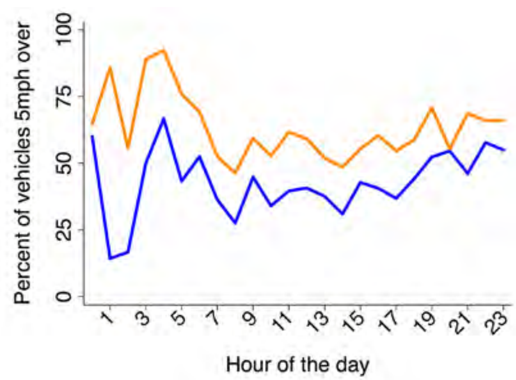


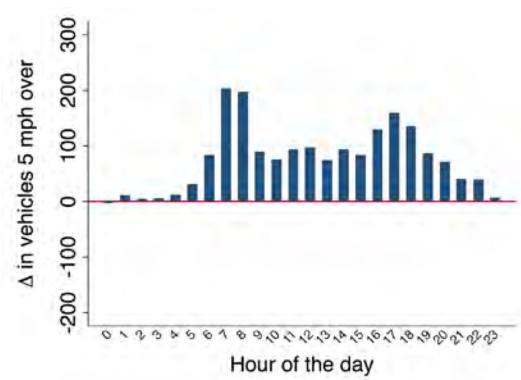


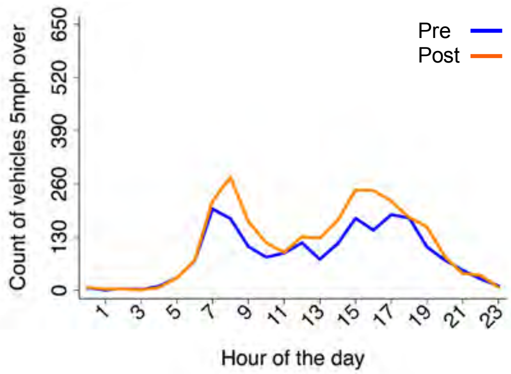
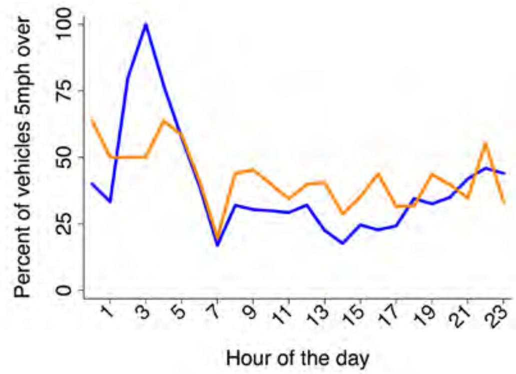
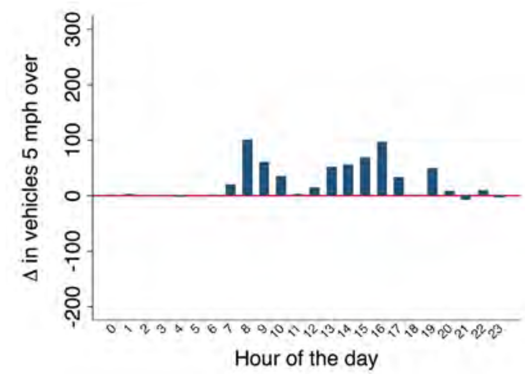
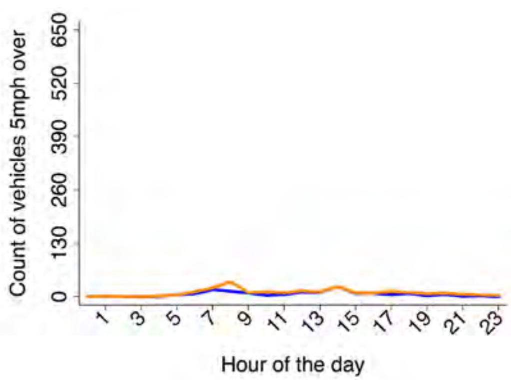
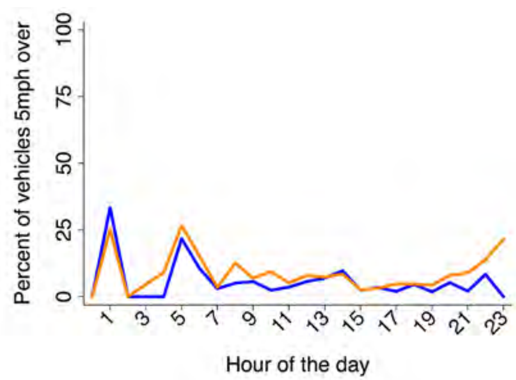
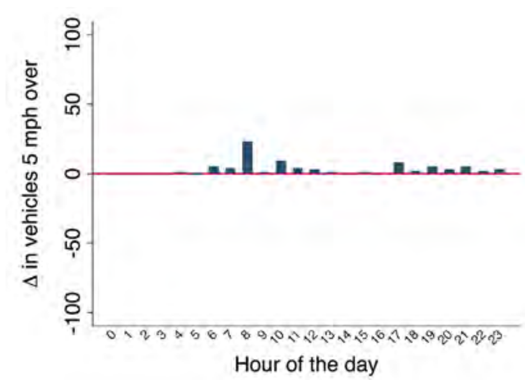


Location 28: Hicks, south of Callecita



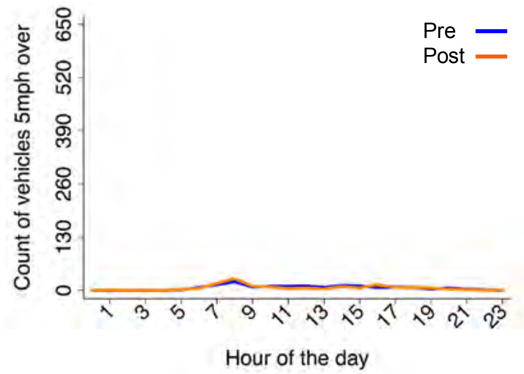


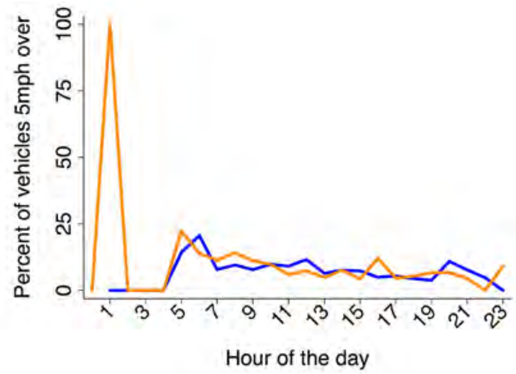


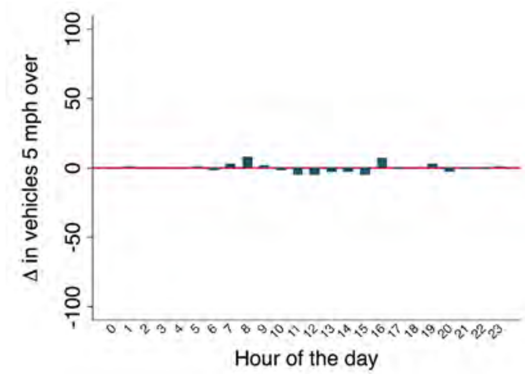
Total number of vehicles traveling 5mph+ over posted speed limit, before-and-after the road diet, by hour	Percent of vehicles traveling 5mph+ over posted speed limit, before-and-after the road diet, by hour	Change in number of vehicles travelling 5mph+ over posted speed limit, by hour
Location 29: Cottle, south of Pine		
		
Location 30: Newport, south of Fairview		
		

Total number of vehicles traveling 5mph+ over posted speed limit, before-and-after the road diet, by hour	Percent of vehicles traveling 5mph+ over posted speed limit, before-and-after the road diet, by hour	Change in number of vehicles travelling 5mph+ over posted speed limit, by hour

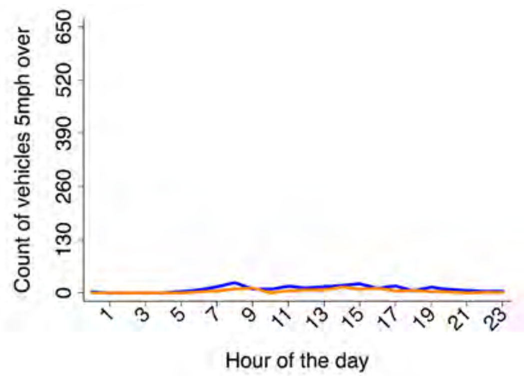
Location 33: Willow Glen, west of Hill

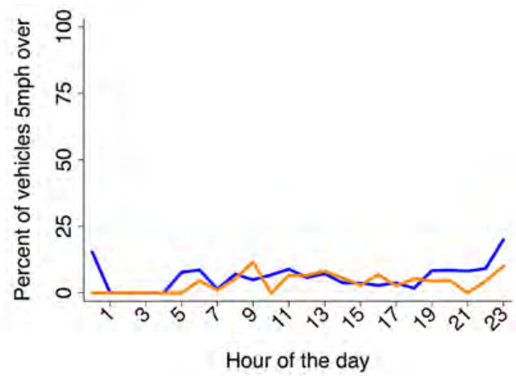


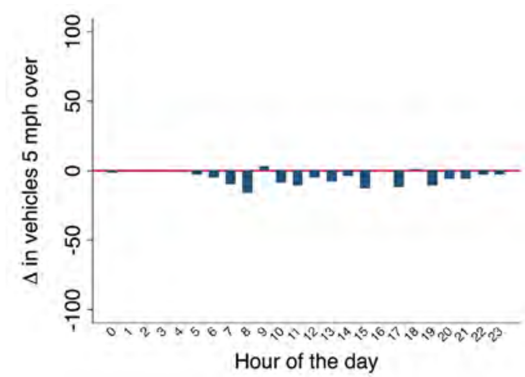




Location 38: Malone, west of Lincoln

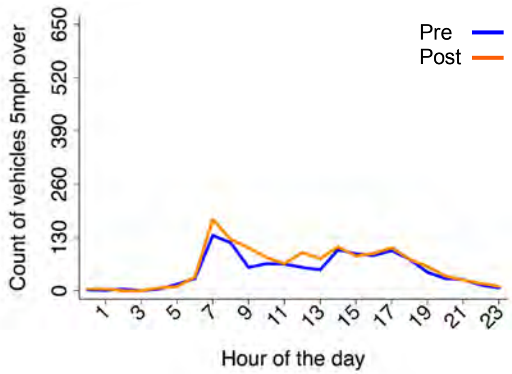


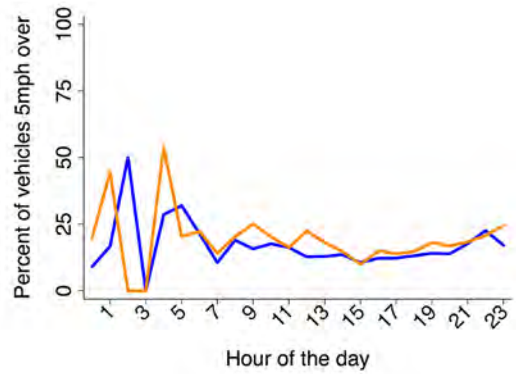


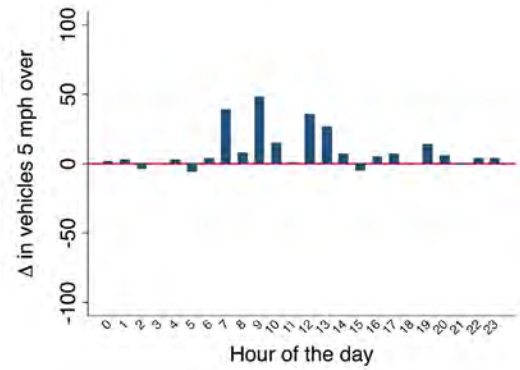


Total number of vehicles traveling 5mph+ over posted speed limit, before-and-after the road diet, by hour	Percent of vehicles traveling 5mph+ over posted speed limit, before-and-after the road diet, by hour	Change in number of vehicles travelling 5mph+ over posted speed limit, by hour

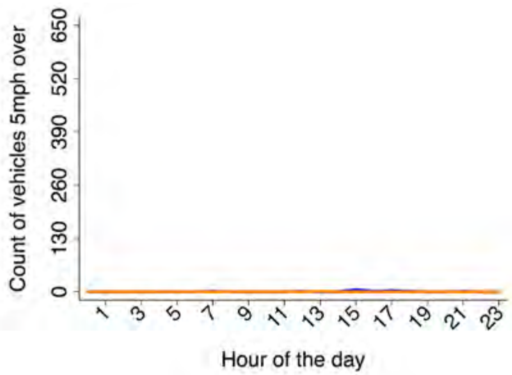
Location 39: Malone, east of Harmil

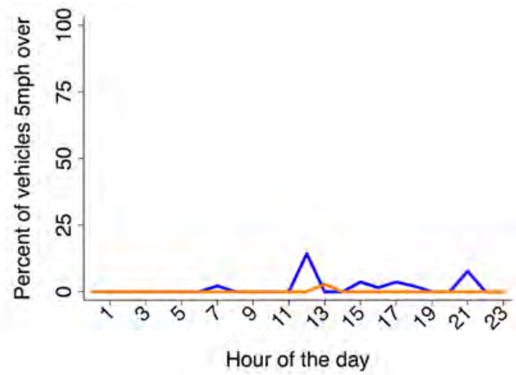


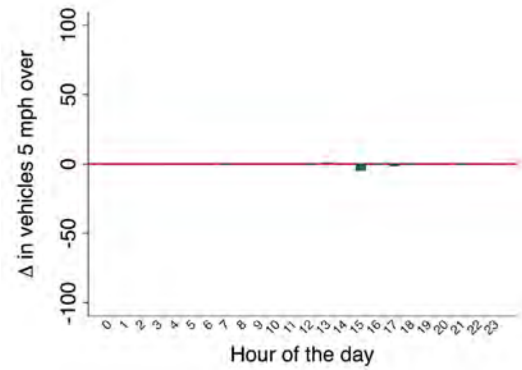




Location 43: Michigan, east of Lincoln

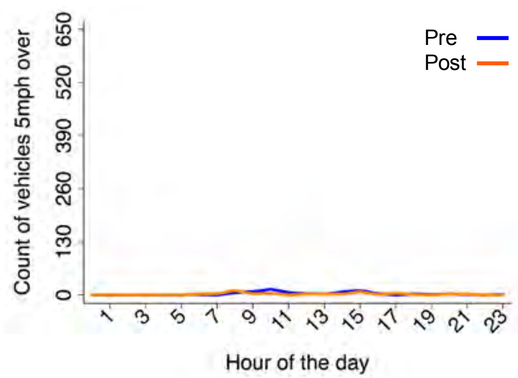


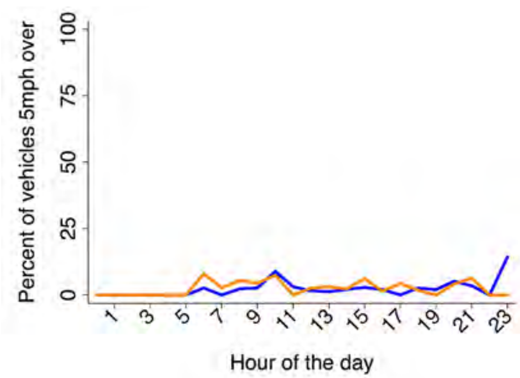


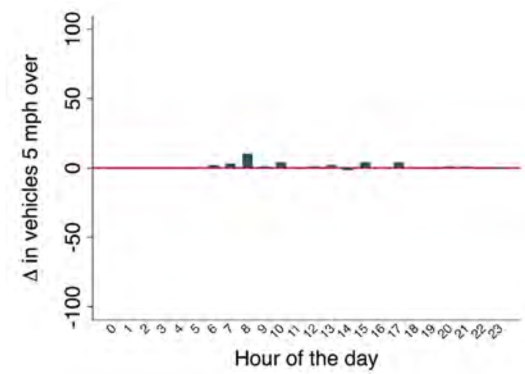


Total number of vehicles traveling 5mph+ over posted speed limit, before-and-after the road diet, by hour	Percent of vehicles traveling 5mph+ over posted speed limit, before-and-after the road diet, by hour	Change in number of vehicles travelling 5mph+ over posted speed limit, by hour

Location 44: California, east of Lincoln





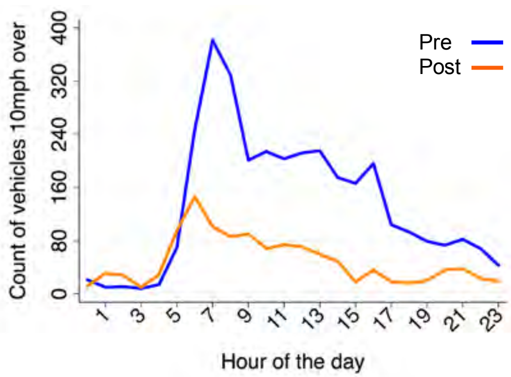


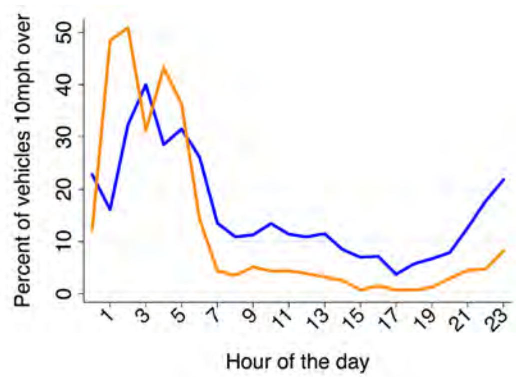
10 MPH+ OVER THE SPEED LIMIT GRAPHS

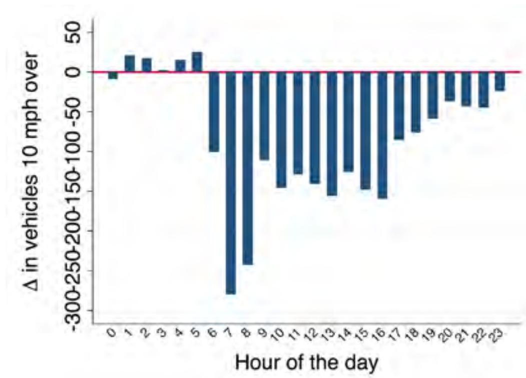
Lincoln Avenue Road Diet Location Graphs: Before-and-after the road diet – total number of vehicles traveling 10mph+ over posted speed limit, percent of vehicles traveling 10mph+ over posted speed limit, and change in number of vehicles travelling 10mph+ over posted speed limit.

Total number of vehicles traveling 10mph+ over posted speed limit, before-and-after the road diet, by hour	Percent of vehicles traveling 10mph+ over posted speed limit, before-and-after the road diet, by hour	Change in number of vehicles travelling 10mph+ over posted speed limit, by hour

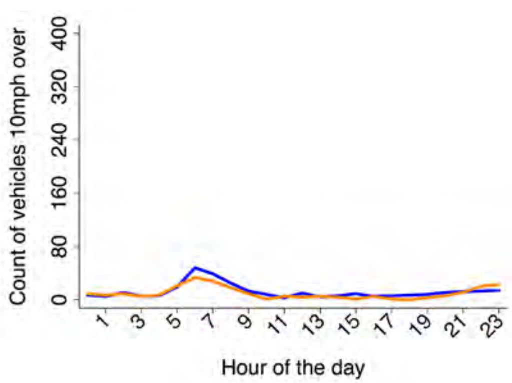
Location 6: Lincoln, south of Glen Eyrie

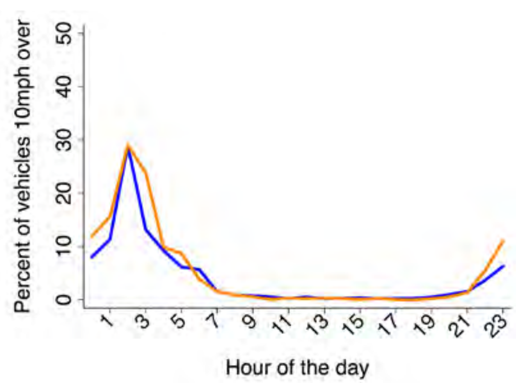


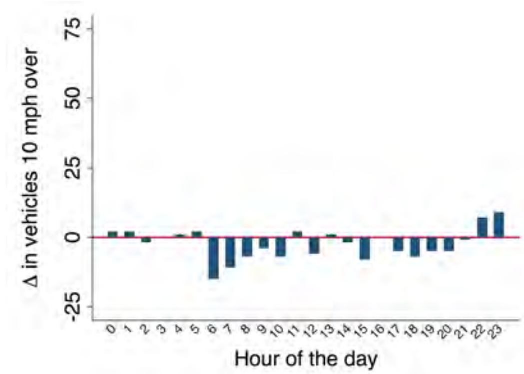




Location 19: Lincoln, south of Meredith



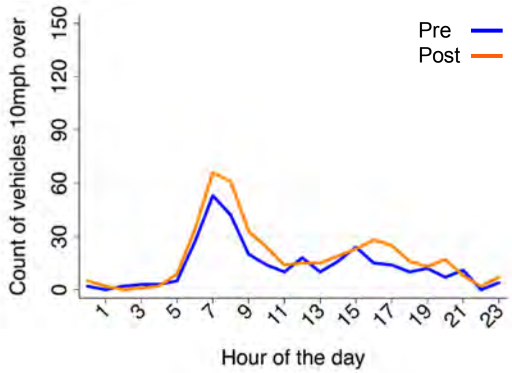


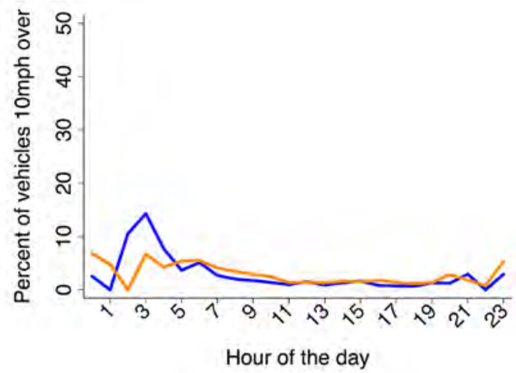


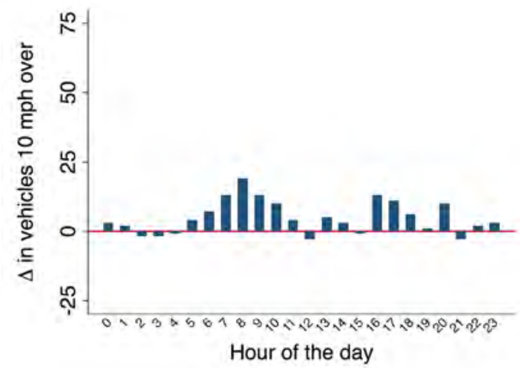
Lincoln Avenue Non-Road Diet Location Graphs: Before-and-after the road diet – total number of vehicles traveling 10mph+ over posted speed limit, percent of vehicles traveling 10mph+ over posted speed limit, and change in number of vehicles travelling 10mph+ over posted speed limit.

Total number of vehicles traveling 10mph+ over posted speed limit, before-and-after the road diet, by hour	Percent of vehicles traveling 10mph+ over posted speed limit, before-and-after the road diet, by hour	Change in number of vehicles travelling 10mph+ over posted speed limit, by hour

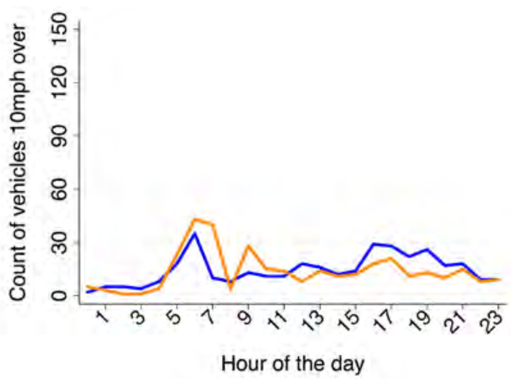
Location 1: Lincoln, north of Parkmoor

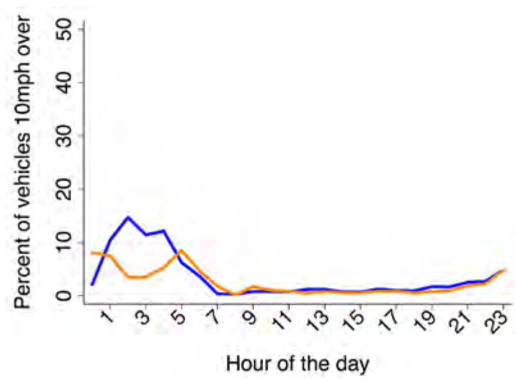


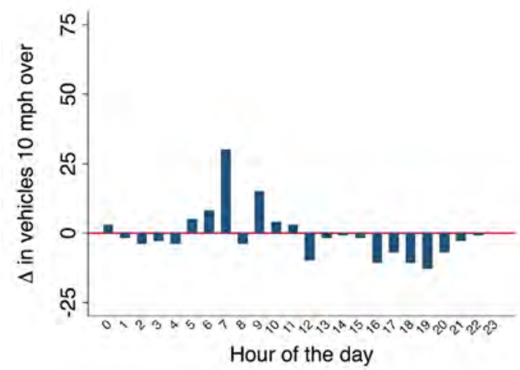




Location 32: Lincoln, south of Nevada

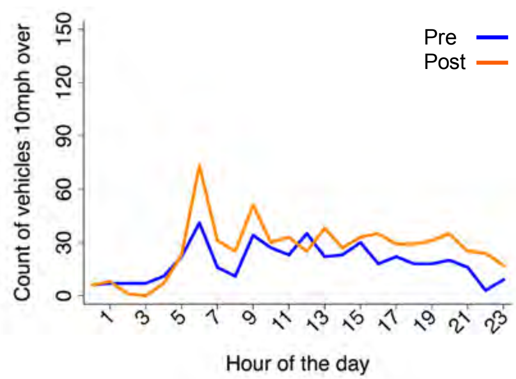


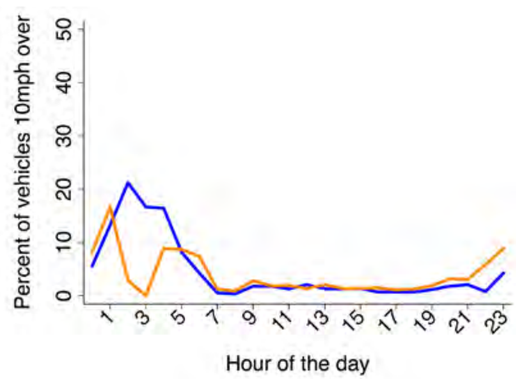


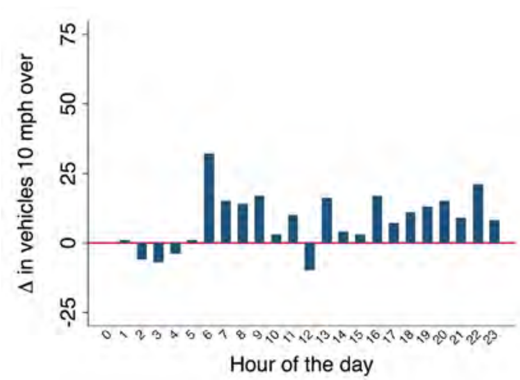


Total number of vehicles traveling 10mph+ over posted speed limit, before-and-after the road diet, by hour	Percent of vehicles traveling 10mph+ over posted speed limit, before-and-after the road diet, by hour	Change in number of vehicles travelling 10mph+ over posted speed limit, by hour

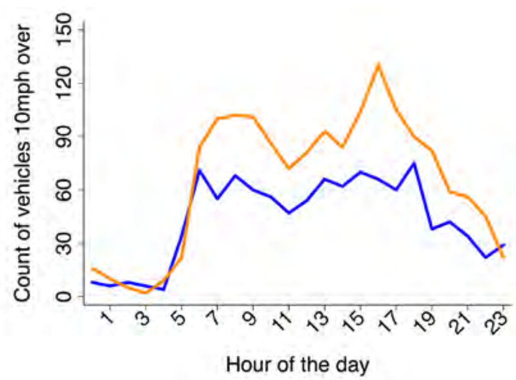
Location 36: Lincoln, south of Clark

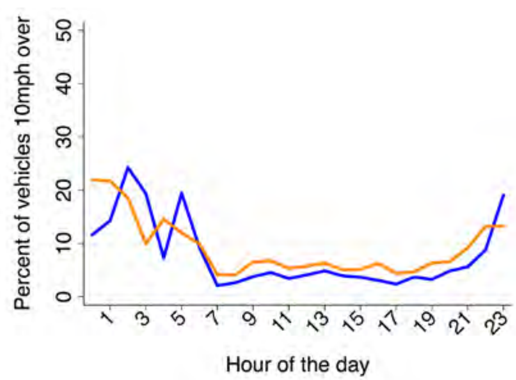


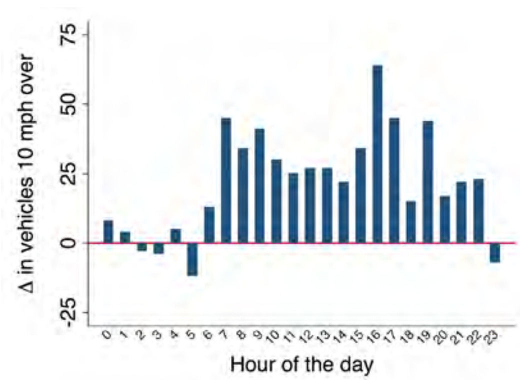




Location 37: Lincoln, south of Curtner



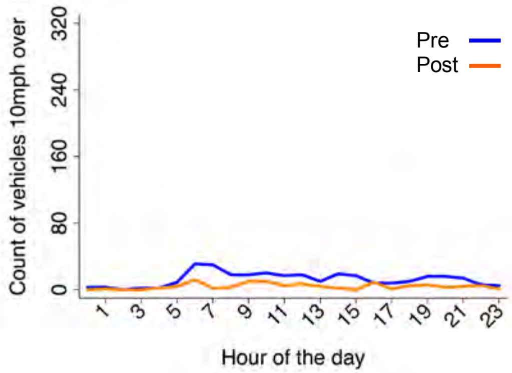


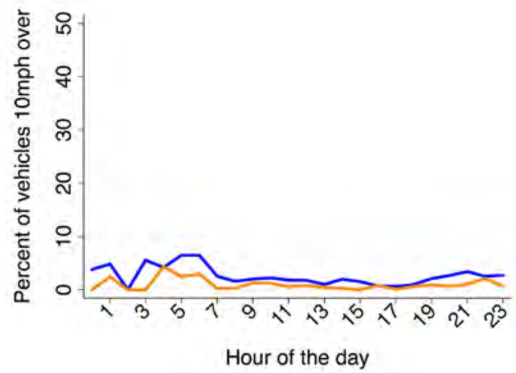


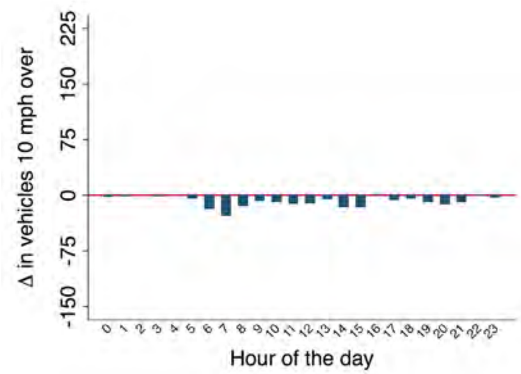
Major Streets Location Graphs: Before-and-after the road diet – total number of vehicles traveling 10mph+ over posted speed limit, percent of vehicles traveling 10mph+ over posted speed limit, and change in number of vehicles travelling 10mph+ over posted speed limit.

Total number of vehicles traveling 10mph+ over posted speed limit, before-and-after the road diet, by hour	Percent of vehicles traveling 10mph+ over posted speed limit, before-and-after the road diet, by hour	Change in number of vehicles travelling 10mph+ over posted speed limit, by hour

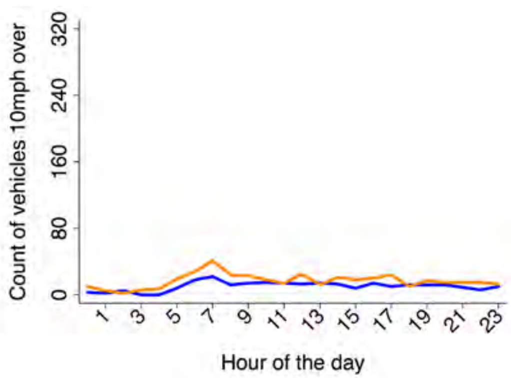
Location 2: Lincoln, south of Glen Eyrie

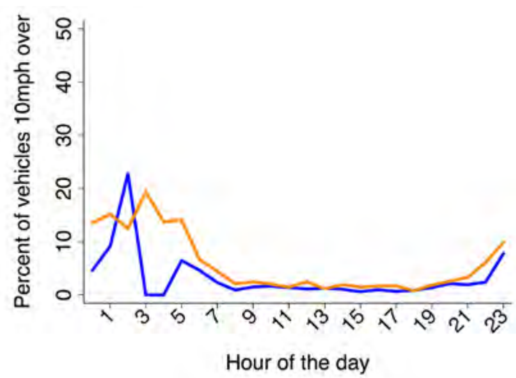


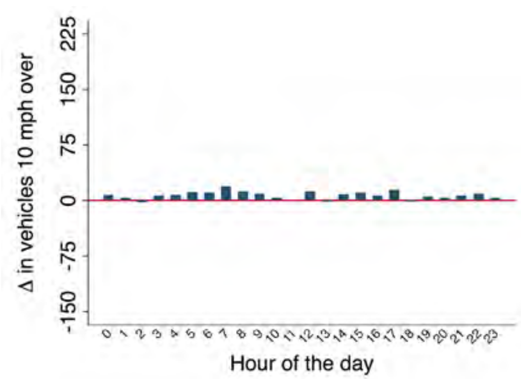




Location 10: Willow, west of Lincoln

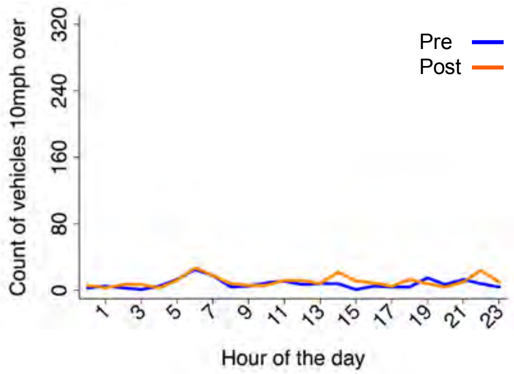


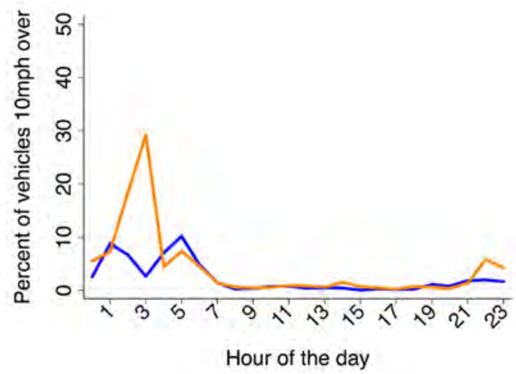


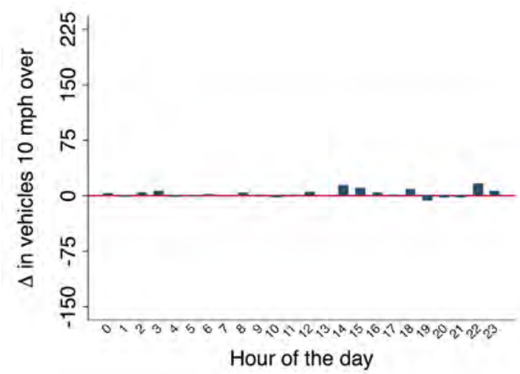


Total number of vehicles traveling 10mph+ over posted speed limit, before-and-after the road diet, by hour	Percent of vehicles traveling 10mph+ over posted speed limit, before-and-after the road diet, by hour	Change in number of vehicles travelling 10mph+ over posted speed limit, by hour

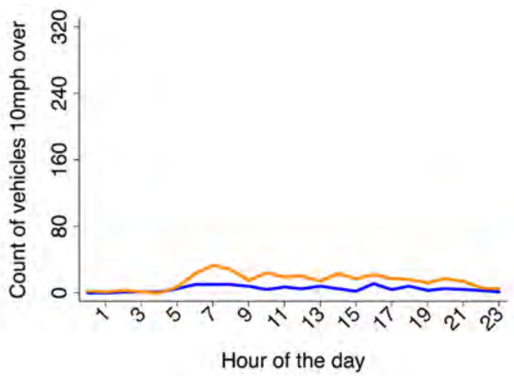
Location 11: Willow, east of Lincoln

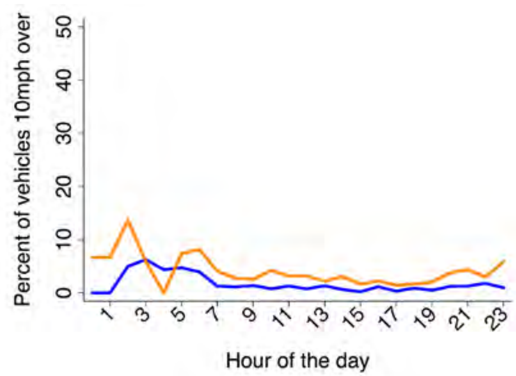


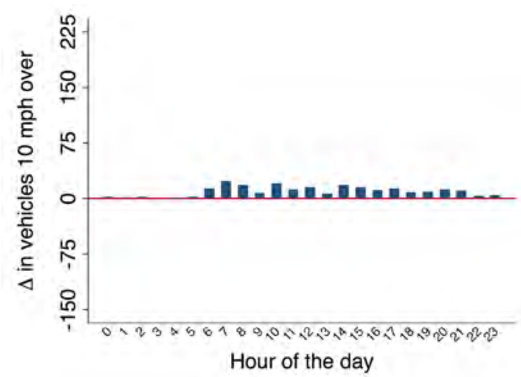




Location 12: Coe, east of Riverside

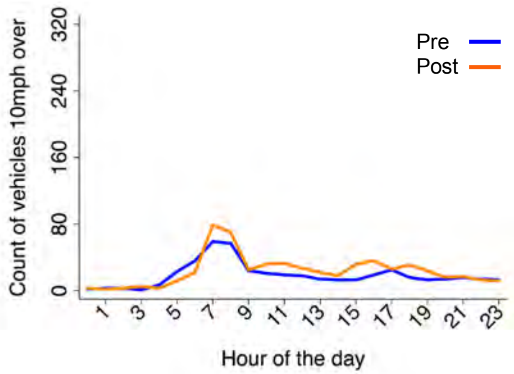


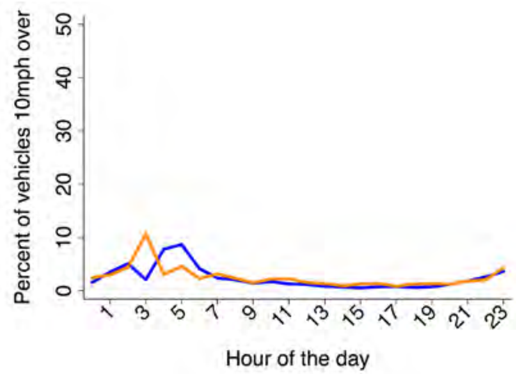


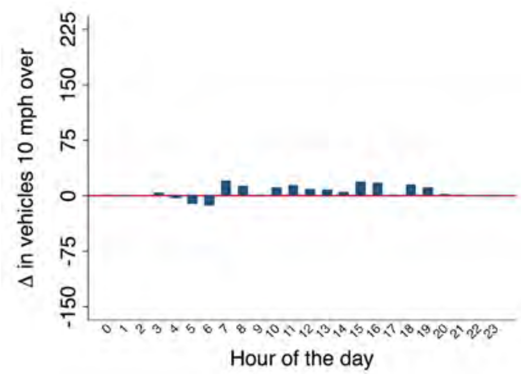


Total number of vehicles traveling 10mph+ over posted speed limit, before-and-after the road diet, by hour	Percent of vehicles traveling 10mph+ over posted speed limit, before-and-after the road diet, by hour	Change in number of vehicles travelling 10mph+ over posted speed limit, by hour

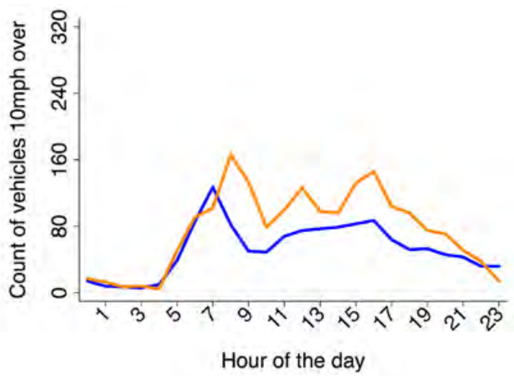
Location 13: Bird, north of Coe

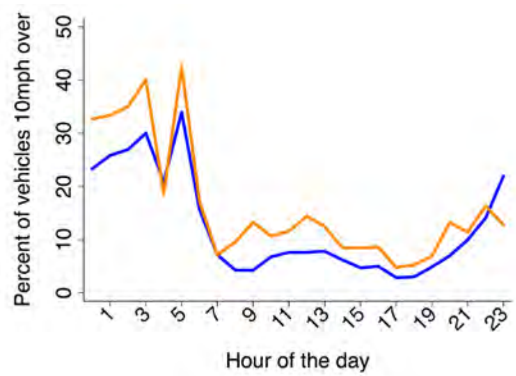


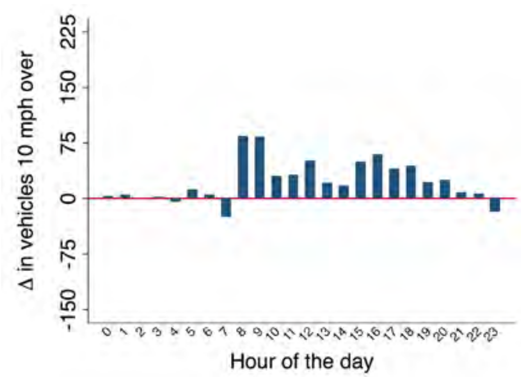




Location 14: Bird, south of Willow

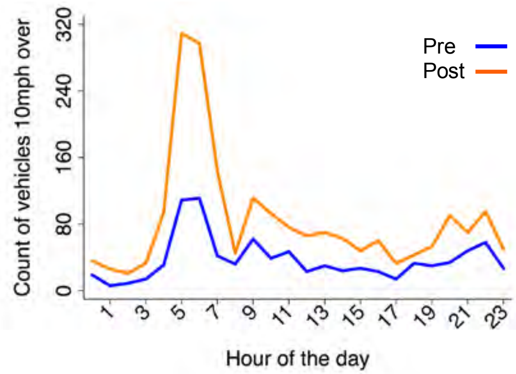


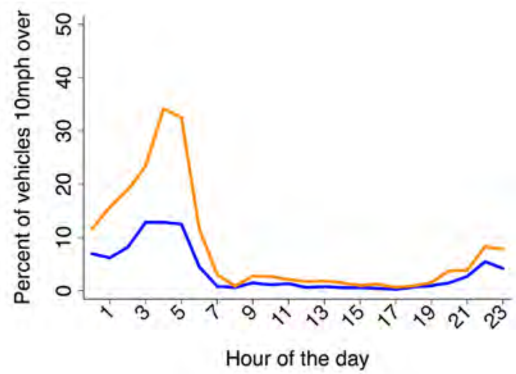


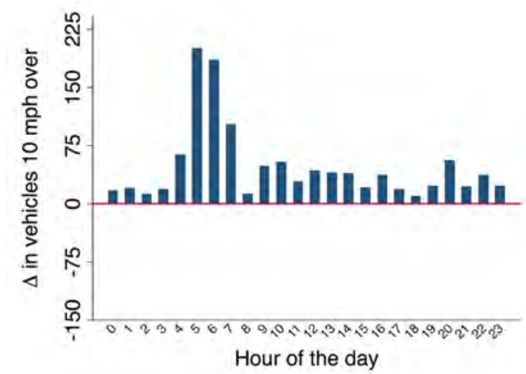


Total number of vehicles traveling 10mph+ over posted speed limit, before-and-after the road diet, by hour	Percent of vehicles traveling 10mph+ over posted speed limit, before-and-after the road diet, by hour	Change in number of vehicles travelling 10mph+ over posted speed limit, by hour

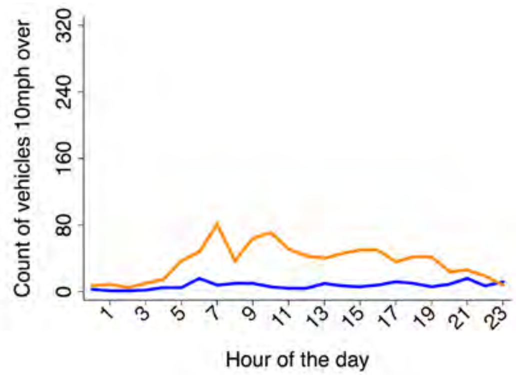
Location 22: Meridian, north of Minnesota

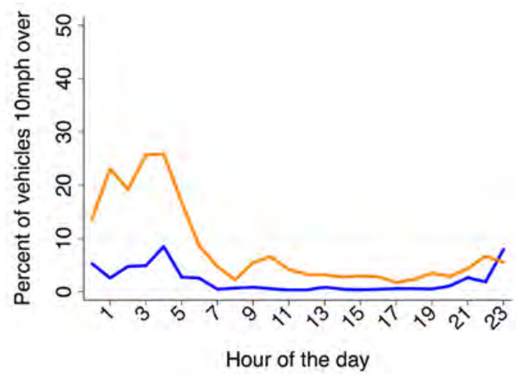


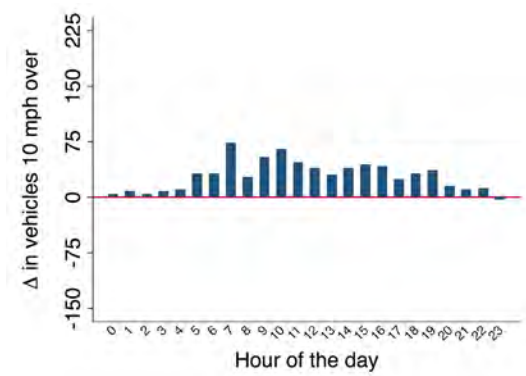




Location 23: Minnesota, east of Lincoln

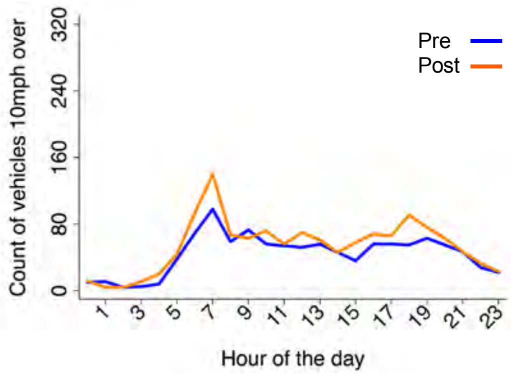


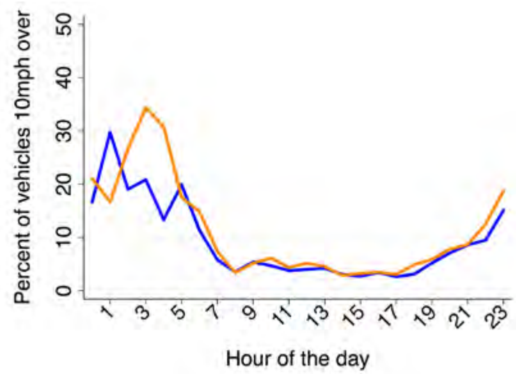


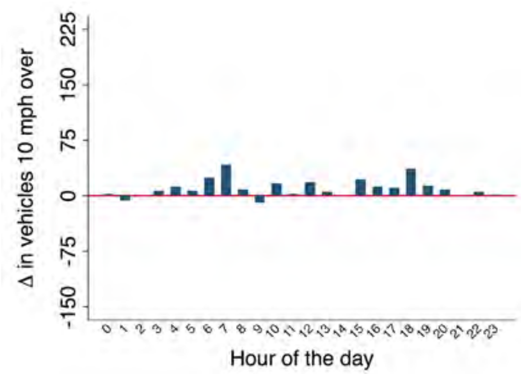


Total number of vehicles traveling 10mph+ over posted speed limit, before-and-after the road diet, by hour	Percent of vehicles traveling 10mph+ over posted speed limit, before-and-after the road diet, by hour	Change in number of vehicles travelling 10mph+ over posted speed limit, by hour

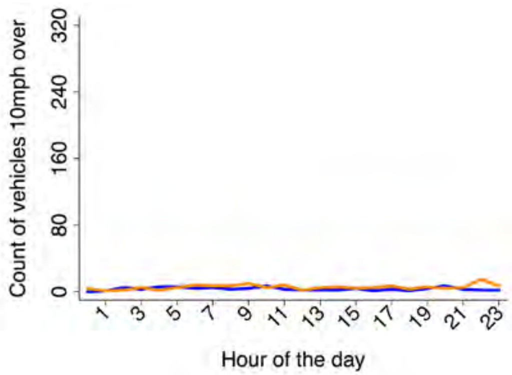
Location 25: Minnesota, west of Lincoln

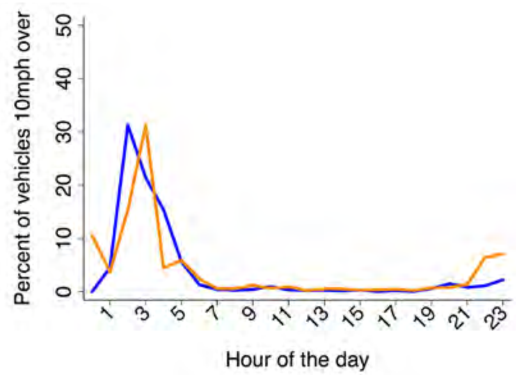


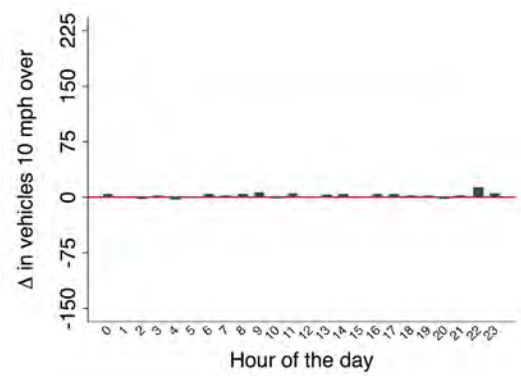




Location 31: Pine, west of Lincoln

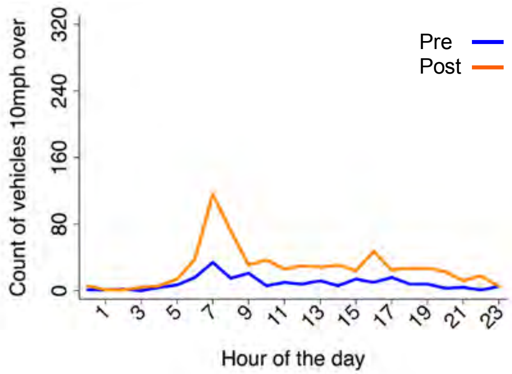


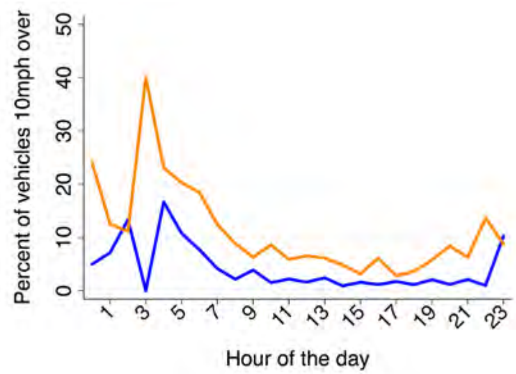


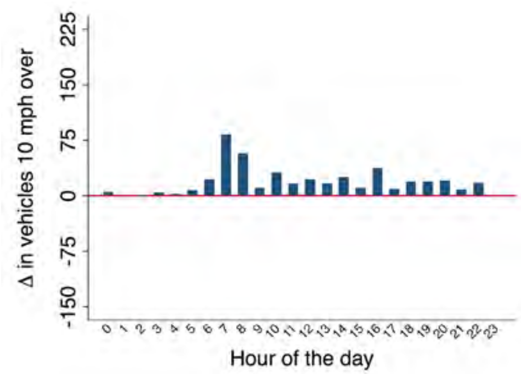


Total number of vehicles traveling 10mph+ over posted speed limit, before-and-after the road diet, by hour	Percent of vehicles traveling 10mph+ over posted speed limit, before-and-after the road diet, by hour	Change in number of vehicles travelling 10mph+ over posted speed limit, by hour

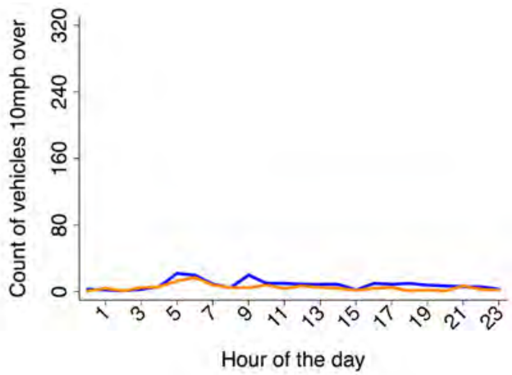
Location 34: Pine, east of Lincoln

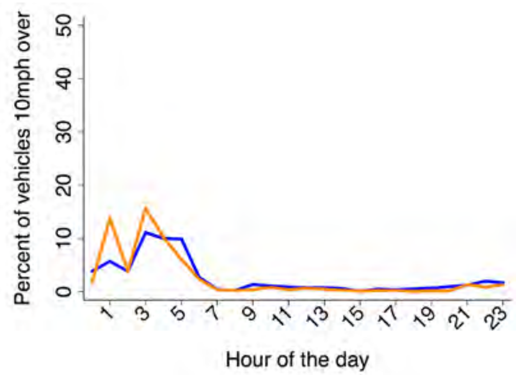


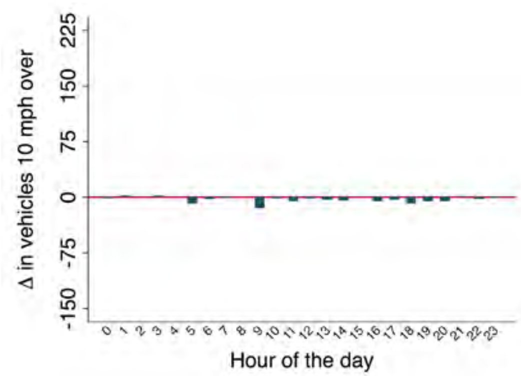




Location 35: Bird, south of Willow Glen Way

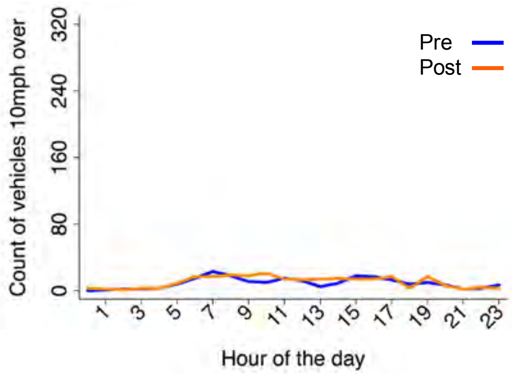


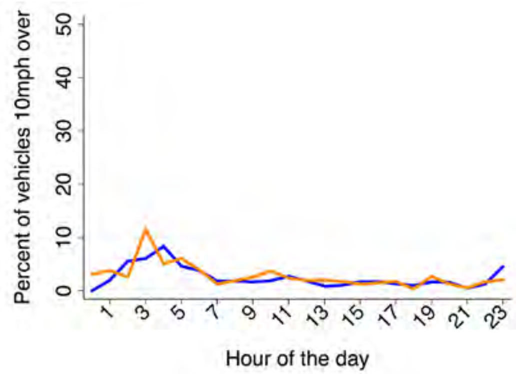


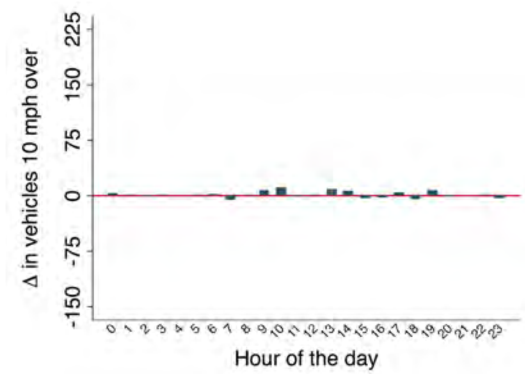


Total number of vehicles traveling 10mph+ over posted speed limit, before-and-after the road diet, by hour	Percent of vehicles traveling 10mph+ over posted speed limit, before-and-after the road diet, by hour	Change in number of vehicles travelling 10mph+ over posted speed limit, by hour

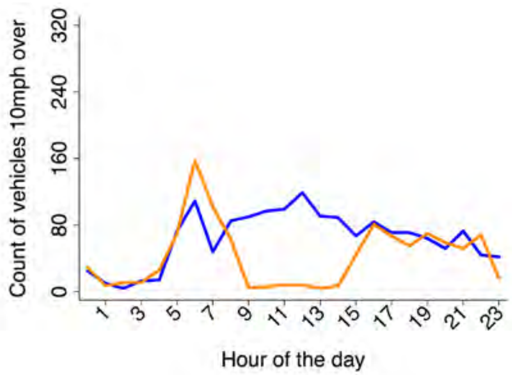
Location 40: Almaden, north of Malone

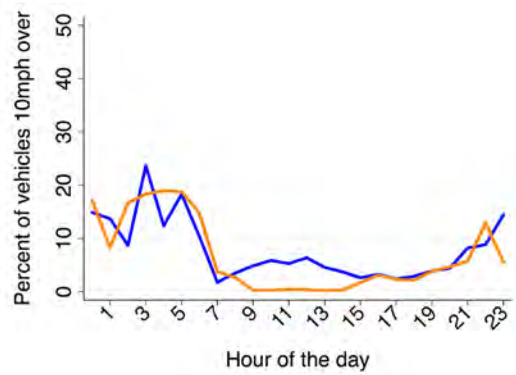


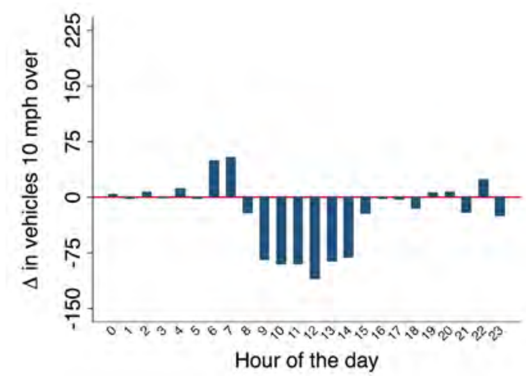




Location 41: Curtner, east of Lincoln

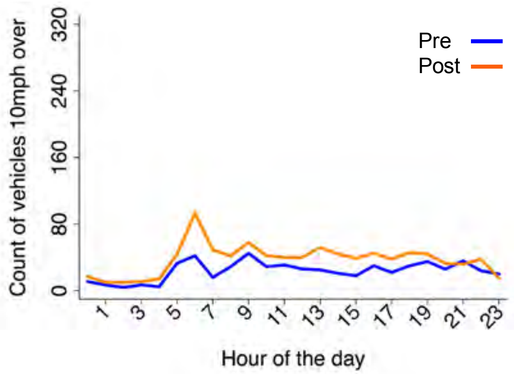


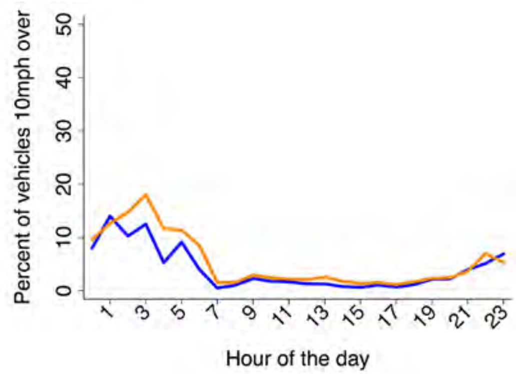


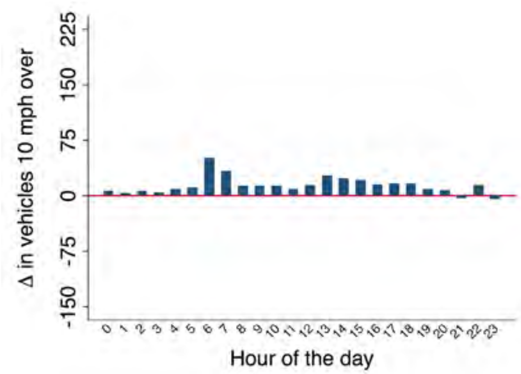


Total number of vehicles traveling 10mph+ over posted speed limit, before-and-after the road diet, by hour	Percent of vehicles traveling 10mph+ over posted speed limit, before-and-after the road diet, by hour	Change in number of vehicles travelling 10mph+ over posted speed limit, by hour

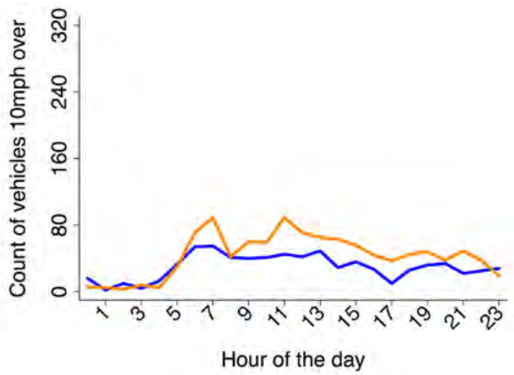
Location 42: Curtner, west of Lincoln

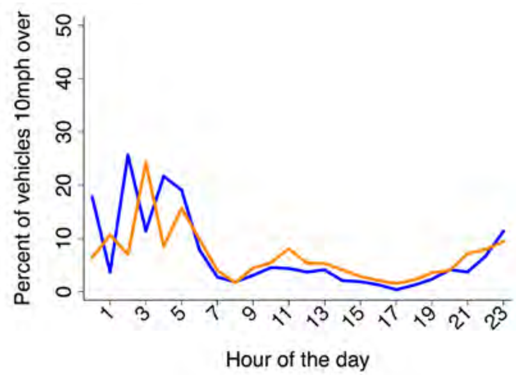


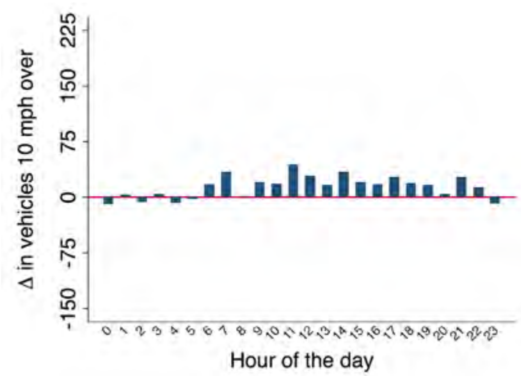




Location 45: Bird, north of Willow



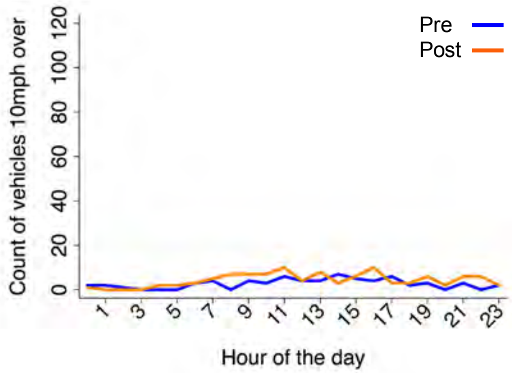


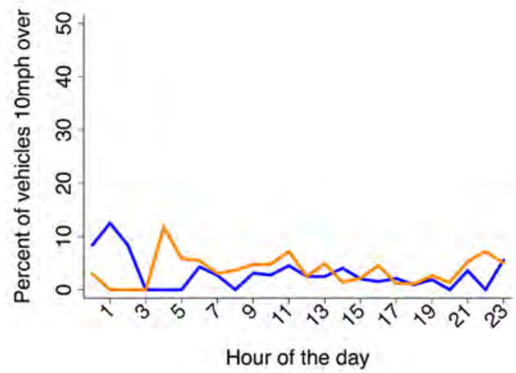


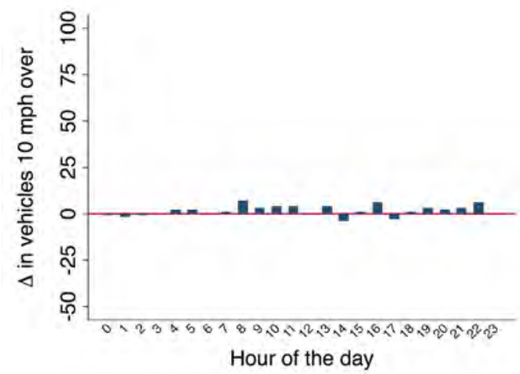
Neighborhood Streets Location Graphs: Before-and-after the road diet – total number of vehicles traveling 10mph+ over posted speed limit, percent of vehicles traveling 10mph+ over posted speed limit, and change in number of vehicles travelling 10mph+ over posted speed limit.

Total number of vehicles traveling 10mph+ over posted speed limit, before-and-after the road diet, by hour	Percent of vehicles traveling 10mph+ over posted speed limit, before-and-after the road diet, by hour	Change in number of vehicles travelling 10mph+ over posted speed limit, by hour

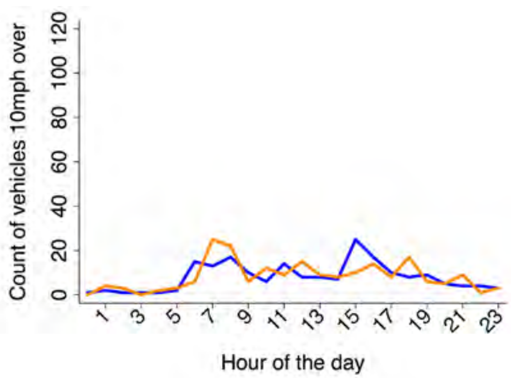
Location 3: Paula, west of Lincoln

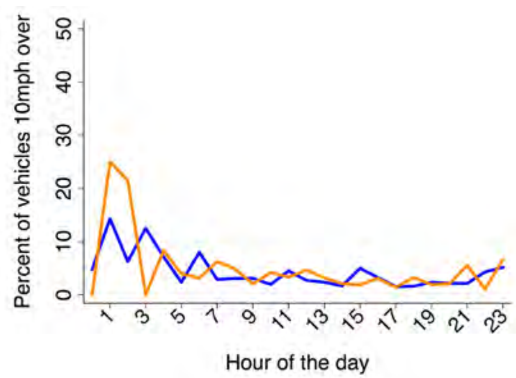


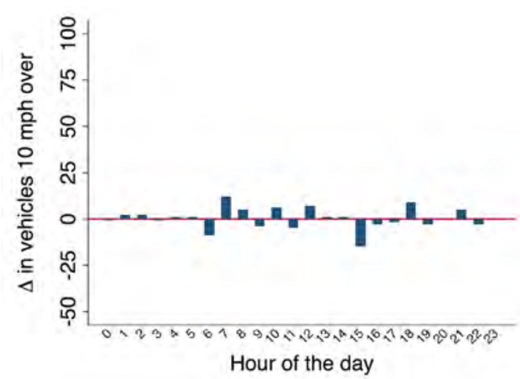




Location 4: Pedro, west of Lincoln

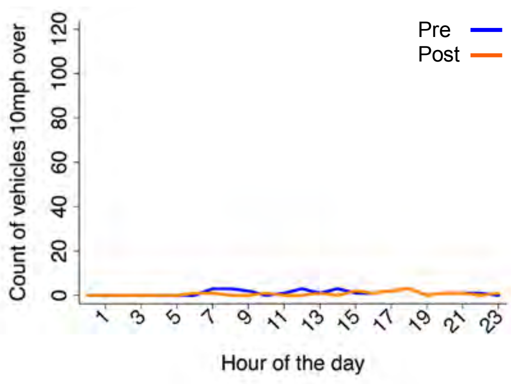


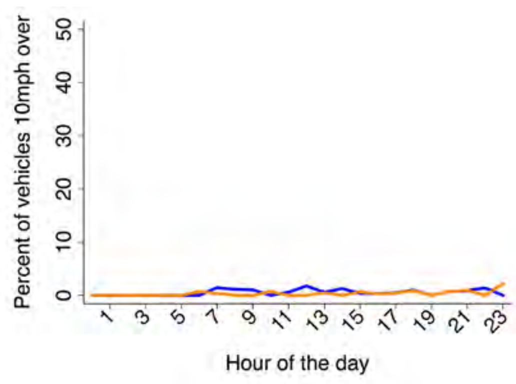


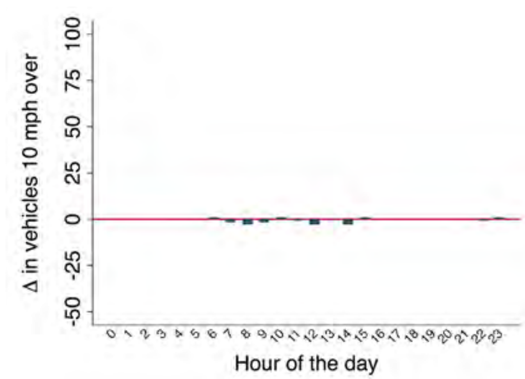


Total number of vehicles traveling 10mph+ over posted speed limit, before-and-after the road diet, by hour	Percent of vehicles traveling 10mph+ over posted speed limit, before-and-after the road diet, by hour	Change in number of vehicles travelling 10mph+ over posted speed limit, by hour

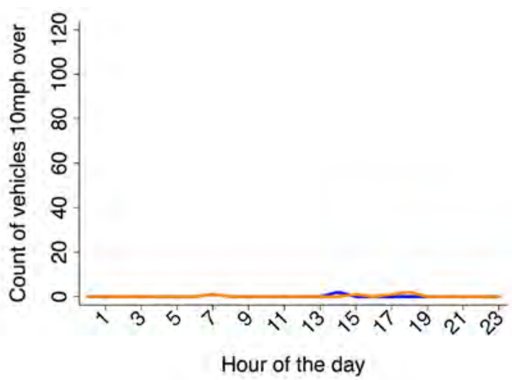
Location 5: Glen Eyrie, west of Lincoln

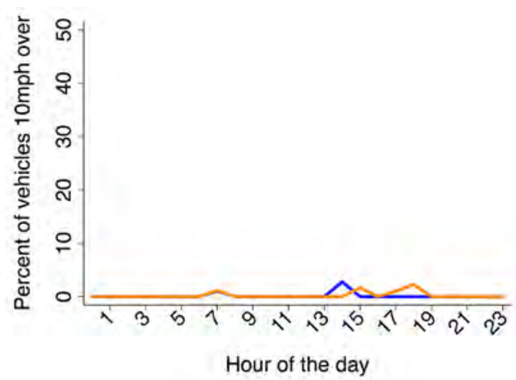


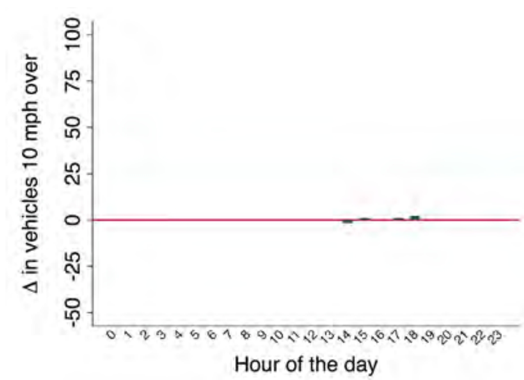




Location 7: Lester, west of Lincoln

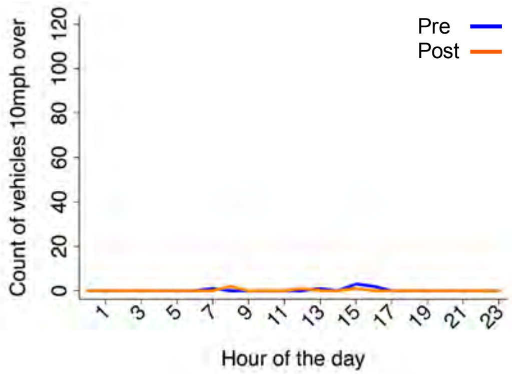


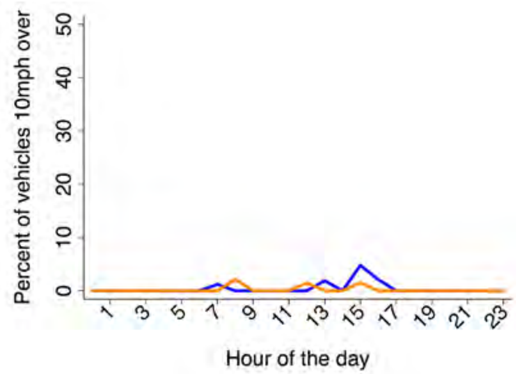


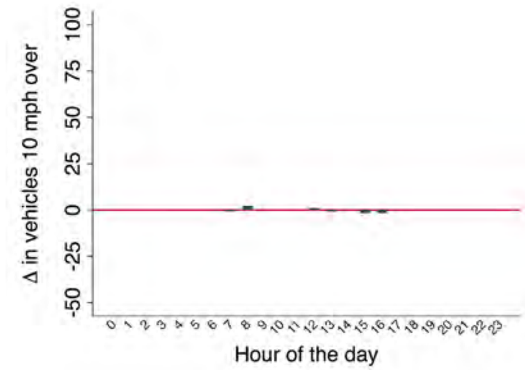


Total number of vehicles traveling 10mph+ over posted speed limit, before-and-after the road diet, by hour	Percent of vehicles traveling 10mph+ over posted speed limit, before-and-after the road diet, by hour	Change in number of vehicles travelling 10mph+ over posted speed limit, by hour

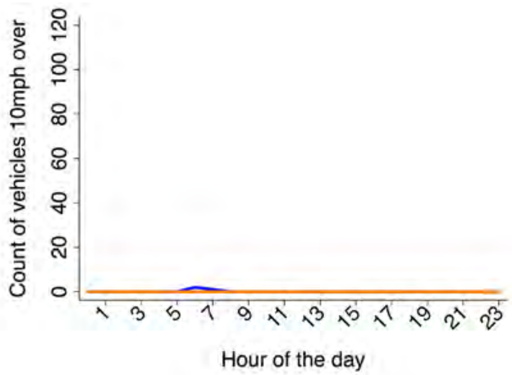
Location 8: Garfield, west of Lincoln

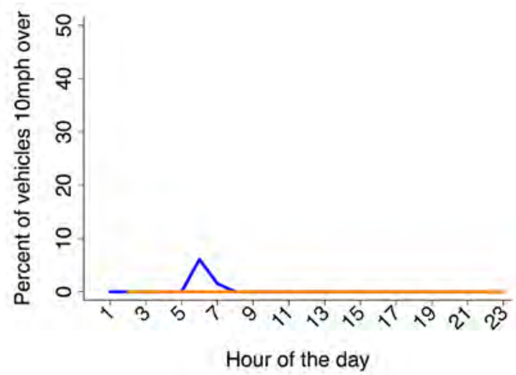


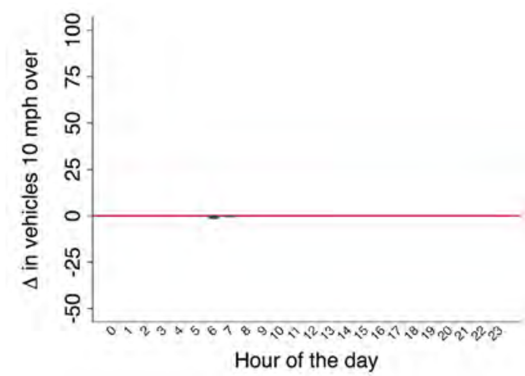




Location 9: El Abra, West of Lincoln

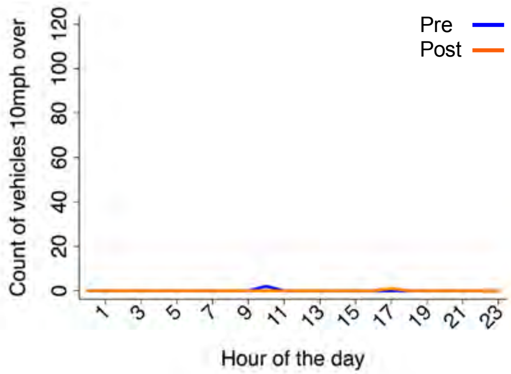


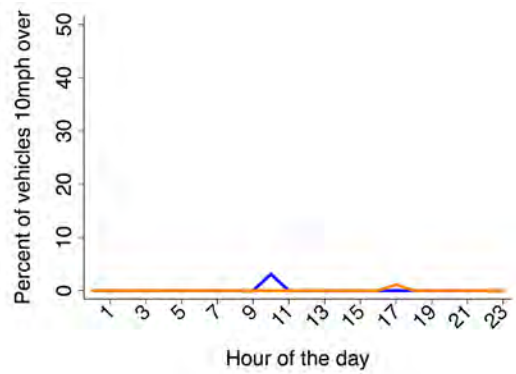


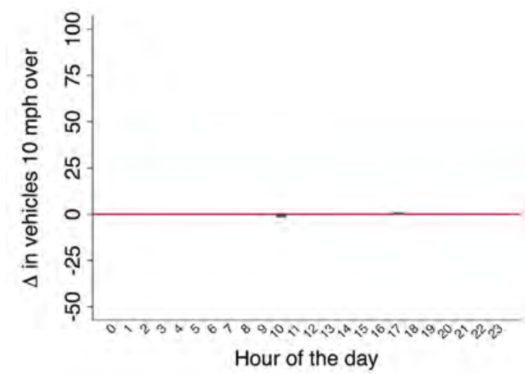


Total number of vehicles traveling 10mph+ over posted speed limit, before-and-after the road diet, by hour	Percent of vehicles traveling 10mph+ over posted speed limit, before-and-after the road diet, by hour	Change in number of vehicles travelling 10mph+ over posted speed limit, by hour

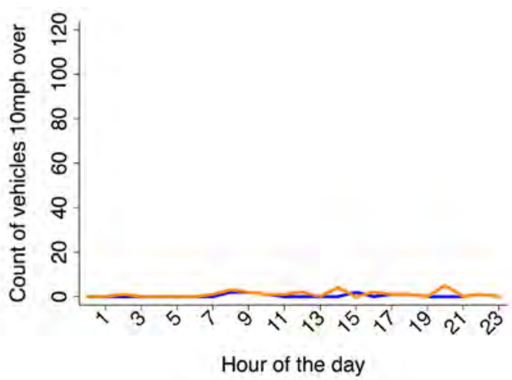
Location 15: Curtiss, south of Willow

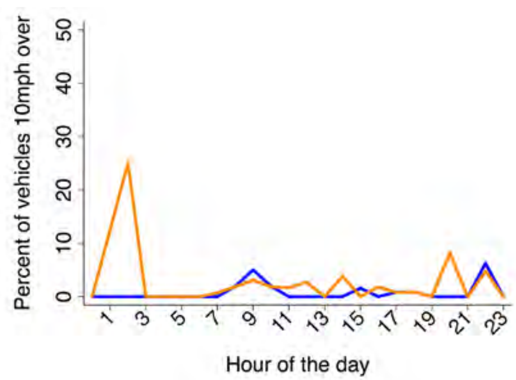


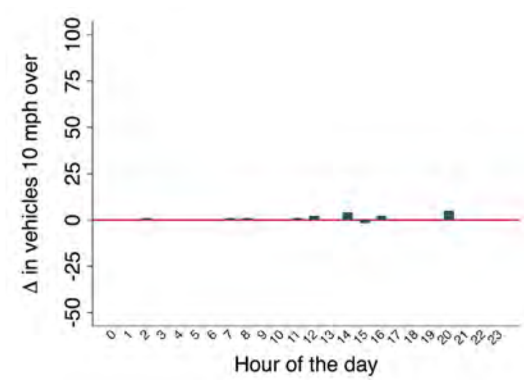




Location 16: Kotenburg, south of Willow

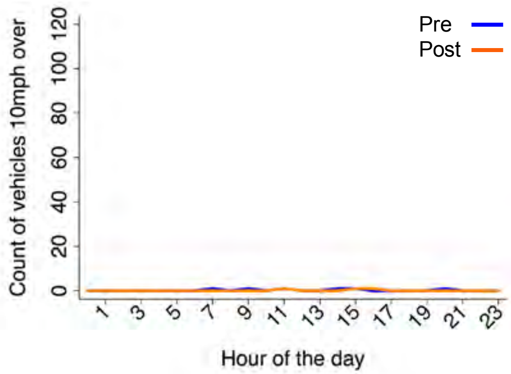


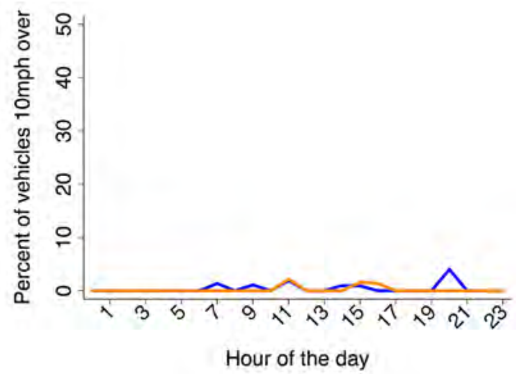


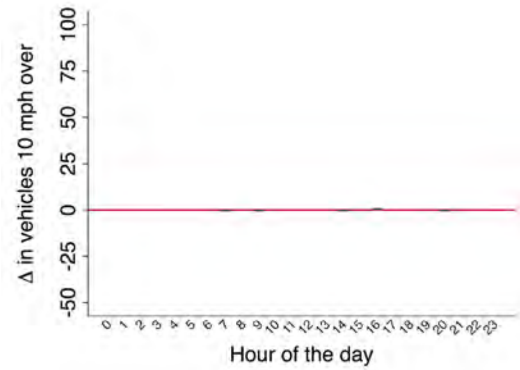


Total number of vehicles traveling 10mph+ over posted speed limit, before-and-after the road diet, by hour	Percent of vehicles traveling 10mph+ over posted speed limit, before-and-after the road diet, by hour	Change in number of vehicles travelling 10mph+ over posted speed limit, by hour

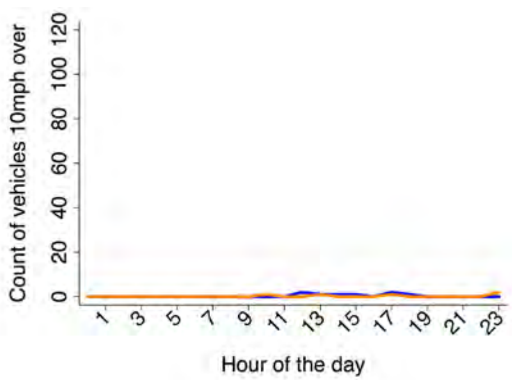
Location 17: Settle, south of Willow

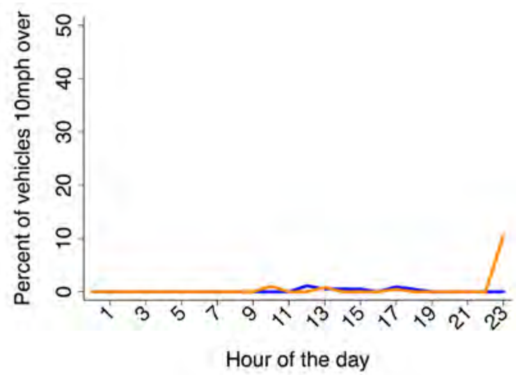


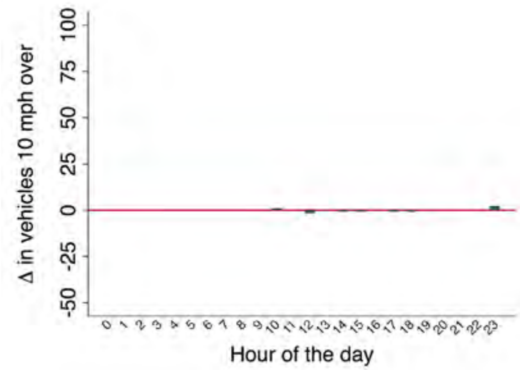




Location 18: Blewett, south of Willow

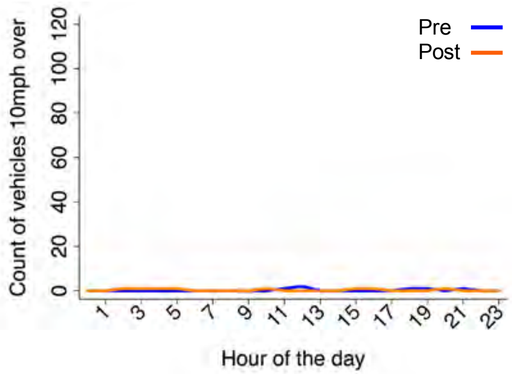


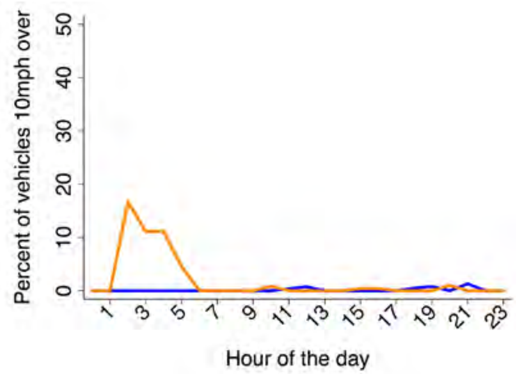


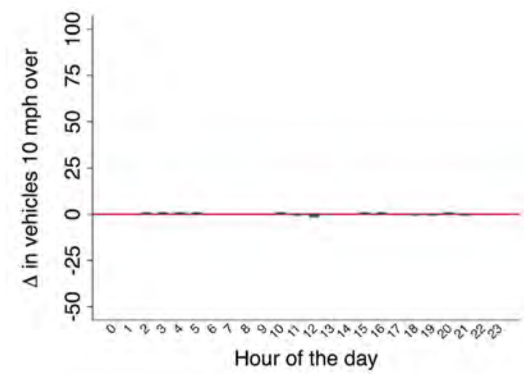


Total number of vehicles traveling 10mph+ over posted speed limit, before-and-after the road diet, by hour	Percent of vehicles traveling 10mph+ over posted speed limit, before-and-after the road diet, by hour	Change in number of vehicles travelling 10mph+ over posted speed limit, by hour

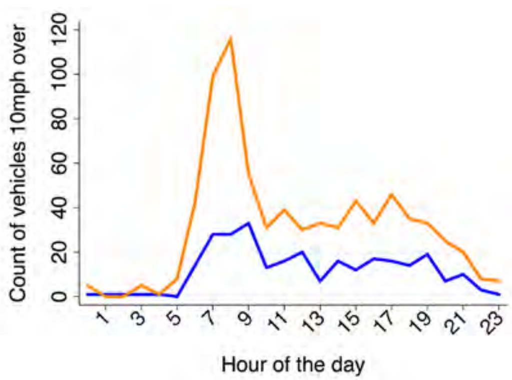
Location 20: Brace, east of Coolidge

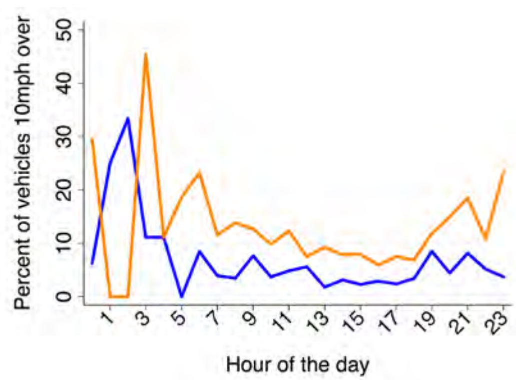


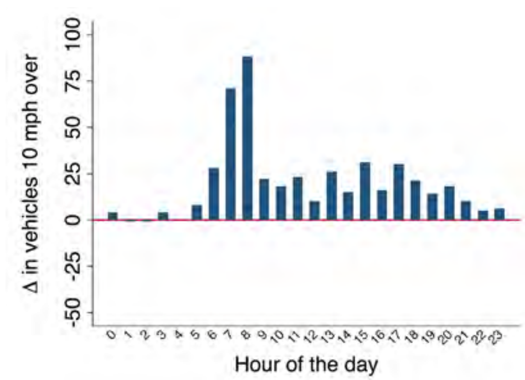




Location 21: Camino Ramon, south of Willow

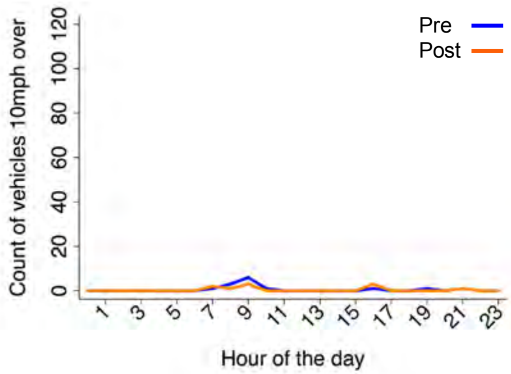


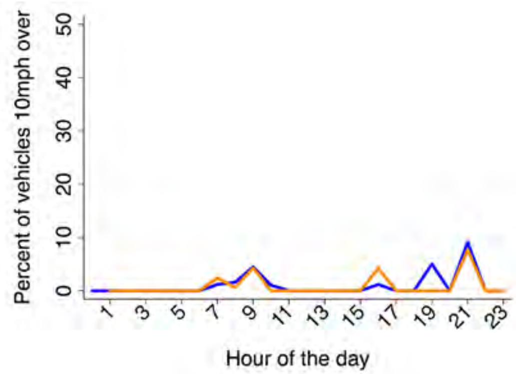


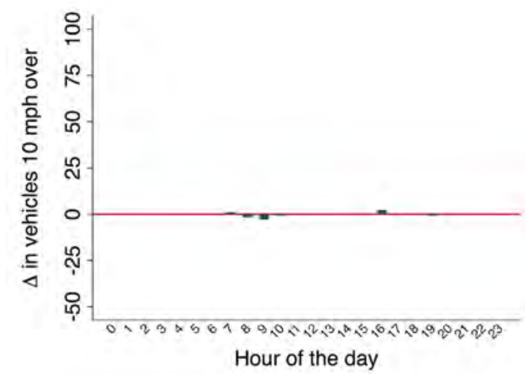


Total number of vehicles traveling 10mph+ over posted speed limit, before-and-after the road diet, by hour	Percent of vehicles traveling 10mph+ over posted speed limit, before-and-after the road diet, by hour	Change in number of vehicles travelling 10mph+ over posted speed limit, by hour

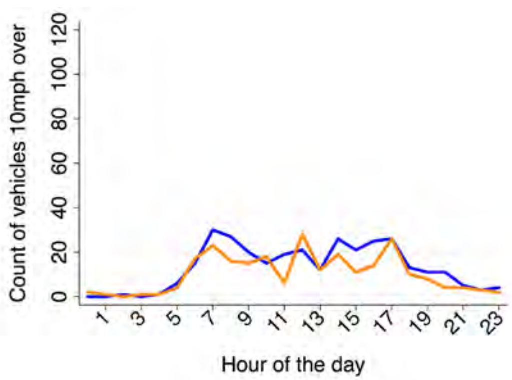
Location 24: Iris, south of Minnesota

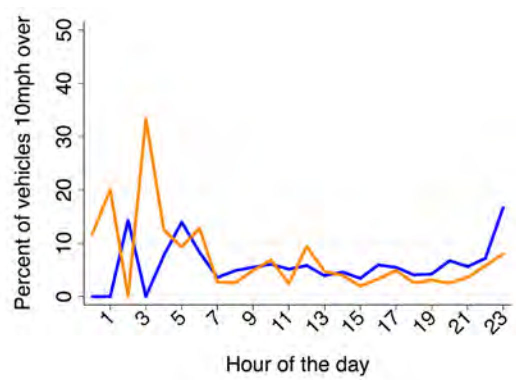


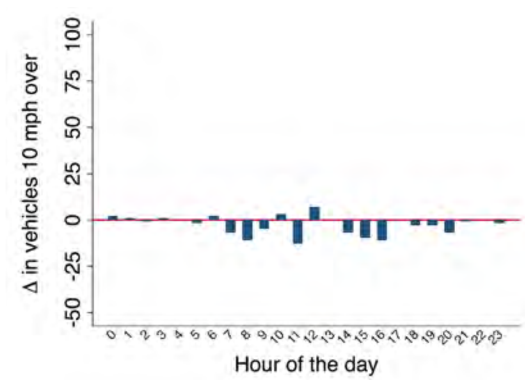




Location 26: Newport, south of Minnesota

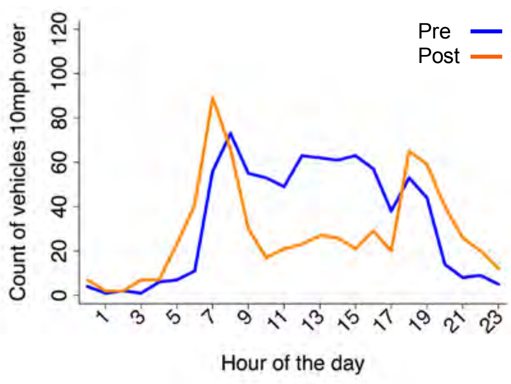


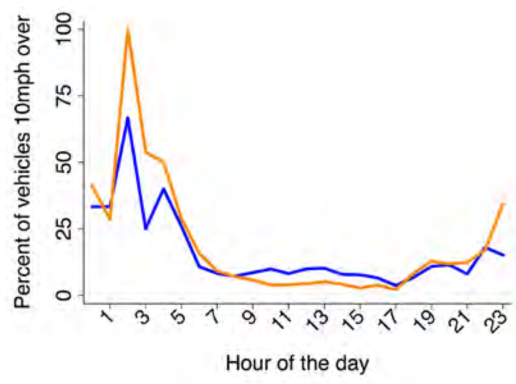


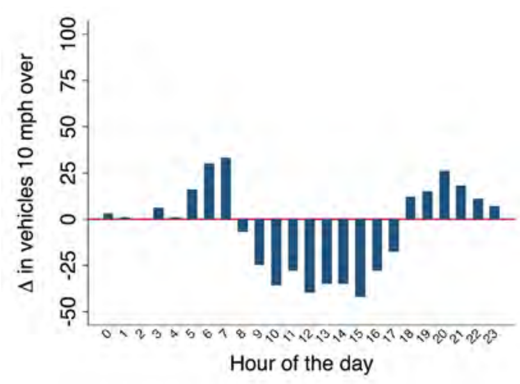


Total number of vehicles traveling 10mph+ over posted speed limit, before-and-after the road diet, by hour	Percent of vehicles traveling 10mph+ over posted speed limit, before-and-after the road diet, by hour	Change in number of vehicles travelling 10mph+ over posted speed limit, by hour

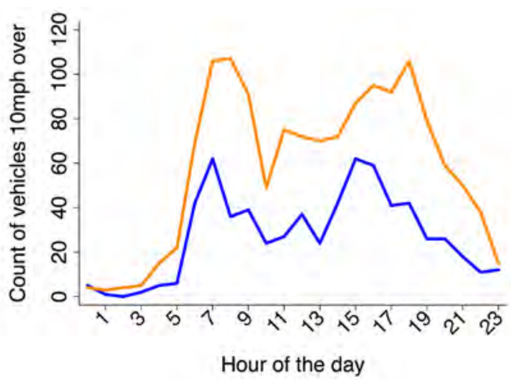
Location 27: Hicks, south of Cherry Valley

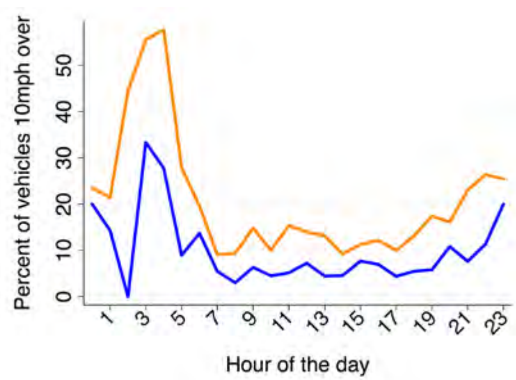


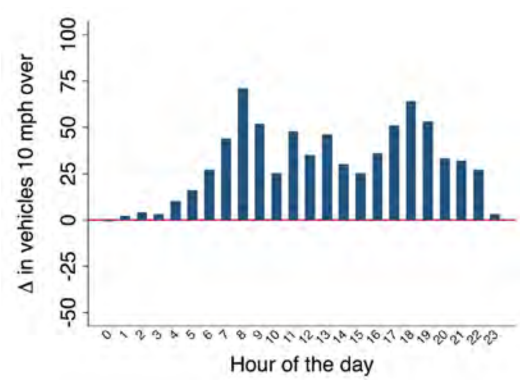




Location 28: Hicks, south of Callecita

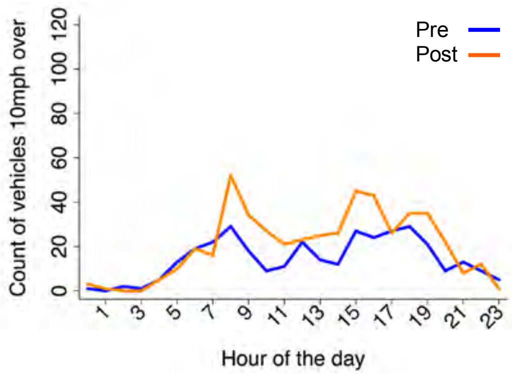


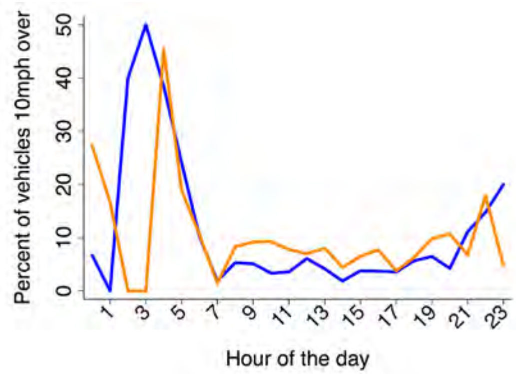


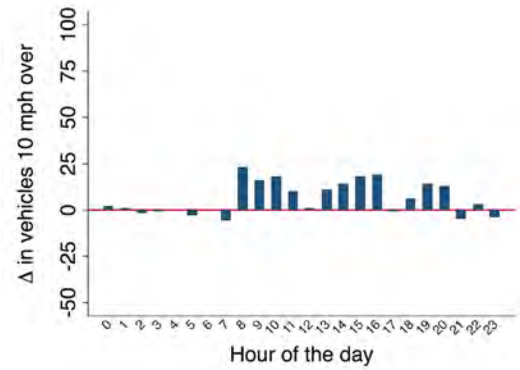


Total number of vehicles traveling 10mph+ over posted speed limit, before-and-after the road diet, by hour	Percent of vehicles traveling 10mph+ over posted speed limit, before-and-after the road diet, by hour	Change in number of vehicles travelling 10mph+ over posted speed limit, by hour

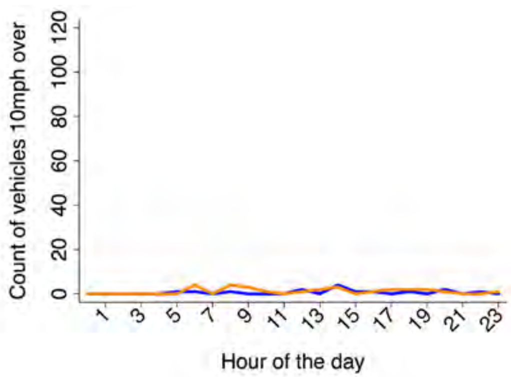
Location 29: Cottle, south of Pine

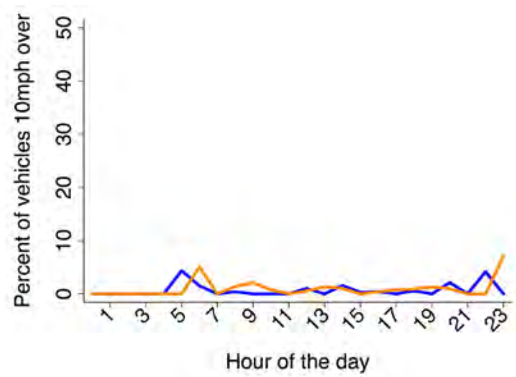


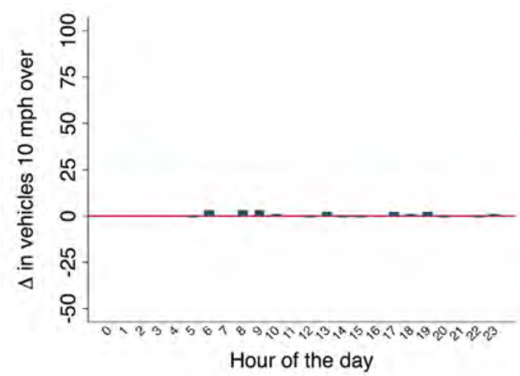




Location 30: Newport, south of Fairview

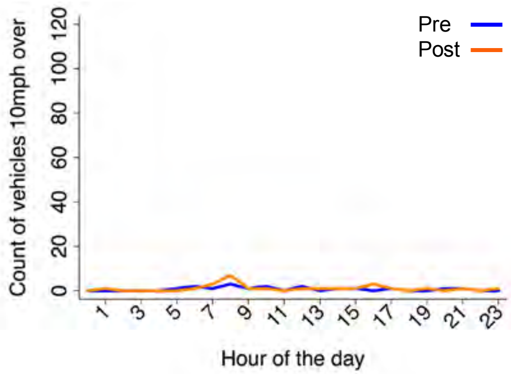


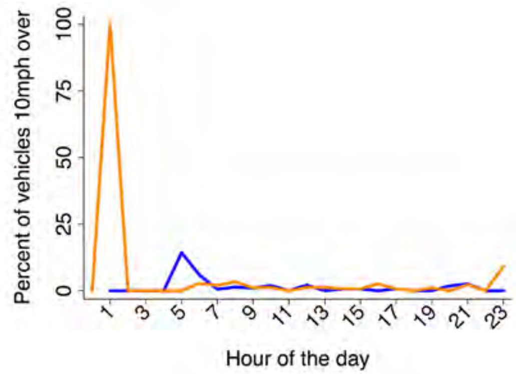


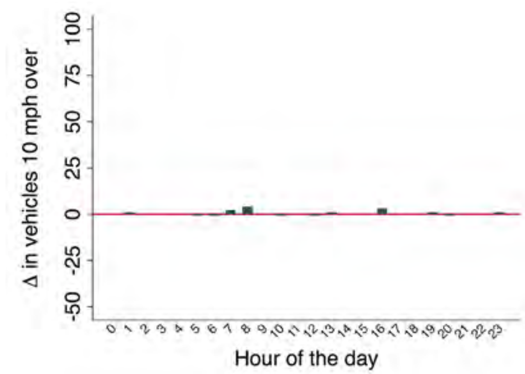


Total number of vehicles traveling 10mph+ over posted speed limit, before-and-after the road diet, by hour	Percent of vehicles traveling 10mph+ over posted speed limit, before-and-after the road diet, by hour	Change in number of vehicles travelling 10mph+ over posted speed limit, by hour

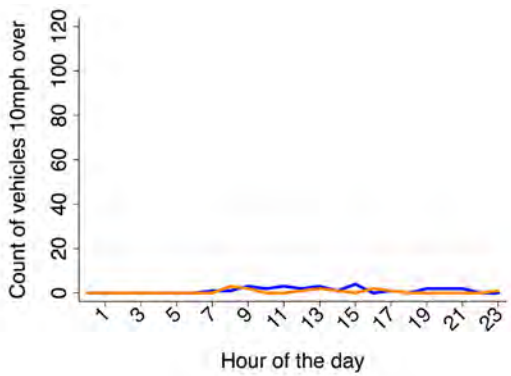
Location 33: Willow Glen, west of Hill

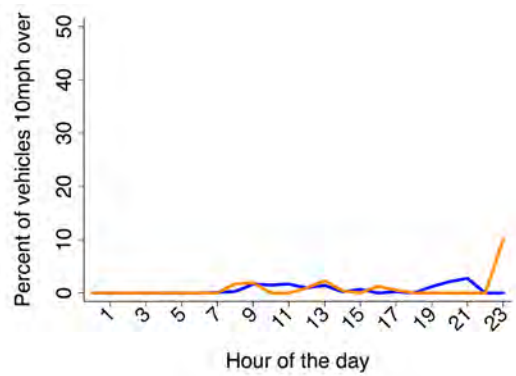


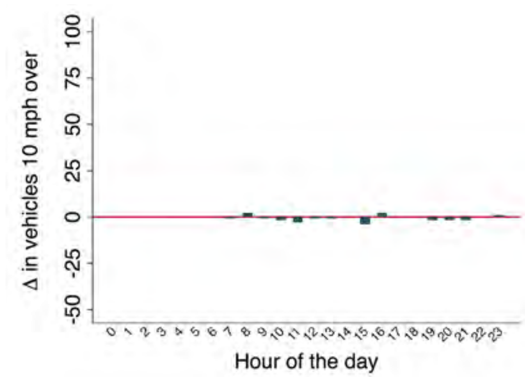




Location 38: Malone, west of Lincoln

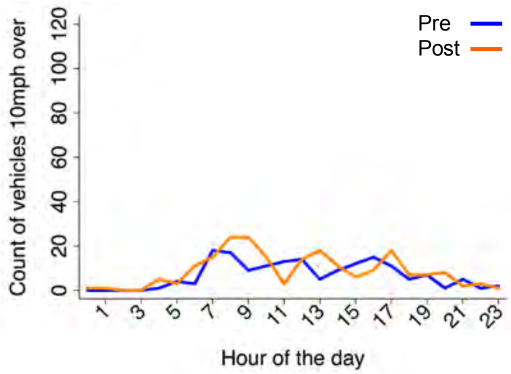


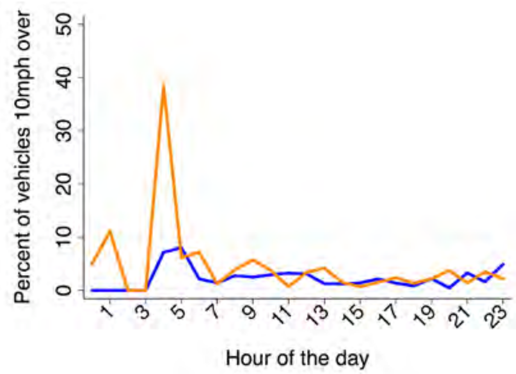


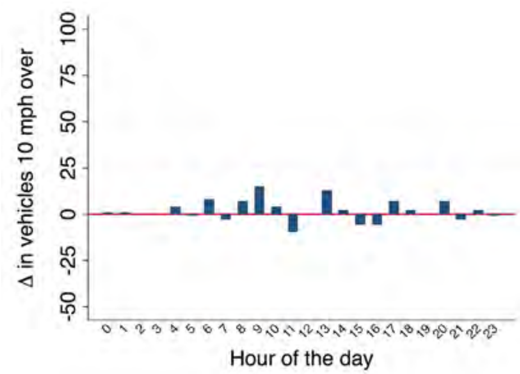


Total number of vehicles traveling 10mph+ over posted speed limit, before-and-after the road diet, by hour	Percent of vehicles traveling 10mph+ over posted speed limit, before-and-after the road diet, by hour	Change in number of vehicles travelling 10mph+ over posted speed limit, by hour

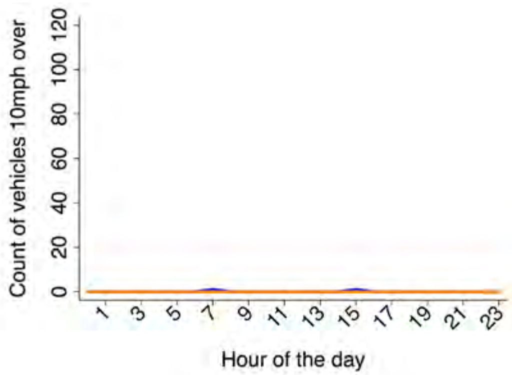
Location 39: Malone, east of Harmil

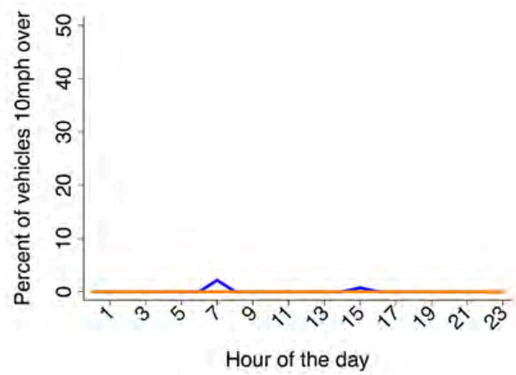


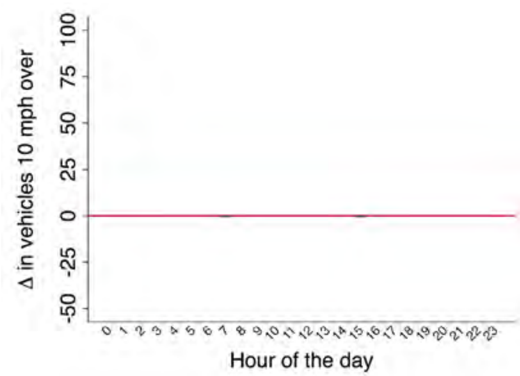


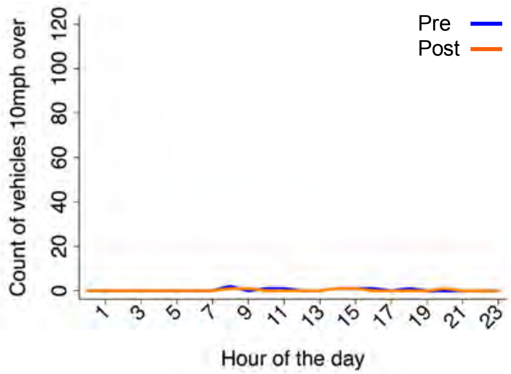
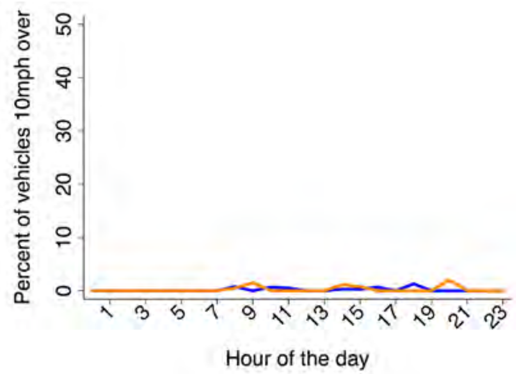
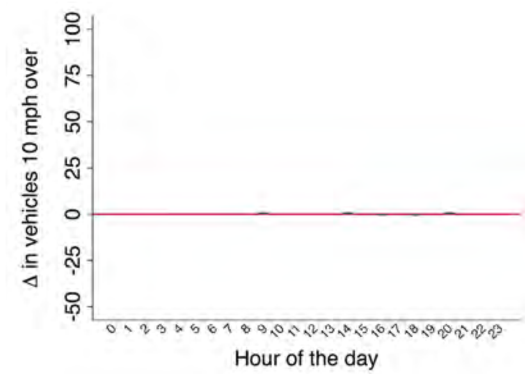


Location 43: Michigan, east of Lincoln







Total number of vehicles traveling 10mph+ over posted speed limit, before-and-after the road diet, by hour	Percent of vehicles traveling 10mph+ over posted speed limit, before-and-after the road diet, by hour	Change in number of vehicles travelling 10mph+ over posted speed limit, by hour
Location 44: California, east of Lincoln		
		

ACRONYMS AND ABBREVIATIONS

ADT	Average Daily Traffic
MPH	Miles Per Hour
MTI	Mineta Transportation Institute
WGBA	Willow Glen Business Association
WGNA	Willow Glen Neighborhood Association

ENDNOTES

1. For example, Arlington County; City of San Francisco; City of Seattle; City of Orlando; Nikiforos Stamatiadis, et al, *Guidelines for Road Diet Conversions* (Lexington, KY: Kentucky Transportation Center, November 2011); Eric Matthew Gudz, Kevin Fang, and Susan Handy, “When a Diet Prompts a Gain: Impact of a Road Diet on Bicycling in Davis, California,” *Transportation Research Record* 2587 (2016): 61-67; Thomas B. Stoute, “Before and After Study of Some Impacts of 4-Lane to 3-Lane Roadway Conversions” (July 2005) accessed April 21, 2017, http://www.iowadot.gov/crashanalysis/pdfs/iowa4to3laneconversion_classicalbeforeafter_march2005.pdf; Michael D. Pawlovich et al., “Iowa’s Experience with Road Diet Measures: Use of Bayesian Approach to Assess Impacts on Crash Frequencies and Crash Rates,” *Transportation Research Record* 1953 (2006): 163-171; Ezra Hauer, et al., *Accident Modification Factors for Traffic Engineering and ITS Improvements*, NCHRP Report 617 (Washington, D.C.: Transportation Research Board, 2008).

2. Herman F. Huang, et al, “How Much Do You Lose When Your Road Goes on a Diet?” Paper presented at the 2nd Annual Urban Street Symposium, Anaheim, CA, 2003; Richard W. Lyles, et al., *Safety and Operational Analysis of 4-Lane to 3-Lane Conversions (Road Diets) in Michigan: Final Report* (East Lansing, MI: Michigan State University, January 2012).

3. Santa Clara County Public Health Department, 2016, “Willow Glen profile 2016,” Accessed April 14, 2017 from: https://www.sccgov.org/sites/sccphd/en-us/Partners/Data/Documents/City%20Profiles/San%20Jose%20Neighborhoods/WillowGlen_neighprofilesPDF1011095.pdf

4. Karen Stevens, “Remove the Road Diet from Lincoln Avenue,” (Change.org, no date), accessed May 7, 2017, https://www.change.org/p/sam-liccardo-san-jose-city-hall-remove-the-road-diet-from-lincoln-avenue

5. Mike Jennett, “Make the Lincoln Avenue Road Diet Permanent in Willow Glen,” (Change.org, no date), accessed May 7, 2017, https://www.change.org/p/sam-liccardo-san-jose-dot-san-jose-city-hall-pierluigi-oliverio-wgba-wgna-make-the-lincoln-avenue-road-diet-permanent-in-willow-glen

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12. Due to technical errors, five locations (2, 9, 23, 25, & 33) were re-analyzed on February 11 and 12, 2015; those data were used for this analysis.

13. Due to technical errors, two locations (23 & 24) were re-analyzed on February 24-25, 2016. In addition, data was also collected for a third day (Tuesday, February 9, or Tuesday, February 23 in the case of locations 23 & 24). For consistency, we use only two days of data collection during the post-road diet period, with the exception of analysis of the 85th percentile speed. For the 85th percentile speeds we used the full set of three days of information because the data provided by the City did not allow for accurate calculation of a two-day 85th percentile speed. We had access only to each day's 85th percentile speed and the average 85th percentile speed for the 3-day post-road diet period. To calculate an accurate 85th percentile speed for the 2-day period would require exact vehicle speeds, not the speed bins provided.

14. Weather Underground (https://www.wunderground.com/) provides historical weather data. For San Jose, CA, during the data collection dates before the road diet, temperatures ranged from a low of 44°F to a high of 73°F, with no precipitation. During the data collection period after the road diet, temperatures ranged from a low of 42°F to a high of 73°F, with no precipitation.

15. The 85th percentile speed is the speed at or below which 85% of all vehicles are travelling.

16. Power refers the probability that a hypothesis test correctly rejects the null hypothesis when it is false. When one minimizes the probability of making a Type II error, one maximizes power.

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